Economic Consequences of Coercive Institutions: Evidence from the US Convict Labor System

By Michael Poyker*

I explore institutions of forced labor in the United States of America. Competition with convict labor producing low-quality goods made returns to capital more attractive relative to return to labor, negatively affecting low-skilled population and benefiting capital-owners. By using a new dataset of US convict labor camps at the end of 19 century, I show that convict labor camps increased capital-labor ratio and decreased manufacturing wages of women. In addition, those counties currently have lower absolute upward mobility and higher relative upward mobility. I use the creation of National Prison Association in 1870 in Cincinnati, Ohio as a quasi-natural experiment. Inspired and organized solely by Rev. Enoch Wines, that event led to a creation of industrial and agricultural departments at prisons across the US. I use distance to Cincinnati as an instrument for convict labor camps output to show that the effect of convict labor on historical and contemporary outcomes is causal. I find that one standard deviation increase in the value of prison-made goods increased capital-labor ratio and decreased average wage of women in manufacturing by 16% and 10% of their standard deviations, respectively. Moreover, 1% increase in a value of goods produced by convicts resulted in a decrease of the probability of a person being born in lower income quintile to move into the top quintile by 0.42 percentage points. I use a series of robustness and sensitivity checks, and placebo tests to ensure that results are indeed causal.

Key words: Convict labor, Coercive Institutions, Economic Development, Intergenerational Mobility
JEL Codes: F1, F16, N26

This Version: December 31, 2016. For the latest version click here

VERY PRELIMINARY AND INCOMPLETE. COMMENTS ARE WELCOME

* Poyker: UCLA, Anderson School of Management, 110 Westwood Plaza, C502 Entrepreneurs Hall, Los Angeles, CA 90095-1481, mikhail.poyker.1@anderson.ucla.edu. The author is grateful to Omer Ali, Maxim Ananyev, Christian Dippel, Sebastian Edwards, Katherine Eriksson, Paola Giuliano, Vasily Korovkin, Adriana Lleras-Muney, Alexey Makarin, Konstantin Platonov, Yuan Tian, Nico Voigtländer, Till von Wachter, Romain Wacziarg, participants at All-UC Economic History Group Conference in Davis 2016, conference participants at APSA 2016, and seminar participants at UCLA for excellent suggestions. All errors are mine.

Institutional history has a profound influence on economic development and world inequality as many countries today still live in the shadow of colonial institutions established more than at least a century ago. One of the most damaging of such institutions is forced labor. When elites are able to coerce part of the population to perform unpaid labor, it can cement growth-killing power arrangements, reduce innovation, cripple "creative destruction" and eventually lead to lackluster economic growth. This study is part of the agenda of studying medium and long-term consequences of the forced labor institutions. While many other papers look at the institutions of developing nations, I explore institutions of forced labor in one of the most developed nations of the world: United States of America. Certainly, it might seem paradoxical to look at the adverse effects of forced labor in a country that rightfully belongs to the club of the richest nations, but one should be aware of an unequal distribution of the benefits of economic development in the US (Oliver and Shapiro (2006); Frank (2009); Chetty et al. (2014*a*,*b*)).

Convict labor was always a controversial topic that was riven with acrimony. New England settlers wanted to remedy moral failures of criminals by making them perform hard labor, and now its proponents argue that in-prison labor creates skills needed for the after release employment (McKelvey (1933, 1977); Shapiro (2011); Whitehead (2012)). However, while there is still a debate if convict labor is the best way to rehabilitate inmates or not, externalities of such labor have never been thoroughly studied.

