

Private Employment of Prison Labor*

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Keeping people in prison is costly. To help defray expenses, prisoners can be required to work, but recent experience indicates little success. A look at some historical evidence about private employment of prison labor may provide insights about the current situation. During the 19th century, prisoners in state penitentiaries were commonly employed by private firms. Terms of employment were set in contracts negotiated between prison officials and the firms. Sometimes a firm set up a plant in the prison. Other times, a firm took responsibility for guarding the prisoners, and they worked outside the prison. Revenues generated by the convict labor covered a share of prison costs, helped to support prisoners' dependents, and provided wages for some prisoners. Proponents of the contract system emphasized its efficiency and claimed it was preferable to alternative uses or non-use of convict labor. Trade unions attacked the system for competing with free (union) labor; manufacturers objected to competition from firms employing convict labor; and reformers argued that private employment subjected prisoners to intolerable, cruel treatment.

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In 1885, some 67 percent of working prisoners were employed in the private sector. Thereafter, the contract system declined. Some states prohibited private employment of convicts, but it persisted in other states. Eventually, federal legislation allowed states to restrict

interstate commerce in convict-made goods. By 1940, the private employment of convicts had ended.

The development and decline of the contract system raises interesting questions that have not been studied systematically. The economics of privately employing convict labor is closely related to slavery and indentured servitude; yet, little is known about how markets for convict labor worked. What kinds of contracts evolved, and what constraints made different contracts appropriate? Is the contract system the most efficient way of employing convicts? Did market incentives lead to cruel treatment of convict workers? Was the contract system effectively regulated out of existence, and if so, why?

This paper studies the demise of the contract system to help understand the institution of convict labor. The conventional explanation in the history literature to explain the end of the contract system is that the self-interest of labor unions combined with the influence of social reformers to acquire legislation banning private employment of convicts. In fact, laws severely restricting private employment were passed, but it is not clear that the system was viable in the absence of legal prohibition. With the technological changes and the development of industries that occurred during the late 19th century, the demand for convict labor may have decreased. So it is possible that private employment of convict labor would have ended, regardless of the laws that prohibited it. Whether or not the laws against the contract system determined its outcome, there is a question about how those laws developed. According to the special interest theory of public regulation, the laws prohibiting convict labor would have been due mainly to efforts of interest groups competing with convict labor: labor unions and firms employing free labor. Independent reformers would have played a minor role.

To investigate these questions about the contract system, we first describe the development of convict labor. Then we consider market forces that would have influenced the contract system and its regulation. Then we examine evidence on the demise of convict labor in the private sector.

Private contracts for convict labor

We begin by describing the development of convict labor during the 19th century. This provides a basis for analyzing the decline of the contract system in the late 1800s, sets out some facts that will be used subsequently, and points out similarities and differences between convict labor, indentured servitude, and slavery.

According to Jackson, systems for private employment of convict labor evolved after state prisons were set up during the period 1800-25.¹ Initial attempts to operate prisons as public enterprises failed—the operations generally incurred net losses—so prisoners' labor services began to be sold to private employers. Private employment produced revenues for the prisons and relieved prison officials of managing production operations. Hiller (1914, p. 255) reports that by 1867 convicts were privately employed in all but three state prisons.

¹Prior to the advent of state prisons, convicts were imprisoned at the local level. There, some thieves were indentured to generate revenues to make restitution payments. Other prisoners were sentenced to compulsory labor in houses of correction where the prisoners' relatives or masters were responsible for providing employment. Penal labor in prison tended to displace corporal and capital punishment.

Three general kinds of private employment contracts developed. The most common, often called the *contract system* in the literature, set a price per convict day of labor at which the employer hired convicts and organized production within the prison. The state supplied the building, power and, sometimes, machine services to the contractor. Care and policing of the convicts was the responsibility of prison officials. These contracts were usually for periods of 5 to 10 years. The second kind of contract was the *lease system*. Employment under a lease contract was generally outside the state prison. Maintenance and guarding the convicts in addition to their work supervision were undertaken by the contractor, in which case the lease created a privately run prison. In some states the contractor paid for a certain number of prisoners, but the housing and maintenance, at the labor site, was the duty of the state. Some lease contracts set a specified sum (U.S. Commissioner of Labor, p. 4) and others were in terms of a percentage of the contractor's profits (Hiller, 1914, p. 253). In some cases a contractor leased all of the convicts in a prison and subleased them to different employers. Lease contracts varied from 1 to 20 years (Mohler, pp. 263, 266). The third kind of contract was the *piece-price system* that set a price per unit an employer would pay for goods produced by convicts. Production took place in state prisons and was supervised by prison officials; the employer only supplied raw materials and collected the finished products.

The relative importance of the different systems of convict labor in 1885 (the first year for which comprehensive data are available) is shown in Tables 1 and 2. Almost half of all convicts, and 67 percent of convicts engaged in production, were privately employed. About 30 percent of all convicts were assigned to prison duties or were idle. Of the privately employed convicts, about half worked in the prisons under private management (the contract system), some 19 percent worked in the prisons under the piece-price system, and 30 percent were leased out.

Table 2 shows the distribution of employment across states. Only 3 states—Arizona, Colorado, and Nevada—used public employment exclusively. Several states used private employment

exclusively, but most had a mix of private and public employment. Of the 42 states and

territories shown in Table 2, private employment dominated public employment in 29 and public employment exceeded private employment in 13.² Lease contracts were used mainly in the South; 10 of the 13 states that leased prisoners to private employers were southern. No southern states used the piece-price contracts; only a few used the contract system. In the rest of the country, both the contract and piece-price systems were widely used.

Table 3 shows the variety of goods produced and the importance of each good in terms of employment. There are 20 broad categories of products for which convict labor was privately employed. However, the data show that all of these goods but two (agricultural implements and lumber) were also produced by publicly employed labor. For each system of employment, particular goods dominate. Almost half of employment under the contract system was accounted for by two goods: boots and stoves. Under the lease system, about 75 percent of the convicts were employed in farming, mining, and construction of public ways. Under the piece-price system, most convicts produced clothing or furniture. Turning to public employment, about half of the convicts worked at stone quarrying and breaking, farming, and clothing. Overall, convict labor was not breaking rocks on a chain gang as legend might

²Delaware, Idaho, Montana, Oklahoma, Utah, and Wyoming reported no convict employment. Oklahoma was not even a territory until 1890 and the data contain no statistics on convict labor in the Indian Territory. Laws in the state of Delaware and the territories of Idaho and Montana directed authorities to contract with other states or territories for the custody of convicts. The laws of Utah directed the authorities to lease the territory's prison and prisoners to a private employer; consequently it is a mystery why no convict labor is reported for Utah. See U.S. Commissioner of Labor (pp. 507-604). Of the states using public employment exclusively, two Nevada and Arizona, had populations well under 100,000; only Colorado, with a population over 200,000 probably had much of a prison.

suggest, but prisoners who did work with stone were usually employed by the state.

