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STRIKEBREAKING AND THE LABOR MARKET IN THE UNITED STATES, 1881-1894

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ABSTRACT

Improvements in transportation and communication combined with technological changes in key manufacturing industries substantially increased competitive pressures in American labor markets during the last half of the nineteenth century. One manifestation of these changes was the widespread use of strikebreakers. In this paper I examine the extent and pattern of strikebreaking in the United States using data from a sample of over 2,000 individual strikes between 1881 and 1894 drawn from reports compiled by the U.S. Commissioner of Labor. Consistent with other evidence of increasing geographic integration at this time, I find that the use of strikebreakers did not vary substantially across regions or by city size. On the other hand, I find that employers in smaller cities and in regions other than the northeast were more likely to have to turn to replacements recruited at a distance, underscoring the important role that employer recruitment played in establishing an integrated labor market. Pronounced variations in the likelihood of strikebreaking across industries suggests, however, that the impact of increasing integration differed for different groups of workers and employers. Finally, the strike data confirm the importance of labor market integration on the outcomes of labor conflict in this period. After controlling for other strike characteristics the use of strikebreakers had a large and negative impact on workers' ability to win strikes.

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1. Introduction

The forces determining wages and working conditions in American labor markets were radically altered in the decades after the Civil War. Improvements in transportation and communication in the decades after the Civil War increased the ability of workers to migrate in response to differential opportunities, and encouraged employers in labor-scarce areas to recruit workers from relatively more labor-abundant regions As local labor markets became increasingly integrated into broader regional and national markets during the late nineteenth century, competitive pressures on wages grew, and the scope for local variations in the terms of employment declined (Commons et al,1918, pp. 43-44; Lebergott 1964, pp. 132-36; Rosenbloom 1996a). In many industries these pressures were further compounded by technological changes that encouraged an increasingly fine division of labor and enabled employers to replace skilled workers with semiskilled operatives or unskilled laborers (Gordon, Edwards and Reich 1982, pp. 112-16).

The impact of these developments on American workers was profound. Broader labor markets and technological changes expanded employment opportunities for some workers. But for others they undermined efforts to increase wages and improve working conditions. The increasing elasticity of labor supply made it difficult for local unions to advance wages (Ulman 1955, ch. 3). Having won higher wages and more control over piece rates in 1881, for example, carpenters in St. Louis "discovered that our advances in wages would soon be lost through the influx of men from cities where wages were lower. Day after day men came from other states where wages were $1.75 to $2" (quoted in Tygiel 1981, p. 366). A skilled butcher in Chicago put the matter more bluntly, observing simply

that the threat of being replaced by less skilled workers was "the club held above our heads at all times" (quoted in Tuttle 1969, pp. 412). Workers appear in some cases to have been willing to drop everything and travel long distances on the basis of even the vaguest of promises, as illustrated by the testimony of one worker recruited by Chicago meatpackers. He reported that he had come from Baltimore after "he met a man near the market of Nelson Morris..., and he asked me if I wanted to go along with some other men to Chicago to work as butchers for $2.25 a day" (quoted in Tuttle 1966, p. 195-96).[1] The effects extended beyond the purely economic, however. When new arrivals displaced long-time employees, as happened in coal mines in Ohio's Hocking Valley in the 1870s, for example, the displaced workers experienced "about the same emotions that an ordinary person would if robbed of his home" (quoted in Gutman 1962, p. 247).

One of the most visible and contentious manifestations of the increasing competitive pressures in American labor markets in the late nineteenth century was the widespread use of strikebreakers. Employers' ability to replace striking workers was one of the most potent weapons available to them in their effort to defeat labor's demands for improvements in employment conditions. Although numerous instances of strikebreaking have been documented by contemporary and historical accounts, there has been little systematic analysis of the use of replacement workers. Mullin (1993) examines the impact of strikebreaking on union membership. Based on data for 395 strikes in Illinois between 1881 and 1886 she finds that the probability that replacement workers would be used increased with city size and

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[1] It is worth noting that this individual also asked if there was a strike, but when he was told that there was not he met the boss who was recruiting workers and set off for Chicago.

with the duration of the strike, but decreased with the number of strikers. She also notes some differences across industries and occupations, finding that unskilled workers were more likely to be replaced, while strikers in the building trades, printing, and cooperage faced a lower risk of replacement.

It has sometimes been argued that strikebreakers were disproportionately drawn from newer immigrants, but Ehrlich (1974) argues that recent immigrants were no more likely to serve as strikebreakers than were the native born or members of older immigrant groups. Based articles and letters published in the National Labor Tribune, a major labor weekly in the late nineteenth century, he attributes the frequency of strikebreaking in the late nineteenth century not to the volume of immigration but the general conditions of labor supply in this period. Many contemporary reports also emphasized the use of African-Americans as strikebreakers. Whatley (1993) has analyzed accounts of 141 incidents of African-American strikebreaking between the Civil War and the early 1930s seeking to identify whether there was a distinctive racial component to these incidents. For the most part, he concludes that employers viewed African-Americans primarily as substitutes for immigrants, using them more frequently when immigration rates were low. On the supply side, however, he argues that strikebreaking provided an important source of opportunities for African-Americans, encouraging migration from the low-wage South to the high-wage North, and opening doors to industries and occupations from which they had previously been barred by racial discrimination.