Contemporary US convict labor system employs nearly one million prisoners (Fraser and Freeman (2012)), and while exact statistics about its output does not exist, some sources estimate the minimum annual value of industrial output produced in 2500 prisons and jails across the US as $2 billion (Dyer (2000) p.18-19). Prisoners are not allowed to have labor unions and their wage is way below minimum wage, ranging from $0.16 to $4.73 for state prisons.[1] The situation is not unique to the United States: (almost) unpaid prison labor is used in almost all other countries around the world. China and Russia employs up to 2 mln. and 0.5 mln. convicts correspondingly.[2] For example in the United Kingdom, in 2012, Prescoed prison in Monmouthshire, south Wales started to "lease out" inmates to the local firms allowing them to pay 6% of the minimal wage. That resulted in firing the free laborer and their substitution with the prisoners.[3] In Russia, inspired by "glorious" traditions of Antebellum South the government imposed convict leasing starting from 2017 and allowed state-owned companies to house and employ prisoners.[4] Finally, in addition to the convict labor, other types of coerced labor such as military labor, peonage, indentured labor, debt bondage,

[1]Some prisoners in Georgia and Texas even had zero wage (Camp and Camp (2002) p.130-131, fn6). For more detailed information about wages in prison industrial complex see Wagner and Sarabi (2003).

[2]Research Foundation, Laogai (2006) and `http://www.forbes.ru/sobytiya/biznes/248825-v-zone-pribyli-kto-i-skolko-zarabatyvaet-na-zaklyuchennykh`.

[3]`https://www.theguardian.com/society/2012/aug/08/prisoners-call-centre-fired-staff`

[4]`https://themoscowtimes.com/news/russian-justice-system-to-reintroduce-forced-labor-in-2017-55589`

and sharecropping are very similar in terms of the lower price of labor (van der Linden and García (2016)).

The question arise if usage of cheap convict labor is harmful for competition with firms that cannot use free labor and free laborers that are substituted away with prisoners? Despite numerous evidence of substitution of free laborers with convicts and complains of firms employing free labor on malevolent competition, unfortunately, it is close to impossible to identify causal effects due to explicit endogeneity embedding the question of interest. However, the task is solvable if we look back into the history of convict labor system: 1870s to 1940s.

Before the Civil War usage of convict labor in industrial manufacturing was virtually nonexisting.[5] With the increase in the crime and incarceration rates after the end of the Civil War states' governments were struggling to finance swelling expenditures on corrections. In 1870, the secretary of the New York Prison Association - Reverent Enoch Wines with a help of few believers in rehabilitation of prisoners through education and labor like himself convinced the governor of Ohio (not yet a president of the United States) Rutherford Hayes to organize a conference in Cincinnati: first congress of the National Prison Association (hereafter NPA).[6] Wines were able to gather 140 delegates from 24 states, that signed the "Declaration of Principles" that emphasized the importance of labor as rehabilitation process, that awards skills to prisoners that will help them to find a job upon release. Probably, more important was the fact, that they presented a number of papers describing successful self-sufficient and profitable existence of the New York prisons, and prisons using convict labor in various industries around the globe (e.g. Irish system) (Wines (1871)).

It is unclear if the well-being of prisoners guided delegates of that congress the same way as Reverent Wines or that they cared about the profitability of their prisons, but after 1870 industrial and agricultural complexes started to appear in almost all correctional facilities and jails. Prison-made goods become so widespread and caused so much complaints from firms that were competing with prisons that Senate and House of Representative directed the Commissioner of Labor to collect data concerning convict labor in 1886 and analyze if convict labor affects firms using free labor in the same industries (US Department of Labor (1887)). For this paper, I accessed and digitalized those documents to create a novel dataset of convict labor in the United States that spans 1886 to 1940.

Those reports draw a picturesque description of events that was happening during the time when a prison opened industrial department. Such convict labor camp would start to sell final low-quality goods on the open market. Prices of a prison-made goods were very low and local firms had to wait until prison sell

[5]The only exception is the New York state prison system, that started to use convict labor since the creation of the Auburn prison in 1818. More about the history of convict labor in the US is in the next Section.