Of the prisons with privately employed convicts, 36 percent produced more than one good, and 34 percent dealt with more than one contractor. On the other hand, 56 percent of the public prisons produced more than one good. So the private employment tended to be more specialized—there was less multiple product production where prisoners were privately employed, and where multiple products were produced there tended to be multiple private employers.

The 1885 data do not show payments to convicts for their usual work whether they were privately or publicly employed; however, they do show payments for overtime work in some states. Of the 41 states reporting, 17 showed payments for overtime and two indicated that there was no way to determine if such payments existed. Most of these payments were for work supplied to private employers, but in three cases the state paid for overtime work. One might expect that payments to the convicts were most common under contracts that made private employers responsible for guarding the prisoners—the accumulated earnings held for a prisoner would have provided an incentive not to escape³—but this was not the case. Only one state reporting income for prisoners used the lease system (the two states where it was not known if prisoners were paid also leased prisoners); overtime income mainly occurred under the contract and piece-price systems.

Further investigation provides some evidence of payments for regular work: Pennsylvania and some other states provided for payment of money to the convict or his family, or payment of time in the form of a shorter sentence (see U.S. Commissioner of Labor). Even where payments to convicts were not required, we expect some kind of payments, either formal or informal, since payments were often effective incentives for slaves.

³This kind of incentive—freedom dues, a form of non-vested pension—was commonly used to discourage indentured servants from running away.

Payment from employers for convict labor was an important source of income for the prisons. Expressing the revenues from convict labor as percentages of prison operating costs, the average shares of expenses for each kind of contract are: contract 62, piece-price 18, lease had no states that incurred prison expenses. The minimum was 100 percent of costs. Alabama and Tennessee had revenues from convict labor that exceeded prison costs by factors of 7 and 15, respectively, which is not surprising since most states with the lease system had minimal prison facilities.⁴ South Carolina reported that revenues exceeded expenses by about 50 percent in 1894, mostly because of payment for leased prisoners.⁵ Prisons that employed prisoners in public enterprises covered, on average, 32 percent of operating costs.

Opposition to private employment

From the time it started to develop, private employment of convicts was attacked by competing groups (Hiller, 1915; Mohler; Gill). In 1823, New York merchants protested the employment of convicts in mechanical occupations, and asked the legislature to prohibit the contract system.

After the Civil War, newly formed national trade unions renewed the attack. Hiller (1914, p. 256) describes the demands made by the hatmakers at their 1878 convention:

1. the abolition of the contract system;
2. the removal of machinery from prisons, and employment of

⁴These figures are calculated from statistics in U.S. Commissioner of Labor (pp. 266-7). Prisons that used more than one system of convict employment are excluded from the calculations.

⁵The prison accounts appear to have been kept much like those of a private corporation, as the prison was responsible for land purchases and capital improvements. See South Carolina.

- prisoners at hard labor only;
3. employment of prisoners at public works carried on by states and for the manufacture of articles needed in prisons;
 4. the instruction of prisoners in common educational branches;
 5. that no merchant who deals in any manner whatever in prison-made articles be patronized directly or indirectly; and
 6. that mechanics refuse to work for or with any man who has been so base as to go to a state prison and instruct convicts in any branch of skilled labor.=

The same year, New Jersey legislation prohibited the manufacture of hats in prison. New York passed a similar law in 1883.

In the 1870s and 80s, the Knights of Labor and the American Federation of Labor used legislative committees at state and national levels to work against privately employed convict labor. Manufacturers whose products competed with those produced in prisons (wagons, agricultural implements, boots and shoes, furniture, wood products, and stoves, for example) organized in 1886 as the National Anti-Convict Contract Association and urged legislation that would end competition from convict labor (U.S. Commissioner of Labor, pp. 365-7). Reformers such as the National Prison Association and the National Conference of Charities and Corrections also led opposition to the convict labor systems. They argued that private employment of convicts produced cruel discipline and maltreatment of convicts as well as unfair competition for free labor and its employers (Mohler, pp. 564-8; Hiller, 1915, p. 875).

Besides advocating laws banning private contract labor, the interest groups proposed several other restrictions: employ prisoners only on public works or in manufacturing goods for government use; prohibit interstate commerce in convict-made goods; require prisons to produce only imported goods; allow only hand labor in prison

product; and limit the number of prisoners employed in any one industry so that prisons cannot specialize production.

Legislative restrictions on prisoner production

Starting in the 1880s, states began to prohibit private employment of convicts. The contract system was outlawed by California in 1879, by Pennsylvania in 1883, by New York and New Jersey in 1884, by Ohio in 1886, and by Massachusetts in 1887. By 1889, the contract system was prohibited in 18 states; by 1905, it was prohibited in 28 states (Hiller 1914). However, there were still 20 states with some form of private employment in 1923. Further restrictions on convict labor came at the federal level. The Hawes-Cooper Convict Labor Act of 1929 removed interstate commerce status from prison-made goods as of 1934; that is, the act allowed states to prohibit the sale of prison goods produced in other states. The Ashurst-Sumners Act of 1935 required that prison goods shipped interstate be clearly marked as prisoner-made.

Despite the flurry of anti-contract legislation in the late 1800s, private employment declined only modestly until the 1900s. Table 4 shows change in private employment between 1885 and 1895: private contracts provided 67 percent of convict employment in 1885 and 65 percent in 1895. By 1904, the share of private employment had fallen to 48 percent, but this decrease was due mainly to decreases in lease and piece-price employment—the share of contract employment was near at its 1885 level. After 1904, private employment decreased more rapidly, accounting for 32 percent of employment in 1914, 20 percent in 1923, and 17 percent in 1932. By 1940, private employment of convicts had been effectively eliminated.

The pattern of declining private employment is roughly consistent with the sequence of public regulation restricting convict employment. If private employment were first banned in states where it played a minor role, and if existing contracts (of 5 to 10 years) were allowed to expire before prohibition became effective, there would have been little impact during the 1800s. As states continued to restrict

convict labor, one would expect private employment to decline in the early 1900s. The end of private employment for convicts in the 20 some states where it survived after 1914 corresponds to the federal regulation of the mid-1930s.

Previous essays on convict labor generally follow Hiller (1914) who (prematurely) concluded that, the contract system clung tenaciously to prison industry until the demands of labor organizations and of reformers became extensive enough to induce legislation for the protection of the prisoner against the cupidity of the entrepreneur, and of free labor against the unfair competition with prison labor. Indeed, this is a reasonable hypothesis in light of events in the market for convict labor, but it has never been systematically tested. It has simply been taken for granted that organized labor and humanitarian reformers had the political power to acquire laws restricting the employment of convicts and that those laws were effective.