In this paper I examine the extent and pattern of strikebreaking in the United States using data from a sample of over 2,000 individual strikes between 1881 and 1894 drawn

from reports compiled by the U.S. Commissioner of Labor (1888, 1896).[2] Responding to the rising wave of industrial conflict in 1886 the Bureau of Labor attempted to enumerate every strike and lockout in the United States between 1881 and 1886. Information was first compiled from newspapers and other publications, and then field agents were dispatched to investigate each conflict. When possible they attempted to interview representatives of both sides involved in the conflict. A subsequent report compiled similar listing of strikes extending from 1886 through 1894. For each strike in its tabulation the Bureau reported, among other facts, the industry and occupation of the workers, whether it was authorized by a union, the number of strikers, employment, wages and hours, both before and after the dispute, the duration of the conflict, and its outcome, including the number (if any) of replacement workers hired, and the number of such workers brought from other locations.[3] Although the Bureau of Labor continued to collect data on strikes after 1894, subsequent publications provided only aggregate figures by state, industry, and year, rather than strike-level figures.

These data provide a previously unexploited window through which to observe the impact of increasing geographic integration on the operation American labor markets. The

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[2] The strike data constitute a 1 in 5 random sample of strikes between 1881 and 1886, and a 1 in 10 random sample of strikes between 1887 and 1894. These data were originally collected by Gerald Friedman who has generously made them available to me.

[3] The data collection effort is described in U.S. Commissioner of Labor (1888, 1896, 1901). Most analysts have viewed the resulting compilation as quite reliable (Friedman 1988; Card and Olson 1995; Currie and Ferrie 1995). Further discussion of the quality of the data is contained in Edwards (1981). Based on local news reports for Terre Haute, Indiana, Bailey (1991) concluded that the only about half of all strikes for which records exist were included in the data, but that the omitted strikes did not vary from the included ones in terms of industrial distribution, size, or duration.

first point to emerge from these data is the extensiveness of strikebreaking in this period. Replacement workers were hired in over 40 percent of strikes, and across all strikes about 12 percent of striking workers were replaced. In comparison, Cramton and Tracy (1995) report that between 1985 and 1989 replacement workers were employed in only 11 percent of major strikes and 17 percent of smaller strikes. Of greater interest than the frequency of strikebreaking in the late nineteenth century, however, is the existence of systematic patterns of variation in the use of strikebreakers, and in the consequences of strikebreaking for workers's ability to achieve the goals of the strike.

Consistent with other evidence of increasing geographic integration at this time (Rosenbloom 1996a, 1996b), I find that the use of strikebreakers did not vary significantly with city size or region. On the other hand, employers in smaller cities and in regions other than the Northeast were much more likely to have brought strikebreakers from other locations, a finding that underscores the important role of employer recruitment in promoting the expansion of labor market boundaries (see Rosenbloom 1994). Pronounced variations in strikebreaking across industries suggests that the impact of changing labor market conditions varied substantially across trades, however, reflecting differences in the nature of technological innovations and union strength.

The strike data also confirm the magnitude of the impact of increasing labor market competition on the outcomes of labor conflict in this era. Even after controlling for a variety of other factors thought to influence the chances of strike success, I find that the use of strikebreakers exerted a powerful negative impact on workers' ability to win strikes, indicating that increasing labor market integration and the consequent increase in the

elasticity of labor supply in the late nineteenth century was an important factor undermining the bargaining power of labor.

2. Historical Background

Over the course of the nineteenth century, the nature of strikes evolved gradually, with key turning points in the mid-1840s and early 1870s.[4] Until the mid-1840s strike activity in the United States was confined mainly to the protests of journeymen in a small number of seaport cities. Over the next two decades strikes spread out both geographically and occupationally, reflecting the accelerating pace of industrialization. Although trade unions made some progress in this period, work rules, hours, or other conditions were rarely explicit issues in the strikes of this period. Rather, most strikes appear to have been essentially defensive responses to employer initiated wage cuts or the impact of rising prices on real wage levels.

Beginning in the 1870s the nature of strike activity began to change. Between 1881 and 1900 the number of union initiated strikes increased from about 50 percent to about 70 percent, while the issues involved shifted away from wages and toward the enforcement of union established work rules. Despite the increasing prominence of unions in late nineteenth century labor conflicts, their existence was still tenuous, and the central issue in many strikes was whether employers would recognize their employees' right to bargain collectively (Card and Olson 1995, p. 33). The outcome of such contests was often difficult to predict as

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[4] The material in the next two paragraph draws primarily on Montgomery (1980, pp. 86-93).

employers and workers struggled to assess the effects of a rapidly changing economic environment on their respective bargaining power.