[6]The organization exists nowadays under the name of "National Correctional Association" (`www.aca.org`) and is the main US supranational prison overseeing association devoted to rehabilitation of prisoners through labor and education.

everything before they could start to sell something themselves: "*Our minimum price of bungalow aprons is about one-third higher than the prison-made goods. We can compete with them only because they do not produce enough to supply the market and then only by selling as close as possible to their price on a small margin of profit*". They were having losses and had to try to decrease the wages (US Department of Labor (1887, 1925)): "*I cut the wages of the girls... Under ordinary circumstances our girls make from $18 to $20 a week... if we keep the cost down to a figure that will make it possible to make goods, a girl can not make more than $2 a day*". However, they still couldn't compete with prisons employing almost free labor. Then those firms that did not close, started to increase the quality of their goods or produce higher grades of the same type of final goods in order to compete with low-quality prison-made goods in a lesser extend. It required higher capital investment, and fewer low-skilled laborers . As a result, firms operating in the same industry as their local prison partially die out while the rest became bigger in terms of capital, and started to rely less on the low-skilled labor.

While prison labor was involved in quite a few industries, the majority of prisons were creating clothes and shoes. Those industries were primarily employing women, and thus they were the most affected by the existence of coerced labor. While demand for their labor decreased only in affected industries, because of the excess supply of labor the overall women's wage adjusted downward. Overall, I found, that counties with a larger values of output produced by prisons had higher capital-labor ratio and smaller wages of women in manufacturing, while no effect on employment of women in manufacturing observed.

In addition to the effect on firms, due to this monopolization in affected industries, capital owners gained, the same way as high-skilled workers, demand on whose labor had increased. At the same time, because of competition with almost free prison labor the poorest low-skilled workers (especially women) were worse off due to the distortion of wages. Thus introduction of prison labor made local poor even poorer, while everybody else benefited from the situation. I argue that convict labor affected intergenerational mobility, and made it lower for the poorest population and higher for everyone else.

I start my analysis by employing OLS estimation on the county-level cross-sectional data. I show correlation of the value of prison-made output in 1886 and variables of interest in 1900, and discuss the direction of possible biases. To alleviate endogeneity problems and show the causal effect of convict labor camps on local firms, I use IV estimation and the distance to Cincinnati, Ohio as an instrument. The idea behind the instrument is that those wardens of prisons living closer to Cincinnati were more likely to come and find out about of usage of convict labor and thus more likely to suggest installment of industrial and agricultural departments within their prisons in order to help rehabilitate prisoners with hard labor and try to make prisons less of a burden for states budgets. Thus I use IV estimation by instrumenting the value of goods produced by labor camps

with distance from counties' centroids to Cincinnati. I found, that one standard deviation increase in the value of prison-made output increases capital-labor ratio and decreases average wage of women in manufacturing by 16% and 10% of their standard deviations.

To show that the effect is not spurious I perform a number of robustness, sensitivity, and placebo checks. First, I show that my IV make sense, and distance to Cincinnati is a good predictor for the number of delegates of the NPA congress, and does not predict any important county-level characteristics in 1870. Moreover, I show, that all effect of the instrument comes through the states that had representatives on the NPA congress. In addition, I estimate a series of placebo tests, where I use distances to all US counties as an instrument, and show that distance to Cincinnati yields one of the strongest first stage results. Second, I show that the results are not driven by the subsample of states, and are robust to exclusion former Confederate and slave states, states that did not have legal state status at 1870 or Deep South states. Finally, I relax exogeneity assumption and following Conley, Hansen and Rossi (2012), show that my coefficients of interest remain significant.

In addition, I study the persistent effect of the convict labor legacy on the contemporary social mobility in the US. First using data from Chetty et al. (2014*a*) I document that those counties that experienced more extensive usage of convicts currently have lower absolute upward mobility (bottom to top) and higher relative upward mobility (top to top) for the 1980-1984 birth cohort. Second I employ IV estimates to show the causal effect of convict labor on the absolute and relative upward mobility. I find that a 1 percent increase in a value of goods produced by convicts results in a decrease of the probability of a person being born in lower income quintile to move into the top quintile by 0.42 percentage points. At the same time, it has a positive effect on relative upward mobility: 1 percent increase in a value of goods produced by convicts increases an rank-rank slope by 0.0057 percentage points.