An alternative hypothesis that privately employed convict labor declined because it was no longer productively efficient cannot be rejected out of hand. Over the period 1880-1930, as manufacturing industries and technology developed, a change in the kind of labor skills demanded or the economies of scale in production may have decreased firms' demand for convict labor. A firm that contracted to employ a prison's inmates had little control over who was hired. Moreover, convict employees could not be laid off when business was slow, but could be counted on to quit when their prison terms were over. Although the prices that firms paid for convict labor no doubt adjusted to offset some disadvantages, the lack of control over work force characteristics, and the costs of monitoring the workers may have made prison production uneconomic.

In the remainder of this paper, we examine some of the theoretical and empirical questions pertaining to the decline in private employment of convict labor. The central question here is whether the demise of privately employed convicts is better explained by a restriction on the supply of convict labor due to the political power of organized labor or a decrease in firms' demand for convict employees.

The market for convict labor

To derive testable implications about the effects of organized labor and reformers versus firms' demand for convict labor, we analyze some pertinent characteristics of the market for convict labor. In particular, we examine the competition that convicted labor provided for free labor, the working conditions and incentives for cruelty to convict labor, and the nature of industries in which convict labor persisted.

Convict labor has much in common with the better known systems of forced labor: slavery and indentured servitude. Consequently, our analysis draws on the studies of slavery contributed by Fogel and Engerman (1974) and on the studies of indentured servitude by Galenson (1977, 1984). The insights provided by Barzel's (1977) analysis of slavery have been especially useful for the questions considered here.

Competition from convict labor

What was the nature of competition provided by convict labor? What was the effect on wages of free labor, on prices of competing goods? Organized labor argued that the contract convict labor system lowered wages and caused unemployment for competing free workers (Hiller, 1915). Manufacturers claimed that they could not compete with prison-made goods; that the prices of prison-made goods were below their cost of production (U.S. Congress, 1906). A typical argument is reported in Hiller (1915, p. 868):

[W]hen labor is scarce and the demand for goods is brisk, the independent manufacturer must pay high wages and cannot afford to compete with prison industry which pays no wages, tax, or rent. Though the amount of prison-made goods is relatively small, it affects the price of other goods regardless of the quantity. One thousand

pairs of shoes offered in the market will affect the price of one million pairs of other shoes for a year or more. If the amount of prison-made goods were not limited and could be produced in any desired quantity, they would monopolize the output and destroy the business of all competitors.

Rhetoric about unfair competition aside, private employment of convict labor would not have lowered wages and product prices. Prison-made goods were generally a small share of the market. A small market share means that prison firms would have taken the market price for a product as given. In the absence of prison firms, other producers would have sold a greater quantity, but the market price would have been the same. The labor market was also highly competitive.

Table 5 shows convicts as percentages of total labor and values of prison-made goods as percentages of total production for several industries. Convicts were a substantial share of labor (almost 20 percent) in the broom and brush industry, but were less than six percent of the labor for other industries. Even in brooms and brushes, prison-made goods were only 7.3 percent of sales; in other industries the shares were less than five percent. Obviously, brick was not a national market, and some of the other industries may have had regional markets too. At the state level, convict labor ranged from 2 to 29 percent of labor in the brick industry. Of 115 state observations underlying all industries in Table 5, convict labor exceeded free labor only ten times; the value of prison-made goods exceeded the value of free-made goods only three times. The picture that emerges from these industries is that convict labor and prison-made goods had small market shares—the prison firms would have been price-takers in the product markets.

When a prison firm entered a market, it may have sold below the market price as a way to induce buyers to try the product. However, there would have been no long-run incentive to sell below the market

clearing price. Even if a prison firm had lower costs than its competitors, the prison could not increase its long-run market share because its quantity of labor was fixed. That is, the prison firm could not attract additional convict labor to expand production.⁶

On the cost side, the notion that prison firms had lower costs because they paid no wages, taxes, or rent and the state sometimes provided power and capital equipment is wrong. Because contracts for convict labor were awarded by competitive bidding, the price of the contract would be bid to the point where no profits were anticipated. The price of the contract would cover the marginal cost for the bundle of resources supplied by the state plus any rents that would accrue to the prison firm. It is irrelevant that the employer made no specific payments for various resources; the contract was for all of the services supplied by the state.

⁶If convicts received job training, thereby increasing the services a convict could sell when released from prison, then the expected returns from illegal activity would increase. With the resulting increase in illegal activity, *ceteris paribus*, there would be an increase in convict labor. Even if there had been this kind of supply effect, it would have been a once-and-for-all shift. In any event, it seems unlikely that it would have been large, since this is an expensive way to get on-the-job training.

It is not hard to understand why the contract price per convict was often low relative to the wage of free labor, even though the contract price included an implicit payment for building rental, machine services, and the like. The employer had much less control over convict labor than over free labor. The employer could not choose a skill mix of convict employees; whoever was imprisoned was employed. Most of the convict employees would have to be trained.⁷ Monitoring convict employees was probably more costly because some devices such as pay increases or firing workers were unavailable, and convict labor would have more incentive for shirking. Consequently, the value of marginal product, and thereby the price paid for a convict worker, would have been low.

The potential extent of competitive bidding for contracts is suggested by the states' convict labor laws. In 1885, convict labor was privately employed in 39 states; 14 states specified competitive bidding by law; 12 more states specified the best price, the most profitable terms, or something similar; the other states' laws were silent on the method of awarding contracts (U.S. Commissioner of Labor).⁸

⁷Trained convicts had to Acquit@ the prison firm when they have served out their sentence. Consequently, there should have been an incentive for the employer to operate a non-prison plant in addition to the prison plant. The employer could use the information he accumulated at the prison plant to offer employment at the non-prison plant to productive convicts. The entrepreneur who produced barrels in the Indiana prison did, in fact, operate a non-prison plant (U.S. Congress, 1906, p. 167) which is consistent with this prediction.

⁸The fact that competitive bidding was often required by law does not mean it was always used. Contracts may have gone to friends of state officials. For example, Georgia high court had to settle a dispute between companies that were paying the state for leased convicts and the Marietta & North Georgia Railroad Company, which the legislature ordered be given 250 convicts per year for free, which the Railroad then leased to private parties for profit. The court struck the deal as an unconstitutional impairment of contracts. See *Georgia Penitentiary Companies Nos. 2 and 3 v. Nelms, Principal Keeper, et al.*, 71 Ga. Rpts. 301 (Ga. Sup. Ct., 1883). Favoritism and rent extraction by politicians does not mean that the results were substantially different than they would have been if there had been more competition for the use of prisoners; if anything, it indicates that the efficiency of

private employment of prisoners could have been even greater.