The rise of large-scale, capital-intensive firms, serving national markets radically altered manufacturers cost functions and transformed the competitive environment in which they sold their products (Chandler 1977; Lamoreaux 1985). At the same time, massive immigration, geographic integration of labor markets, and new manufacturing technologies were altering labor supply and demand conditions (Gordon, Edwards, and Reich 1982; Rosenbloom 1996a). The uncertainty that these developments engendered was undoubtedly a factor in the rising level of labor conflict during the last third of the nineteenth century.[5] As one of the most visible consequences of the changing economic environment during the late nineteenth century strikes command our attention, and the systematic patterns that are revealed by the outcomes of these conflicts offer a variety of important insights into the development of American labor markets at this time.

3. The Incidence of Strikebreaking

One of the important characteristics of late nineteenth century strikes was the widespread use of replacement workers. Aggregate strike statistics reported in Table 1 show that between 1881 and 1900 over half a million replacement workers were hired in 23 thousand strikes involving 4.7 million strikers. Close to 40 percent of these replacement

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[5] Strikes are pareto inefficient since whatever the final outcome, both sides could have been better off if they had reached this solution without the foregone production and earnings caused by the strike. Consequently most efforts to model strike activity postulate some form of incomplete and/or asymmetric information to rationalize why strikes occur at all. (Kennan 1986 provides a good overview of the literature).

workers were recruited from communities other than the one in which the strike occurred. Individual strike-level data which are available only for the period 1881-1894 show that replacement workers were employed in just over 40 percent of all strikes. In these cases, employers on average replaced approximately half of those workers on strike.[6] There was, however, considerable variation in the use of replacement workers.

Employers' decisions to use replacement workers presumably reflect their calculation of the balance between the costs and expected benefits of recruiting strikebreakers. Formally, suppose that employers choose the fraction of strikers to be replaced, S, to maximize their net expected benefits. Let P(S, X) denote the probability that the employer wins the strike, B(Y) denote the benefits to the employer of winning the strike (i.e. reductions in labor costs), and C(S, Z) denote the cost of recruiting replacement workers, where X, Y, and Z are vectors of relevant characteristics. Then expected net benefits can be written as:

$$(1) \qquad N = P(S, X)*B(Y) - C(S, Z)$$

Maximizing this expression with respect to S, subject to the constraint that S be nonnegative, implies the following reduced form relating the optimal fraction of strikers to replace to other strike characteristics:

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[6] In some cases the number of new workers hired during a strike exceeded the number of workers on strike. Setting the ratio of replacements to strikers equal to one in these cases, the fraction of strikers replaced averaged across all strikes in which replacements were used was 0.54. The fraction of strikers replaced was on average higher in small strikes than large ones, so weighting large and small strikes equally overstates the relative number of replacement workers. Summing the number of replacement workers and strikers involved in strikes where replacements were hired (in effect weighting each observation by the number of replacements), the ratio of replacements to strikers is 0.22.

(2) $S = G(X, Y, Z)$ when $G(X, Y, Z) > 0$, and

$S = 0$ otherwise.

Using data on strikebreaking and other strike characteristics drawn from the Commissioner of Labor's reports it is possible to estimate this relationship.

A variety of factors seem likely to have influenced the relative supply and hence cost of recruiting replacement workers. The pool of potential replacment workers was larger in industries and occuptions that did not require specialized skills. Since strikebreakers risked ostracism as "scabs" as well as the possibility of physical violence, the supply of willing replacement workers would likely have been greater in large cities, where they might better preserve their anonymity. The concentration of newly arrived immigrants in larger cities, and in the Northeast might also be expected to increase the supply of potential strikebreakers. The issue of controlling migratory labor was central to the emergence in this period of national trade unions (Ulman 1955, chs. 2-3; Commons et al 1918, pp. 307-12). To the extent that unions were effective in achieving this goal, we would expect that the supply of replacements would be smaller in union authorized strikes, especially after the mid-1880s as national unions affiliated with the American Federation of Labor became more adept at using strike funds to discipline local unions and to maintain solidarity among striking workers.[7] The supply of potential strikers may also have been reduced when more workers were on strike in a particular industry and location.