To show the robustness of my results I perform similar tests that for the contemporary effect of convict labor. However, one can say that distance to Cincinnati captures trade or migration patterns that appear between 1870 and 1980s. To alleviate this concern using data from Donaldson and Hornbeck (2016) instead of direct distance to Cincinnati I use railroad based distance, that takes into account infrastructure existing in 1870.

Finally, I study the mechanism of how convict labor camps affect contemporary social mobility. In particularly, I show that convict labor camps remain a significant factor affecting upward mobility even upon addition of the most robust univariate correlation with upward mobility described in Chetty et al. (2014*a*): segregation, inequality, school quality, social capital, and family structure. This fact suggests, that convict labor camps affect social mobility through the channel different from those described by Chetty et al. (2014*a*). However, the convict labor camps become insignificant when I control on the contemporary capital-labor

ratio.

My contribution to the literature lies in the following aspects. First, this is the first economic paper that studies the coercive institutions in the United States and the first paper that show a causal effect of convict labor on local firms.[7]

Second, this paper contributes to the field of institutional economy related to coerced labor (Fogel and Stanley (1974); Wright (1978); Acemoglu and Wolitzky (2011)). Previous studies highlighted the importance of the institutions and differences in the initial factor endowments in explaining the degree of inequality in wealth, human capital, and economic growth (Engerman and Sokoloff (2002, 2005)). Dippel, Greif and Trefler (2015) show that predisposition in sugar suitability determined how coercive institutions evolved due to sugar price changes.

Third, the paper is related to the literature related to coerced labor and long-run economic consequences. Buggle and Nafziger (2015); Markevich and Zhuravskayaa (2017) studies economic consequences of the institutions on serfdom in Russian Empire, while Kapelko and Markevich (2014); Kapelko, Markevich and Zhuravskaya (2015) investigate the consequences of Soviet GULAG. Dell (2010) examined the long-run adverse impacts of the forced mining labor system in XVI-XIX century Peru and Bolivia on contemporary health outcomes. Although, a growing literature continues to study the importance of institutions the case of US convict labor system is unique as it allows to show the persistent effect of labor coercion on economic outcomes and distinguish the channel of its effect.

The paper also speaks to the literature on intergenerational mobility, such as recent seminal contribution by Chetty et al. (2014*a*), who measured upward mobility in the US.

The paper is organized as follows. The historical background of convict labor in the United States is introduced in Section I. Section II describes the data. Identification strategy, estimation results, and robustness checks are presented in Section III. In Section V I discuss the long-run effect of convict labor on intergenerational mobility, and try to identify the mechanism in Section V.A. Section VI contains concluding remarks.

I. Convict labor: Historical Background and Implications

A. Types of Convict labor System in the US

Convict labor system in the US had long evolution in the past 150 years. Nevertheless, the development of penitentiary was integrally related to rapid industrialization and convict labor become widespread only after the Civil War (Wilson (1933)). At first, hard labor was seen as more humane and effective punishment than physical punishment (influenced by Quakers' and Protestant beliefs), but

[7]While sociologists and criminologists were studying convict labor thoroughly over last century, only few qualitative papers were raising the topics of malevolent competition between prison-made goods and goods created by the free-laborers (Wilson (1933); McKelvey (1934); Roback (1984)).

with time convict labor become an important source of income for state government.

After the Civil War, US states started to impose convict labor laws allowing to employ prisoners into productive labor. Laws varied a lot in terms of profitability for the state and other parties involved, and working conditions of prisoners. For example, convict leasing was the most profitable form that allowed states to auction prisoners and bear no costs for keeping them in correctional facilities. Such prisoners were usually employed in hard unpaid labor in mines or plantations and kept in conditions close those of slaves. At the same time, milder forms of convict labor allowed using prisoners only for creating goods inside the prisons for sale or for in-prison consumption. All states used convict labor, and all but 5 states (DC, Idaho, Montana, North Dakota, and Utah) involved private contractors.

There were six systems of convict labor: "contracts system", "piece-price system", "state-account system", "state-use system", "public works and ways", and "convict leasing" system[8].