Competitive bidding for contracts, along with the small market shares and relatively fixed supplies of convict labor, would insure that market wages and product prices would not have been affected.⁹ However, convicts would have substituted for free labor, that is, the labor services supplied by convicts in markets with prison firms would otherwise have been supplied by free labor. In competitive markets, the displaced resources are no worse off in the long run.¹⁰ On the

⁹Evidence purporting to show that convict labor reduced wages and prices does not withstand close examination. For example, U.S. Congress, 1906 (pp. 155-68) presents statistics on provision cooperage in Chicago over the period 1875-85. Annual prison production increased 360 percent over the period; production by other firms increased 1.30 percent. The share of prison-made provision cooperage increased from 43 to 68 percent. Annual earnings of free provision coopers decreased 30 percent and the price of provision cooperage decreased 34 percent. Based on these facts, the report concluded:

The simple fact that 67.8 percent of the provision cooperage used in Chicago is manufactured in prisons, by contractors who pay no rent, no insurance on buildings, and no taxes on realty, and hire men at from 45 to 62 2 cents a day, renders every other fact here shown as to the decline of business in Chicago, the falling off in the market price, the reduction of wages, and the consequent reduction of skilled coopers to the rank of day laborers inevitable without other demonstration.

Further investigation shows that the changes in Chicago cooperage were due to competition, but did not depend on convict labor. Technology for producing wooden barrels by machine was introduced in 1875. Several substitutes for wooden provision cooperage such as refrigerator cars and iron-bound cooperage were introduced. The prison plant used the machine technology, but the free plants did not. This may well have been due to plant size because the prison employed about 200 convicts; the free plants, on average, employed 10 coopers. Overall, technological change and substitutes seems a more logical explanation for the downward trend in prices and wages than does convict labor per se.

¹⁰This is to say that for the industries concerned we take the long-run supply of labor as infinitely elastic. In the short run, the supply of labor may have been upward sloping, in which case some displaced labor would have lost quasi-rents.

other hand, if there were monopoly (collusion) in the labor or product market, a prison firm would reduce the monopolist's market share and monopoly rents. So, labor unions would have opposed convict labor since the unions' monopoly rents would increase if prison firms were eliminated.

The attack on convict labor makes sense even though the private gains from excluding convict labor and prison-made goods from the market would have been small (and in competitive markets would have been only short-lived), because it is likely that public regulation restricting convict labor could be acquired cheaply. Few would oppose a ban on employing convicts besides the employers. Convicts had little incentive to oppose a ban and trivial political power since they could not vote. Lower revenues from convict labor meant more tax revenues were required to run prisoners, but this cost was diffused over heterogeneous taxpayers which would work against political opposition. Furthermore, the alternative of a state-run monopoly prison, that would provide rents to be distributed, may have been more attractive to politicians than the private employment of convicts, insofar as the bidding for labor in that system was competitive. The attack on convict labor by competing interest groups is similar to the attacks on imported goods that produce tariffs and other restrictions, in that there is often no well-organized, politically powerful opposition in either case.

Labor unions' campaign against convict labor seems reasonable in another regard, since the ban on convict labor was only one of the self-interest measures for which unions worked. Recall that unions sought the abolition of child labor, exemption from antitrust laws, the imposition of minimum wage laws, and other market restrictions. A systematic study of interest groups that have successfully used the political process to monopolize markets may well show that it may be accomplished by accumulating numerous small market restrictions. Viewed as only one of many items on organized labor's political shopping list, unions' concern with convict labor is not puzzling. Moreover, it also makes sense for labor unions that were attempting to develop political power to seek to restrict competing

groups, such as convict labor, that would not generate much political opposition.

Working conditions and treatment of convict labor

Reformers' claims that privately employed convicts suffered brutal working conditions and cruel treatment are based on selected examples. Anecdotes about maltreatment are a weak basis for generalization. However, work on the economics of slavery can be used to investigate employer and employee incentives in the markets for convict labor. This approach leads to the prediction that convict labor worked harder and in worse conditions than comparable free labor. Yet, some of the implications from this economic analysis differ from conventional claims about the treatment of convict labor.

Barzel (1977) has shown how owners are led to extract more production from slaves than would be forthcoming from hired workers, and his analysis is applicable to convict labor. A free employee can trade a leisurely work pace, pleasant working conditions, or shorter work hours for lower earnings. A convict employee does not have this choice. The employer of convict labor will set work hours, intensity of the work pace, and convicts' net product. Since the employer gets no benefit from a leisurely work pace or pleasant working conditions, he will only allow maintenance consumption, that is, consumption such as food, rest, and cleanliness required to maintain the convicts' work efforts. Therefore, the output of a convict worker will be greater than that of an equally capable free worker through greater work effort, longer hours, or both. A convict will have less total consumption than the free workers, but a convict's maintenance consumption will be greater than convict subsistence maintenance since it must rise with output. Free workers would not choose the working conditions and treatment of convict labor.

In forced labor, a noteworthy difference between convicts and slaves is that convicts were generally not destitute like slaves. Convicts with nonhuman wealth would have been willing to use some of it to

purchase a less rigorous work pace. Hence we predict that wealthier convicts or their families made payments to employers in order to influence working conditions.

The notion that wealth maximizing employers would have treated and maintained convict employees like machines is contrary to reformers' claims that convicts were routinely worked to death. However, the machine analogy suggests that there would have been a relation between convicts' treatment, in the sense of net productivity, and the length of their sentences. To the employer, a convict's working life is the length of his sentence because convicts quit the prison firm and are no benefit to the employer once their sentences are served. Put another way, the value of a convict to the employer depreciates to zero at the end of his term, regardless of the rates at which the convict is worked and maintained. It follows that a higher rate of net productivity will be extracted from convicts with shorter terms because the employer will provide less maintenance that yields future benefits. Since the value of the convict depreciates to zero at the end of his term, the employer will let him depreciate physically, too. Monitoring costs may have precluded tailoring work and maintenance according to individual convict's terms, but net productivity should have been higher in prisons where the average term was shorter.¹¹

¹¹Similar results would follow, depending on the length of the employer's contract. Employers with longer contracts or options to renew the contracts would find it worthwhile to provide more maintenance than employers with shorter contracts, as would employers who expected to hire convicts in post-prison production facilities.

This relationship between length of sentence and the maintenance of convict labor may explain the claim that convicts at state prisons received better treatment from employers than convicts in county or city jails (Mohler, p. 567). Generally, convicts in state prisons had longer sentences than convicts in local jails, so market incentives would lead to better treatment at the state level. Another implication here is that convict labor received less maintenance than slaves because the economic life of convicts was shorter. In any case, employers would choose more rapid physical depreciation for convict workers than comparable free workers would choose for themselves. This is another reason that free men would have found the same treatment as convicts undesirable.