Turning to the benefits of recruiting replacement workers, employers in this period

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[7] Consistent with this view, Friedman (1988, pp. 13-17) shows that the impact of union authorization on strike success increased significantly after 1886.

often appeared to be strongly opposed to granting recognition to union demands. This suggests that the benefits of winning a strike may have been greater when the strike was offensive in nature (over issues like wage increases, hours reductions, or work rules) then when they were defensive responses to employer initiated wage cuts. Since the costs of foregone production and wage concessions were both increasing functions of establishment size, we would expect the benefits of using replacement workers to be an increasing function of establishment size. On the other hand, the more workers on strike, the less likely the chances of the employer winning the strike for any number of replacement workers hired. Finally, since the ability of workers to sustain a lengthy work stoppage provided an indication of their resistance to concessions, employers benefits from breaking a strike were likely to be increasing with strike duration.[8]

Because of the large number of employers for whom the nonnegativity constraint on S is binding, ordinary least squares will not be an appropriate method to estimate the relationship in equation (2). To allow for the possibility that the function G is discontinuous at zero, I have adopted a two-stage estimation procedure.[9] In the first stage I estimated a probit equation in which the dependent variable takes the value one if any strikebreakers were used, and zero otherwise. In the second stage I estimate by ordinary least squares the

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[8] Card and Olson (1995) find a proportional relationship between factors affect strike duration and the size of wage increases when strikes were successful. Lengthy strikes may thus signal the existence of large quasi-rents, and thus may also be a proxy for the benefits that employers can expect to get from replacing striking workers.

[9] An alternative approach would be to use the Tobit model, but this imposes the unnecessary restriction that the function G is continuous at zero (see Maddala 1983, ch. 6). In the two-stage procedure used here, the continuity of G(.) is a testable hypothesis.

determinants of the fraction of strikers replaced over the set of observations with non-zero numbers of replacement workers. To control for possible sample selection bias in this equation I include the inverse mills ratio calculated from the first stage probit estimates. The explanatory variables in each case are the same.

To capture locational differences in the supply of strikebreakers, I include zero-one indicator variables for three regions and four city size classes. The excluded category is cities with population less than 25,000 in the Northeast. To control for the effects of skills and industry on supply and demand I include an indicator variable for highly skilled workers and a set of indicators for 14 of the most common industries in the data. Indicators variables for each year are included to control for macroeconomic fluctuations. To control for the impact of differences in strike causes I include indicator variables for defensive strikes and for strikes initiated by labor demands for higher wages, or shorter hours. The excluded category is strikes over work rules. I also control for whether the strike was authorized by a union, and include a second variable to measure whether there is a shift in this variable after 1886. Finally I control for establishment size, the number of strikers and the length of the strike, and the strike rate in the state and industry.

Table 2 reports the results of estimating both equations. Because the coefficient estimates of the probit equation are not directly interpretable I have transformed them into slope coefficients. For discrete variables the number reported indicates the change in the probability of using replacement workers that would result from changing this variable's value from zero to one when all the other independent variables are set at their sample means. For the continuous variables, the number reported is the partial derivative of the

probability of using replacement workers with respect to that variable, where the derivative is evaluated at the sample means of the independent variables.

Looking first at the probit estimates, the use of strikebreakers appears to have been quite uniform across different regions, and city size classes indicating that location had no significant effect on employers' access to strikebreakers. On the other hand, there were pronounced differences across industries. The use of strikebreakers was much more likely in transportation, printing, and food preparation than elsewhere, and much less likely in the building trades, mining, metalworking, and glassmaking. In each case the effects are both economically and statistically quite significant. There does not appear to be any significant effect of skill levels on the probability of strikebreaking, but this may simply reflect the fact that most of the effects of skill differences are being captured by the industry variables. The coefficients on union authorized strikes indicate that unions were able to reduce the likelihood of strikebreaking, and that the magnitude of this effect increased after 1886.

Consistent with expectations, large employers were more likely to hire replacements than were small employers, but the probability of replacements declined the greater the number of strikers. The coefficients on these variables are quite similar in magnitudes, though opposite in sign, suggesting that the probability of hiring replacements was a negative function of the fraction of workers on strike. Employers were also more likely to hire replacements as strikes dragged on, as indicated by the positive coefficient on strike length, and less likely to seek replacements in defensive strikes than in those initiated to gain wage increases, hours reductions or changes in work rules.

Few of the coefficients on the year effects are statistically significant. But their

temporal pattern of variation suggest that the relationship between strikebreaking and macroeconomic fluctuations may have been changing over this period. In the 1880s the likelihood of strikebreaking appears to have moved procyclically, suggesting that demand side forces dominated year to year variations. However, the depression that began in 1893 produced no corresponding downturn in strikebreaking.

In contrast to the systematic pattern of variation evident in the probit equation, very few of the explanatory variables help to predict the proportion of striking workers replaced. The only variables that are statistically significant at the 5 percent level are the logs of establishment size and the log of the number of workers on strike. It would appear that although the number of replacements was an increasing function of the number of strikers, the proportion of strikers replaced fell as the share of the workforce on strike increased.