It was widely held that convicts= treatment under the lease system, where the employer provided all maintenance as well as work, was worse than under the contract system, where the state provided the maintenance (Mohler, p. 563). This notion is not supported by the analysis here which implies that worse treatment would be more likely where the state supplied maintenance. With the lease system, the employer had complete control of the convict; he could monitor their maintenance consumption to insure that it was consistent with their maximum productivity. With the contract system, however, much of the convicts= maintenance consumption was administered by the state=s prison warden. Therefore, the maintenance supplied could have been influenced by how the warden=s pay was determined. Suppose the warden was rewarded according to the net revenue generated by his prison with the contract price taken as exogenous. Once the contract price for convict labor was set, a net revenue maximizing warden had an incentive to skimp on the prisoners= food, health care, and other components of maintenance consumption since the employer bore the costs of lower prisoner production. Consequently, one would expect to find employers specifying maintenance levels in their contracts and making side payments to wardens in order to keep prisoner maintenance closer to the

employers= desired levels.¹² Alternatively, suppose that the warden was rewarded according to the gross revenue from prison labor contracts. Then the warden had an incentive to supply the level of maintenance demanded by the employer. In either case, the prison warden had no incentive to provide better prisoner maintenance than the private employer would have.

The economics of convict labor implies that free labor would have judged the treatment and working conditions of prisoners to be inferior to that of comparable free workers. In this sense, convict labor was treated worse than free labor. Yet, the employer had an incentive to maintain the productivity of convict workers during their terms in prison. Whether the resulting treatment was inhumane is not a matter for economic analysis.

Viability of convict labor

¹²Copies of North Carolina prison contracts with private employers of prisoners indicate that such issues were understood by the parties. In a fixed price annual contract for 100 prisoners to work at quarrying, the payment to the state was cut if any convict was incapable of working more than six days per month. If a worker was injured due to negligence or abuse by the employer, the state was still to be paid for the worker as if he were not injured. Details about meal schedules and length of meal breaks, as well as responsibility for food and medical care was spelled out.(North Carolina).

Would private employment of convict labor have persisted in the absence of legal prohibition? The literature presumes that the contract system was economically viable and attributes its demise to the political efforts of labor unions and reformers. It is surprising that the viability of convict labor has not been questioned because until a few decades ago the conventional wisdom was that slavery in the U.S. was not economically viable. Fogel and Engerman (1974), Goldin (1976), and other economic historians have shown that slavery in the antebellum South was profitable. Similarly, indentured servitude continued after the Civil War in the U.S. and continued in Japan until recent times.¹³ Before concluding that the contract system for convict labor was ended by public regulation, it would be worthwhile to consider the viability of convict labor.

Because of the similarities between slavery and convict labor, and because slavery has been carefully studied, it is logical to see if the history of slavery yields any insights about the viability of convict labor. The evidence on slavery provides some support for the idea that private employment of convict labor was profitable, but one important finding seems consistent with the alternative notion that the contract system of convict labor was not economically viable.

Fogel and Engerman (pp. 202-6) attribute the profitability of slavery to efficiency of slaves= assembly line type of production on large scale plantations. They stress the productivity achieved by specialization and division of slave labor, and conclude, "The fact that

¹³Indentured servitude has been studied most carefully by Galenson. It seems that indentured servitude declined as the relative price of transportation from Europe to the U.S. declined. Recall that indentured servitude was primarily a means whereby the destitute obtained a loan to pay for passage to America. There is evidence of some indentured servitude of blacks in Illinois as late as the 1840s. As the price of transportation decreased and the value of human capital increased, it became unnecessary to enter a long term contract of servitude to pay for passage. See Ramseyer for a discussion of indentured servitude in Japan that lasted until the 1950s.

economies of scale were achieved exclusively with slave labor, clearly indicates that in large-scale production some special advantage attached to the use of slaves@ (p. 234). Barzel (1977) argues that the special advantage was the extra production that could be extracted from forced labor.

Slaves were mainly employed in agriculture, 94 percent in 1850-60 according to Fogel and Engerman (p. 38); while privately employed convicts were mainly in manufacturing (93 percent in 1885 according to Table 3, although leased prisoners, who were most like slaves, were used relatively more in agriculture, mining, and road work). Yet, one would expect the slaves= efficiency in assembly line type production to carry over so that slaves= (and thereby convicts=) forced labor was relatively efficient in manufacturing. On the contrary, Fogel and Engerman found Athere is no evidence that slaves possessed any special advantage or disadvantage for large-scale production in urban industries... [I]n the urban context slaves and free laborers were quite good substitutes for each other@ (pp. 234-35). Goldin (pp. 77-105) concludes that the demand

for slaves in cities was increasing over the period 1820-60, but there were no great economies in employing slave labor in urban industry. Since slaves were not inefficient in urban industries, the evidence led Goldin to predict that urban slavery would have continued in the absence of emancipation and even increased after 1870 (p. 126).¹⁴

Considering the similarities between slavery and convict labor, the evidence that urban slavery was no less efficient than free labor suggests that privately employed convict labor would have been economically viable save for legal prohibition. However, the sharp difference in relative productivity for slave and free labor between agriculture and manufacturing suggests a line of reasoning wherein the contract system of convict labor was at a disadvantage to free labor and may not have been viable.

¹⁴Goldin also reports an interesting parallel between urban slavery and convict labor. There was abundant opposition to urban slave labor from competing free labor: A[T]hroughout the period 1820-1860, white tradesman and artisans attempted to close their occupations by slave labor... They petitioned city councils for ordinances prohibiting the use of slave labor in various occupations. In addition, they spread propaganda in certain city newspapers about the alleged evils of using slaves in skilled occupations (p. 28).

What made slave labor more productive than free labor in plantation agriculture, but the same as free labor in manufacturing industries? If the relative productivity of slaves in agriculture was due to specialization and division of labor on large scale plantations, and if both slave and free labor benefitted from specialization, division of labor, and large scale in manufacturing, then free labor could have organized agriculture on a large scale and been as productive as slave labor. Hence, the organization of slave and free agriculture is inadequate to explain the productivity differences without invoking a taste for small farms by free labor.¹⁵ If more productivity could be forced from slaves in agriculture, it would seem that more productivity could be forced from slaves in manufacturing. But perhaps not, if the cost of monitoring slaves was higher in manufacturing than agriculture.

Monitoring costs and shirking problems with forced labor

¹⁵It is important to realize that Fogel and Engerman attribute slave productivity in agriculture to slavery and the organization of plantations, not to some inherent comparative advantage of slaves in agriculture. They explain the fact that free men did not work in gang labor by non-pecuniary disadvantages to gang labor which translates into a taste for individual work on small farms. This does not explain why there were not similar non-pecuniary disadvantages to assembly line production in manufacturing. If free labor in cities had a taste for assembly line production, some of those workers could have been employed on plantations. Did they also have a taste for city life? As usual, the problem is that differing tastes can be used to explain anything, but predict nothing. According to Goldin: AThe urban factory made it as easy to organize white labor as it was to organize slave labor into large-scale production units. Furthermore, immigrants who moved to the Southern part of the U.S. were attracted to the urban areas in far greater numbers than to the rural communities.@ Although, A[f]or reasons which are not yet entirely clear, free labor could not be mobilized for large-scale, gang labor on farms at a wage rate competitive with the shadow price on slaves@ (p. 105). While Goldin does not quite resort to differing tastes, she does not explain the factory-agriculture difference in slave productivity either.

So far, we have not considered monitoring costs and shirking. Barzel claims that monitoring costs are of prime importance in understanding slavery, "When policing costs are positive, slaves will not always be more productive than freeman.... Only in a subset of activities, then, will slaves be more productive" (p. 99). The manufacturing-agriculture difference in slave productivity may be a case in point. Because forced labor is not paid its marginal product, it has more incentive to shirk work time for its consumption than free labor. Consequently, slave labor required more monitoring than free labor, and when the costs of monitoring are taken into account, the net productivity of slaves did not always exceed that of free labor.

There are at least three reasons for monitoring costs to have been greater in manufacturing than in agriculture. First, monitoring quality would have been more costly in manufacturing. Often, defects are not obvious in manufactured goods that are intricate, have concealed parts, or are packaged. Shirking on quality is one way to reduce effort, but appear to meet productivity requirements. In contrast, monitoring the daily task quotas on a plantation, for example, planting, hoeing, picking cotton, would have been less costly. Defects would have been evident, and the quality of cotton would not have been much affected. Second, monitoring sabotage would have been more costly in manufacturing. Forced labor has an incentive to sabotage because equipment failure that stops production converts work time into leisure time. There would have been more opportunities for sabotage in manufacturing since it is more mechanized than agriculture. Third, monitoring the simultaneous tasks in manufacturing would have been more costly than monitoring sequential tasks in agriculture. In manufacturing, all or many stages of the production process are carried on simultaneously and it is necessary to monitor the quality and quantity at each of these stages in order to maintain a smooth flow of production and efficient use of raw materials. In agriculture, seasonality—planting, growing, and harvest season—makes the production process sequential, so labor focuses on a single task depending on the season. This similarity of

tasks reduces monitoring costs because uniformity is easier to monitor than diversity.¹⁶

¹⁶The monitoring problem seemed to be addressed in some contracts. For example, in North Carolina contracts for cutting wood and quarrying, which is much like agricultural work, the state provided the monitors (guard). In a contract for shoe production, the prisoners were under supervision of company monitors. (See North Carolina.)

If monitoring costs do, in fact, explain why slave labor was no more productive than free labor in manufacturing, then it may follow that privately employed convict labor was not economically viable. Recall that the evidence showing equal productivity of forced and free labor in urban industries is for 1850. At that time, both urban slavery and convict labor were expanding, and we have been told that urban slavery would have continued in the absence of emancipation. Slavery was ended in 1865, but privately employed convict labor continued to grow until 1880-85. The cost of monitoring forced labor would have increased and probably increased relative to the cost of monitoring free labor. Hence, there is a reason consistent with the evidence on slavery to believe that the demise of the contract system of convict labor after 1885 could have been due to inefficiency rather than legislated restrictions.

Employee skills, training costs, and lay-offs

Considering certain differences between convict, slave, and free labor, there are additional reasons for questioning the viability of privately employed convict labor. An employer of convicts hired from the given distribution of labor skills in a prison. Unlike an employer of free labor or owner of slaves, he could not select workers with particular skills from appropriate markets. Some contracts let prison firms select convicts that seemed best suited for the work, other contracts let prison firms select from general categories into which prisoners had been classified, but there were also contracts that required an employer to hire all of the convicts in prison.¹⁷ A prison

¹⁷An 1881 contract for prisoners at New York's Sing Sing prison specifies that the prison will select 900 convicts with regard to their adaptability and aptness to be taught the work. If, after a reasonable trial, a man proved unfit for work, another was to be substituted for him. Alabama offered five classes of prisoners, four that were able to work in mines and one that was not, for which prices varied substantially. See Alabama, 1888 (pp. 250-251) and 1922 (p. 17). Tennessee had four classes of convicts with pay varying accordingly. For example, the third and fourth classes included lame, young, weaker male and female convicts. See Tennessee (pp. 10-13). Kentucky furnished the classes of able-bodied and non-

firm=s alternative was to train convicts whose skills were inadequate. Expected training costs would have been reflected in a firm's bid prices for a prison contract.¹⁸ If the efficient level of training in manufacturing industries increased relative to the average skill level of prisoners, then firms= demand for convict labor would have decreased.

The training situation is different from slavery because an owner had claim to a slave=s lifetime income stream. If an owner anticipated that training a slave would be a profitable investment, the training would be financed. With convicts, however, an employer=s claim was only to the end of a convict=s term or the employer=s contract. So the anticipated stream of earnings from investment in convict=s training was generally shorter than the anticipated stream from training a slave. Training a convict, therefore, was much like providing general training for free labor: It would have been paid for by the seller of labor services (the state in the case of convicts). An employer would pay only a share of the training costs such that a normal rate of return was expected over the contract period.

able-bodied convicts to employers. See Kentucky (pp. 19-20). A contract for producing iron in the Texas State Prison classified and priced convicts in three classes. See Texas, 1885 (p. 11).

¹⁸For example, the harness and saddlery contract in the Tennessee prison specified a price per convict increased over time as convicts became experienced, and contracts for foundry labor in Ohio, Maryland, and Indiana prisons had provisions whereby new convicts were furnished at a zero price for a learning period. See Tennessee. A Wisconsin contract also provided for the price to increase as the convicts became more efficient. See Wisconsin, 1913, (p. 5). A North Carolina contract for shoe manufacturing provided that the state receive 30 cents per day for new workers. After a month, the wage rose to 55 cents per day, but the employer had the right to reject workers who failed to perform properly. (See North Carolina.)