4. The Recruitment of Strikebreakers

Location had little impact on the ability of employers to find replacement workers because employers were able and willing to tap into a pool of migratory labor located primarily in major cities and in the Northeast. Close to two-fifths of strikebreakers hired in this period were brought from other locations, but the use of outside strikebreakers varied systematically with strike location. To examine the use of outside strikebreakers I again used a two-stage estimation procedure, first estimating a probit equation where the dependent variable takes the value one if any strikebreakers were brought from elsewhere, and then estimating the determinants of the fraction of replacement workers brought from elsewhere by ordinary least squares, controlling for sample selection bias. The independent variables

are identical to those used to explain the use of replacement workers.

Table 3 reports the estimated coefficients. Overall replacement workers were brought from elsewhere in about 13 percent of all strikes. However, the probability of recruiting replacements from elsewhere fell substantially with city size, and was only about 3 percent for the largest cities. Employers in the North Central region were more than one third more likely to recruit replacements from outside than were those in the Northeast. The point estimates for strikes in the South and West indicate that employers in these regions were also much more likely to recruit strikebreakers from somewhere else, but because of the small sample sizes for these regions, the effects are not statistically significant at standard confidence levels.

A number of the industry effects are large and significant. Transportation, printing, and food processing--the three industries in which strikebreaking was most common--were also the most likely to have strikebreakers recruited from elsewhere. The probability of using outside strikebreakers was lower in mining, but did not vary appreciably in other industries. The propensity to use outside strikebreakers was unaffected by the cause of the strike, or whether it was authorized by a union. On the other hand, outside strikebreakers were more likely to be used the greater the number of workers on strike and the longer the strike lasted.

Turning to the determinants of the fraction of replacements recruited from other places there are both interesting parallels and divergences with the propensity to use outside replacements. Not only were employers in smaller towns and outside the Northeast more likely to use outside replacements, but they used proportionately more of them than did

employers in larger cities and in the Northeast. On the other hand, the industry effects are rather different. Outside replacements were especially numerous in food preparation, less important in metals and tobacco. The effects of union authorization are also quite intriguing. Through 1886 the number of replacements brought from outside was substantially higher in union authorized strikes. But after 1886, the net effect of union authorization is close to zero. A higher strike rate in the industry and state also raised the proportion of strikebreakers recruited from elsewhere.

Taken together the results in Tables 2 and 3 strongly confirm the impression of an increasingly integrated labor market, in which labor supply conditions did not differ greatly across locations. They also point to the important role that employer recruitment played in promoting increased integration. Outside of the largest cities, and in regions other than the Northeast, employers were much more likely to seek out workers from other places when confronted with a labor shortage caused by a strike.

5. Strikebreaking and Strike Success

The widespread use of strikebreakers in late nineteenth century strikes provides one index of the increasing elasticity of labor supply in this period. It seems reasonable to suppose that the availability of a pool of replacement workers willing to take the place of strikers would significantly undermine labor's ability to raise wages or improve working conditions. This conjecture is strongly supported by the existence of a strong negative relationship between strike success and the incidence of strikebreaking revealed in the Commissioner of Labor's strike data.

Several previous studies have examined the determinants of strike success during the late nineteenth century. Friedman (1988) argues that the distinctive characteristics of American unions emerged in response to the relative hostility of government toward organized labor. During the late nineteenth century, unions learned to win strikes through the accumulation of large strike funds that could be used to control and direct strikes by small groups of strategically placed workers. In regressions for the determinants of strike success he finds that union authorization increased the probability of success only in the years after the collapse of the Knights of Labor who followed an alternative strategy of inclusive unionism and large but poorly supported strikes. Card and Olson (1995) examine the determinants of strike success in the period 1881 to 1886, modelling strikes as wars of attrition. The winner in this context is the side that is willing to hold out the longest. Using information on strike duration and outcomes, they estimate separate time to concession functions for firms and workers, as well as reduced form strike success equations. Overall they find that union ordered strikes and those involving a larger fraction of employees were more likely to succeed because both of these variables raised the time to concession of workers more than they did that of employers. On the other hand, they find that strikes involving a greater proportion of female workers were less likely to succeed.

In table 4 I report estimates of the determinants of strike success. I use the same explanatory variables as before but add to them indicator variables for the use of replacement workers and the use of replacement workers brought from elsewhere. Again I report the implied effects of each variable on the probability of strike success. Following Friedman (1988) I treat partially successful strikes as successes. It is apparent that the use of

replacement workers had an extremely strong and negative impact on the chances of worker success. For the entire sample the probability of strike success was about 55 percent, but other things constant, when replacement workers were used the probability of success fell by 43 percentage points.

The other coefficient estimates are consistent with the results of previous research. Like Friedman (1988) and Card and Olson (1995) I find that union authorization increased the probability of success, and that this effect increased after 1886. In contrast to Friedman, however, I find that after controlling for the use of strikebreakers, union authorization was important even in the first half of the 1880s. The coefficient estimates on the logs of the number of strikers and establishment size are very similar in magnitude but opposite in sign, implying that strike success was an increasing function of the fraction of workers on strike. Several of the industry effects are also significant.