Another potentially important difference is that convict labor was less variable as a factor of production than either free or slave labor. With free labor, a firm could hire or lay-off workers, depending on demand for its product. Slaves, too, could be bought or sold to increase or decrease the quantity of labor. With convicts, however, the quantity of labor depends ultimately on the flow into and out of prison as determined by crime, law enforcement, and punishment, rather than demand for a firm's product.¹⁹ Although some contracts provided for limited short-run adjustments, long-run adjustments in the scale of a prison firm were constrained by the stock of convicts in a prison.²⁰ Again, disadvantages from lack of control for the quantity of convict labor would show up in the prices bid for convict labor contracts. If lack of control over the quantity of labor became more disadvantageous as manufacturing became more sophisticated, the demand for convict labor would have decreased.

¹⁹Roback (1984) has shown evidence from the Jim Crow era (post mid-1890s) in the South that the penal authorities would make short-run adjustments in the supply of convict labor, such as, by enforcing the vagrancy laws during harvest time. Most prison populations were quite steady, but there was substantial turnover. Half of the prisoners sent to the South Carolina penitentiary in 1894 were for terms of one year or less. (See South Carolina.)

²⁰A stove producer's contract for convicts in New York specified that the employer could adjust the quantity of convicts employed on January 1 of each year. During the year, the quantity could be increased but not decreased. See Gildermeister (p. 259). A knitting shop contract in Wisconsin contained an option by which the quantity of labor could be decreased during the year. (See Wisconsin, 1914, p. 15.) The contracts for Alabama prisoners to mine coal and produce lumber made no provision for changing the quantity of labor, but they tied the price per prisoner to the price paid free miners and the market price of lumber. (See Alabama, p. 17.) However, the Texas contract of 1883 made the lessees responsible for all prisoners over a 15-year period at a fixed price per year. (See Texas, 1882, pp. 61-2.)

In summary, there are several reasons why the demand for contract labor may have decreased during the 1880s and continued on a downward trend over time. This idea can be reconciled with the evidence on the viability of urban slavery. Hence, decreasing demand for convict labor could have been the main force behind its decline over the period 1880-1940. In this case, public regulation prohibiting and restricting convict labor would have followed rather than led its demise.

If declining demand is the primary determinant for the end of privately employed convict labor, there would, during such times, be similar declines in various prisons across states. If, on the other hand, public regulation is the primary determinant, decreases in convict labor would have been more closely related to the political power of organized labor than characteristics of prison industries. To test this notion and others derived from the economics of convict labor, we now turn to empirical analysis.

Empirical analysis

Evidence pertaining to the treatment of privately employed convicts and to the relation between trade unions and the decline of the contract system is presented here. The theoretical analysis predicts that convict labor was worked harder than comparable free labor and that the productivity extracted from convicts was inversely related to the average length of sentence in a prison. The evidence supports this hypothesis. In particular, it shows the predicted inverse relation between length of sentence and relative productivity of convict and free labor.

The idea that private employment of convict labor ended because special interest groups acquired legislative restrictions implies that contract employment was inversely related to the political power of labor unions and rival producers. This predicted relationship shows up in the empirical results: across states, private employment of convicts was significantly lower where union power was greater and rival producers were more important.

Relative productivity and average sentence

Our theoretical analysis predicted that more work was extracted from privately employed convicts than was supplied by comparable free workers and that relatively more productivity was extracted where convicts had shorter sentences. This hypothesis about working conditions under the contract system can be tested with data from the U.S. Commissioner of Labor's 1887 report on convict labor. For each prison, the report shows the average length of convicts' sentences, the number of privately and publicly employed convicts, and the number of free workers necessary to do the same amount of work as the convicts.²¹

We use the ratio of actual convict workers to equivalent free workers (the number of convicts per free worker) as the measure of relative productivity. The range of this statistic is from a maximum relative productivity of 0.54, where 0.54 convicts produced the same as one free worker, to a minimum of 5.5, where 5.5 convicts produced the same as one free worker. When productivity measured as the number of convicts per free worker is regressed on average sentence, the predicted inverse relation between relative and length of sentence translates into a positive coefficient for length of sentence indicating that the longer the sentence, the more convicts required to do the work of one free worker.

The theory implies that relative productivity is influenced by convicts' wealth as well as sentence length, because wealthier convicts would purchase better working conditions. With sentence length held constant, less productivity would be extracted from wealthier convicts than from poor convicts. Consequently, wealth should enter the regression equation with a positive coefficient. As wealth increases, the number of convicts per worker equivalent increases. Income per capita for each state in the year 1880 is used as a proxy for convict

²¹The statistics on free labor necessary to do the convicts' work are estimates collected from prison officials and others familiar with the work (U.S. Commissioner of Labor, p. 291).

wealth.²² The idea here is that in states where per capita income and thereby wealth is relatively high, convicts on average will have more wealth with which to acquire less rigorous working conditions.

²²The income data for each state are taken from Easterlin (pp. 99-101).

Notice that there is also an implicit wealth effect in the sentence length variable, since *ceteris paribus* convicts with shorter sentences have more wealth due to less foregone income for their human capital. This effect would work against extracting more productivity from convicts with shorter sentences. No attempt has been made to separate the indirect wealth effect of sentence length from its opposite direct effect on relative productivity. We presume however, that the direct effect will dominate.

Another variable that should affect relative productivity is age, in that older convicts are likely to have more human capital and, therefore, be relatively more productive than younger convicts. To account for age, we use average age of convicts in each prison from the Commissioner of Labor=s report on convict labor. The regression coefficient for age should be negative because greater age will increase productivity and, thereby, decrease the number of convicts per free labor equivalent.

The preceding variables will be used to estimate ordinary least squares, cross-section regressions in the form:

$$\log RP = b_0 + b_1S + b_2Y + b_3A + E, \quad (1)$$

where RP is relative productivity (number of privately employed convicts in a prison/free laborers required for the same work), S is the average sentence length for convicts in the prison, Y is per capita income in the state where the prison is located, and A is the average age of convicts in the prison. The term E is a random disturbance; the term b_0 is a constant. The semi-logarithmic functional form is suggested by the scatter between RP and S. Variables RP, S, and A are all observed in 1886; Y is observed in 1880.

The regression statistics are presented in Table 6. The results uniformly support the theoretical predictions: Convict productivity relative to free labor is greater where sentences are shorter, where per capita income is lower, and where convicts are older. First, consider

regression equation 1 that estimates the relative productivity of privately employed convicts for a sample of 171 prisons. The coefficients of S and Y both have the expected positive signs, and both are significantly different from zero at high confidence levels. Next, average convict age, A, is included in regression 2; however, the sample size is reduced considerably because numerous prisons did not report any value of A. The estimated coefficient of A is negative as predicted, although it is insignificantly different from zero at the .05 level. The coefficients of S and Y, however, are again positive and statistically significant.