6. Conclusion

Increasing labor market integration and technological change made it relatively easy for employers to replace striking workers during the late nineteenth century. Replacement workers were used in over 40 percent of strikes in the years 1881 to 1894, and in nearly a third of these cases employers brought some of these replacements from other places. While the probability of strikebreaking did not vary across locations, reliance on replacements recruited from other places was greater in smaller communities and in regions other than the Northeast. These results clearly strongly confirm the impression of an increasingly integrated national labor market in this period, and imply that employer recruitment of labor

was an important engine in mobilizing labor. The availability of a pool of replacement workers in turn had a powerful impact on the outcome of labor conflict at this time. Other things equal, workers chances of success were substantially reduced by the use of replacement workers.

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Table 1

Aggregate Strike Statistics, 1881-1900

Year	No. of Strikes	No. on Strike	New Employees		New Employees Brought from Other Places	
			No.	Percent of Strikers	No.	Percent of New Employees
1881	471	101,070	10,957	10.8	3,949	36.0
1882	454	120,857	11,353	9.4	5,356	47.2
1883	478	122,198	11,434	9.3	4,450	38.9
1884	443	117,313	11,833	10.1	4,324	36.5
1885	645	158,584	19,077	12.0	7,224	37.9
1886	1,432	407,152	39,854	9.8	12,932	32.4
1887	1,436	272,776	39,549	14.5	18,173	46.0
1888	906	103,218	16,700	16.2	5,237	31.4
1889	1,075	205,068	16,725	8.2	6,802	40.7
1890	1,833	285,900	31,034	10.9	12,393	39.9
1891	1,717	245,042	34,115	13.9	17,378	50.9
1892	1,298	163,499	25,847	15.8	13,492	52.2
1893	1,305	195,008	21,907	11.2	11,017	50.3
1894	1,349	505,049	75,092	14.9	35,198	46.9
1895	1,215	285,742	24,726	8.7	9,221	37.3
1896	1,026	183,813	13,289	7.2	5,128	38.6
1897	1,078	332,570	16,108	4.8	7,344	45.6
1898	1,056	182,067	19,064	10.5	7,335	38.5
1899	1,797	308,267	36,303	11.8	16,171	44.5
1900	1,779	399,656	31,590	7.9	11,331	35.9
TOTAL	22,793	4,694,849	506,557	10.8	214,445	42.3

Source: U.S. Department of Labor (1901), pp. 340-43.

Table 2
Determinants of Use of Replacements and
The Fraction of Strikers Replaced

Variable	Probit Regression for Use of Replacements		OLS Regression for Fraction of Strikers Replaced	
	Coefficient[a]	Standard Error	Coefficient	Standard Error
City Size Effects[b]				
25,000-49,999	0.0015	0.0497	0.1149	0.1296
50,000-99,999	0.0034	0.0457	0.1875	0.1170
100,000-249,999	0.0758**	0.0439	0.1996	0.1845
250,000 or more	-0.0468	0.0289	0.0829	0.1319
Region Effects[c]				
North Central	-0.0284	0.0271	-0.0899	0.0944
South	-0.0128	0.0483	-0.0269	0.1293
West	0.0242	0.1235	-0.1685	0.3021
Industry and Occupation Effects[d]				
Transportation	0.1464*	0.0563	0.3455	0.3267
Construction	-0.1009*	0.0436	-0.2924	0.2675
Mining	-0.2239*	0.0463	-0.4516	0.5832
Stone Quarrying and Cutting	-0.0385	0.0638	-0.1815	0.1903
Metals and Metallic Goods	-0.0882*	0.0449	-0.3235	0.2334
Machinery	-0.0891	0.0784	0.1241	0.2952
Printing and Publishing	0.1560*	0.0744	0.4374	0.3409
Furniture	0.0030	0.0717	-0.2910	0.1822
Wooden goods	0.0059	0.0796	-0.0435	0.2125
Boots and Shoes	-0.0635	0.0584	-0.3559	0.2135
Clothing	0.04330	0.0518	-0.0477	0.1632
Tobacco and Cigars	-0.0251	0.0510	-01460	0.1443
Glass	-0.1549*	0.0769	-0.4314	0.4362

Food Preparation, Canning, Butchering	0.1568**	0.0830	0.0792	0.3739
Skilled Occupation	0.0224	0.0310	0.1363	0.0965
Strike Cause Effects[e]				
Wage Increase	-0.0310	0.0269	-0.0069	0.0966
Hours Reduction	0.0153	0.0482	0.0418	0.1290
Defensive	-0.0774*	0.0360	-0.1449	0.1996
Strike Characteristics Effects				
Log(No. of employees)	0.0385*	0.0124	0.2731*	0.0898
Log(No. of Strikers)	-0.0448*	0.0128	-0.4518*	0.1018
Log(Strike Duration)	0.0895*	0.0093	0.2664	0.1956
Authorized by Union	-0.0409	0.0389	-0.1020	0.1353
Authorized by Union, 1887-1894	-0.0862**	0.0482	-0.0720	0.2292
Strike Rate in State and Industry	0.0143	0.0369	0.1454	0.1032
Year Effects[f]				
1882	0.0749	0.0765	-0.2475	0.2548
1883	0.1649	0.0748	0.1285	0.3944
1884	0.0467	0.0757	-0.0840	0.2280
1885	-0.0361	0.0689	0.0685	0.2049
1886	0.0453	0.0605	-0.1061	0.1923
1887	0.1184	0.0745	-0.0731	0.3281
1888	0.1658	0.0823	-0.0224	0.4246
1889	0.0661	0.0779	-0.0515	0.2569
1890	0.0518	0.0728	-0.2479	0.2309
1891	0.0461	0.0727	-0.2354	0.2247
1892	0.0696	0.0759	-0.3917	0.2628
1893	0.0826	0.0764	-0.3246	0.2744
1894	0.0845	0.0821	-0.2037	0.2848
Constant			1.1486	1.3056
Inverse Mills Ratio			-0.3789	1.5689

No. of observations	2023	838
Chi-Squared	211.67	
R-Squared		0.195

* Statistically significantly different from zero at the 95% confidence level.
** Statistically significantly different from zero at the 90% confidence level.

[a] Coefficients are reported as the partial derivatives of the probability with respect to the each variable, evaluated at the sample mean values of the independent variables. For zero-one categorical variables the coefficient shows the change in probability for a discrete change in that variable from zero to one.
[b] Omitted category is cities with population under 25,000. Population between census years is calculated from a linear interpolation based on population growth rates between each pair of census years.
[c] Omitted category is Northeast.
[d] Omitted category is all other industries.
[e] Omitted category is strikes over work rules.
[f] Omitted category is 1881.

Notes: The observed probability of strikebreaking is 0.412, and the predicted probability of strikebreaking is 0.405.

Source: Strike sample data described in the text.

Table 3
Determinants of Use of Replacements Brought from Elsewhere and
The Fraction of Replacement Workers Brought from Elsewhere

Variable	Probit Regression for Use of Replacements		OLS Regression for Fraction of Strikers Replaced	
	Coefficient[a]	Standard Error	Coefficient	Standard Error
City Size Effects[b]				
25,000-49,999	0.0201	0.0268	-0.0036	0.0844
50,000-99,999	-0.0208	0.0231	-0.1274	0.0968
100,000-249,999	-0.0237	0.0213	-0.1888**	0.0991
250,000 or more	-0.0921*	0.0163	-0.5088**	0.2982
Region Effects[c]				
South	0.0250	0.0273	0.1717**	0.0942
West	0.0597	0.0691	0.3159**	0.1869
North Central	0.0556*	0.0161	0.2290	0.1486
Industry and Occupation Effects[d]				
Transportation	0.0936*	0.0368	0.2247	0.2185
Construction	-0.0089	0.0260	-0.1032	0.0796
Mining	-0.0695*	0.0205	-0.3450	0.2820
Stone Quarrying and Cutting	0.0406	0.0393	0.0766	0.1342
Metals and Metallic Goods	-0.0165	0.0249	-0.2389*	0.0920
Machinery	0.0099	0.0470	-0.0258	0.01266
Printing and Publishing	0.2252*	0.0554	0.3737	0.3962
Furniture	-0.0387	0.0408	-0.3144	0.1986
Wooden goods	-0.0685	0.0409	-0.4409	0.3601
Boots and Shoes	0.0451	0.0353	0.0569	0.1351
Clothing	0.0180	0.0317	-0.0988	0.0973
Tobacco and Cigars	-0.0388	0.0271	-0.0324*	0.1623

Glass	-0.0532	0.0364	-0.2720	0.2431
Food Preparation, Canning, Butchering	0.1411*	0.0603	0.5460**	0.3104
Skilled Occupation	0.0051	0.0181	0.0152	0.0551
Strike Cause Effects[e]				
Wage Increase	-0.0071	0.0154	0.0067	0.0478
Hours Reduction	0.0355	0.0295	0.1917	0.1192
Defensive	-0.0024	0.0197	0.0629	0.0533
Strike Characteristics Effects				
Log(No. of employees)	0.0004	0.0075	0.0171	0.0216
Log(No. of Strikers)	0.0149**	0.0076	0.0137	0.0467
Log(Strike Duration)	0.0429*	0.0053	0.1535	0.1225
Authorized by Union	0.0174	0.0219	0.1625**	0.0887
Authorized by Union, 1887-1894	-0.0243	0.0273	-0.1618	0.1093
Strike Rate in State and Industry	0.0068	0.0207	0.1914*	0.0593
Year Effects[f]				
1882	0.0269	0.0459	0.0848	0.1270
1883	0.0281	0.0448	0.0949	0.1282
1884	0.0214	0.0454	0.0377	0.1219
1885	-0.0346	0.0348	-0.2924**	0.1639
1886	-0.0094	0.0340	-0.0660	0.1023
1887	0.0561	0.0489	0.2031	0.1811
1888	0.0633	0.0547	0.2686	0.1949
1889	0.1030**	0.0562	0.2882	0.2458
1890	0.0148	0.0448	-0.1086	0.1290
1891	0.0498	0.0474	0.2119	0.1729
1892	0.0080	0.0459	0.0021	0.1341
1893	0.0557	0.0499	0.2103	0.1794
1894	0.0725	0.0549	0.1867	0.2063
Constant			-1.2737	1.5226