Finally, regression 3 provides a check on the results in 1 and 2 by estimating an equation like 2 for prisons with publicly employed convicts. That is, 3 regresses the ratio of number of publicly employed convicts to equivalent free workers on appropriate values of S, Y, and A. Without the profit incentive that motivates the extraction of productivity from privately employed convicts, there should be no systematic relationship between relative productivity (RP) and S and Y for publicly employed convicts. If there is such a relationship, it would raise serious doubt that regressions 1 and 2 actually estimated the relationship that they were interpreted as showing.²³ As it turns out, however, the results for 3 add support to the evidence in 1 and 2; neither S nor Y are statistically significant at the .05 level. Furthermore, S enters the regression with a negative sign indicating that if there is any relationship it is opposite that of privately employed convicts. Relative productivity increases with sentence length for public employment. The age variable (A) is negative and significant. This is not unexpected because it is a reasonable result that convicts with more human capital would be more productive under either public or private employment.

²³Alternatively, the same regression results in equation 3 in Table 6 would raise a question of whether public employment of convicts really had any different working conditions than private employment despite reformers' claims that they were substantially different.

The evidence in 3 also serves to contradict the alternative interpretation of 1 and 2 that more productive workers may systematically commit crimes that receive shorter sentences. If this were so, it would show up under both private and public employment. The difference between 2 and 3 eliminates this interpretation.

Overall, the evidence on productivity in Table 6 provides strong support for the theory of working conditions for forced labor. The relationship between relative productivity and length of sentence shows up clearly. The convicts were worked harder where their sentences and, thereby, their prison working lives were shorter. Since the convicts were not destitute, wealth seems to have been used to mitigate the convicts' working conditions. These results lend indirect support to the idea that free labor would have found prison working conditions unacceptable for itself even if it had been paid its marginal product.

Private employment and special interests

If the political activity of trade unions and rival producers caused the decline in private employment of convicts, there should be less private employment where special interests had more political power. We test this notion by estimating the relationship between the percentage of privately employed convicts in each state and measures of interest groups' political power.

Data on convict labor by state are readily available. The problem is finding empirical counterparts to the special interests' political power. The economic theory of regulation has not discovered much about the determinants of groups' relative political power. Furthermore, data for the years in question are often unavailable or incomplete. Consequently, the variables used to measure political power are only approximations. A regression that tests this relationship is reported in equation (2) below. The variables reported, their sources, and the reason for their inclusion are as follow.

$$\begin{aligned} \log PP = & 0.724 - 0.0724TSx10^{-2} - 2.338M + 0.32TXx10^{-4} \quad (2) \\ & (12.112) \quad (-3.031) \quad (-4.271) \quad (0.495) \\ & + 0.400EFx10^{-2} - 0.116R - 0.709P \\ & (2.079) \quad (-2.182) \quad (-10.794) \end{aligned}$$

$$R^2 = 0.820 \quad SEE = 0.149 \quad N = 41$$

(Figures in parentheses are t-ratios.)

PP is the dependent variable. It is the number of prisoners privately employed divided by the total number of prisoners, by state in 1885. (U.S. Congress, *Bulletin of the Department of Labor*)

TS is the number of trade societies, commonly called trade unions, by state on May 31, 1880. (Weeks) This measure is used because union membership by state is not available until 1939. As the number of unions in a state increases, the political power of organized labor increases, and the share of convicts privately employed falls. Hence, a negative sign is expected for TS.

M is the value of manufacturing produced by firms that compete with prison labor by state in 1885 divided by the total value of manufacturing by state in 1880. (U.S. Congress, *Bulletin of the Department of Labor* and U.S. Department of the Interior, *Report on Valuation*) This is an attempt to measure political power of rival firms. As the share of rival firms in state manufacturing increases, the rivals have more political power and should be able to restrict private employment of convicts. Hence, a negative sign is expected for M.

TX is the aggregate value of taxes levied for state and local purposes divided by the population, by state in 1880. (U.S. Department of the Interior, *Report on Valuation*) This is intended to measure a state's demand for public programs, including public employment. The expected sign for TX is unclear. Public employees will oppose competition from prison labor, but state officials might want to use the labor to reduce prison costs.

EF is total employment in firms that compete with prison labor divided by the total number of firms that compete with prison labor, by state in 1885. (U.S. Congress, *Bulletin of the Department of Labor*) In general, the larger this ratio, the more concentrated is employment. If concentration implies a lesser degree of competition among employers for employees, then the threat of convict labor as a substitute for free labor may give employers added leverage. A high ratio may indicate a relatively small number of producers in industries that compete with prison labor, so there are fewer producers to lobby for restrictions. In these cases the sign would be expected to be positive. If labor markets are highly competitive and the number of firms in an industry that competes with prison labor is not related to political influence in the legislature, then the expected sign is unclear.

R is a dummy variable for states that restricted, but had not prohibited, the private employment of convict labor in or prior to 1895. R takes the value 1 for states with restrictions and 0 otherwise. For example, an act approved April 2, 1887 in Colorado provides that convicts shall not be hired out for the purpose of carrying on an industry that comes in competition with free labor in that state. (U.S. Commissioner of Labor, *Second Annual Report 1886*, and U.S. Congress, *Bulletin of the Department of Labor*) The expected sign is negative.

P is a dummy variable for states that prohibited the private employment of convict labor in or prior to 1895. P takes the value 1 for states with prohibition and 0 otherwise. For example, an act approved in 1889 in Washington state provides that the labor of convicts shall not be let out by contract to any business. (Source is the same as for R) The expected sign is negative.

The results were basically what we expected. TX is not significant, which is consistent with our thinking that its effect is ambiguous. All other variables are significant and are signed as predicted.

In sum, the results presented here suggest that the demise of the contract system of convict labor was linked to political efforts by trade unions and the growth of rival firms that did not use prison labor. There is no clear evidence that the decline in private use of

prison labor was due to economic inefficiency of that labor as a supply source.

Concluding remarks

Although the subject of convict labor does not have the historical importance of slave labor or even of indentured servitude, it has enough similarities to, and differences from, these institutions to make it a worthwhile subject for study. In particular, the study of convict labor provides a source of evidence for propositions about the economy of forced labor. The evidence here seems to confirm Barzel's insights about the productivity of forced labor. Further, the apparent role of unions in working to reduce competition from convict labor offers an interesting parallel to Goldin's findings about the role of organized labor in attacking urban slavery and excluding ex-slaves from skilled trades in the post-Civil War period.

The historical evidence indicates that prisoners today could do substantially more to help cover the costs of their incarceration and, in doing so, learn some marketable job skills of use at the end of their sentences. Special interest interference with the constructive use of this labor may be the primary reason the costs of prison are higher than necessary and the prisoners are denied the chance to gain useful employment skills.

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