Inverse Mills Ratio		0.9554	0.6185
No. of observations	2033	262	
Chi-Squared	237.21		
R-Squared		0.253	

* Statistically significantly different from zero at the 95% confidence level.
** Statistically significantly different from zero at the 90% confidence level.

[a] Coefficients are reported as the partial derivatives of the probability with respect to the each variable, evaluated at the sample mean values of the independent variables. For zero-one categorical variables the coefficient shows the change in probability for a discrete change in that variable from zero to one.
[b] Omitted category is cities with population under 25,000. Population between census years is calculated from a linear interpolation based on population growth rates between each pair of census years.
[c] Omitted category is Northeast.
[d] Omitted category is all other industries.
[e] Omitted category is strikes over work rules.
[f] Omitted category is 1881.

Notes: The observed probability of bringing replacements from elsewhere is 0.1294, and the predicted probability of bringing replacements from elsewhere is 0.0927.

Source: Strike sample data described in the text.

Table 4
Determinants of Strike Success

Variable	Coefficient[a]	Standard Error
Strikebreaking Effects		
Replacement Workers Employed	-0.4310*	0.0275
Replacements Brought from Elsewhere	-0.0023	0.0424
City Size Effects[b]		
25,000-49,999	-0.0032	0.0545
50,000-99,999	-0.0170	0.0503
100,000-249,999	0.0409	0.0472
250,000 or more	0.0605**	0.0321
Region Effects[c]		
South	-0.1114*	0.0516
West	0.1598	0.1164
North Central	0.0144	0.0295
Industry and Occupation Effects[d]		
Transportation	-0.0358	0.0609
Construction	0.1163*	0.0478
Mining	-0.0583	0.0526
Stone Quarrying and Cutting	0.1791*	0.0678
Metals and Metallic Goods	-0.0347	0.0506
Machinery	-0.0064	0.0883
Printing and Publishing	0.0672	0.0770
Furniture	-0.0562	0.0795
Wooden goods	-0.1573**	0.0870
Boots and Shoes	0.0278	0.0647
Clothing	0.1368*	0.0545
Tobacco and Cigars	0.2274*	0.0529
Glass	-0.0946	0.0896

Food Preparation, Canning, Butchering	0.0227	0.0861
Skilled Occupation	0.0422	0.0337
Strike Cause Effects[e]		
Wage Increase	0.0931	0.0294
Hours Reduction	0.0552	0.0519
Defensive	0.0107	0.0398
Strike Characteristics Effects		
Log(No. of employees)	-0.0455*	0.0139
Log(No. of Strikers)	0.0596*	0.0141
Log(Strike Duration)	-0.0609*	0.0104
Authorized by Union	0.0993*	0.0415
Authorized by Union, 1887-1894	0.0864**	0.0523
Strike Rate in State and Industry	-0.1022*	0.0402
Year Effects[f]		
1882	-0.0574	0.0814
1883	-0.1172	0.0805
1884	-0.1585*	0.0804
1885	-0.1604*	0.0745
1886	-0.1056	0.0649
1887	-0.2284*	0.0781
1888	-0.2146*	0.0869
1889	-0.1726*	0.0827
1890	-0.0362	0.0785
1891	-0.1628*	0.0785
1892	-0.1460**	0.0807
1893	-0.1364**	0.0816
1894	-0.1594**	0.0885
No. of observations	2033	
Chi-Squared	639.77	

* Statistically significantly different from zero at the 95% confidence level.
** Statistically significantly different from zero at the 90% confidence level.

[a] Coefficients are reported as the partial derivatives of the probability with respect to the each variable, evaluated at the sample mean values of the independent variables. For zero-one categorical variables the coefficient shows the change in probability for a discrete change in that variable from zero to one.
[b] Omitted category is cities with population under 25,000. Population between census years is calculated from a linear interpolation based on population growth rates between each pair of census years.
[c] Omitted category is Northeast.
[d] Omitted category is all other industries.
[e] Omitted category is strikes over work rules.
[f] Omitted category is 1881.

Notes: The observed probability of strike success is 0.550, and the predicted probability of strike success is 0.566.

Source: Strike sample data described in the text.