1) Under the contract system prison officers, under legal instruction, advertise for bids for the employment of the convicts of their respective institutions, the highest responsible bidder securing the contract. The contractor engaged to employ a certain number of convicts at a certain price per day. Institution or the state furnishing power, and sometimes machinery, but rarely tools. All convicts were employed within the walls of the prison.

2) The piece-price system was in a way similar to the contract system. At the same time contractor had nothing whatever to do with the convicts. The contractor furnished the prison officers with material ready for manufacturing, and the prison officers agreed to return the completed work, for which the government received a certain agreed price per piece. Thus, under this system contractor had no position in the prison.

3) The third type was a state-account system, where prison acted as a firm and sold goods on the market thus assuming all business risks. As a result all profit went directly to States, however, this system had two major problems. First, was managerial, as wardens could be bad businessmen, and, second, as prison needed to employ convicts even if there was no demand for the goods produced.

4) The state-use system is very similar to the state-account system, with the exception of the fact that use of sales of goods was limited exclusively to State departments and agencies.

5) The public works and ways system first become a separate type of convict labor system in US Department of Labor (1906), however, previously it was

[8]Before 1905 "state-account system", "state-use system", and "public works and ways" were inseparably combined, and "state-account system" was called "public-account system".

counted as part of other convict labor systems. As it is clear from the name, prisoners were engaged in the construction and repair of public works and ways rather than in the productions of goods for consumption.

6) The last convict labor system was convict leasing. Prisons and local sheriffs had right to "lease" convicts to private individuals, firms or farms\plantation. The lessee paid to the prison (government) and personally public officials involved in the usage of convicts and was responsible for feeding, clothing, and housing (Sellin (1976)). Convict leasing was the most profitable system of convict labor (US Department of Labor (1887, 1906, 1925, 1933, 1941)) for the States.

"Convict leasing", "contract" and "piece price" system of convict labor assumed private operation of the convict labor and were producing goods that were sold on the open market (often interstate) thus competing with the free labor. First, convict labor was significantly cheaper than the free labor. Second, some types of convict labor system were criticized in particular, such as firms that were operated under the contract system was criticized due to lower than the market price of good produced. Public account system was similar in a way that the goods were produced for open sale and thus competed with goods produced by free labor.

At the same time, "State use" and "Public works and ways" systems intended to produce goods that would be consumed by the prison itself or by the state where they were produced. According to the Bureau of Labor (US Department of Labor (1887, 1906, 1925, 1933, 1941)), this factor made them less dangerous for the free labor in terms of competition. .

No matter which system was used, prison labor competes with free labor to some extent. And since approximately 60% (Sharkey and Patterson (1933)) of all prison-made goods were sold in states other than that their state of origin firms that were using free labor was unhappy about convict labor everywhere across the US. Much opposition to the prison made goods has therefore developed, however, states could only pass legislation regulating production the convict-made goods in their own state and could not regulate interstate trade. United States Congress has attempted to enact some legislation prohibiting usage of prison labor since the beginning of the 1900s however, the first anti-penal labor law (Hawes-Cooper Convict Labor Act) was signed in 1929 and was enacted on January 19th, 1934. That Act allowed states to prohibit sales of convict-made goods produced in other states.

During next two years two more federal laws were signed and enact (Ashurst-Sumners act, 1935, and Walsh–Healey Public Contracts Acts, 1936) that basically prohibited any usage of convict labor as they prohibited interstate trade and private contracts on a usage of convict labor that exceeds $10,000.

As can be seen in Tables 1, private forms of convict labor were more popular at the begging[9]. However, private control systems (convict leasing, contract,

[9]Similar trends can be observed for the number of employed convicts in Table A2.

and piece-price) were gradually replaced with the state-account, state use and public works and ways systems due to increasing social pressure (US Department of Labor (1914); Sharkey and Patterson (1933)) until in 1936 two federal laws (Ashurst-Sumners and Walsh–Healey Public Contracts Acts, 1936) prohibited usage of convict labor for producing goods for sale.[10]

As can be seen in the Table 1 the trend toward a decrease of those forms of convict labor that produce goods for sale on the open market existed long before 1936. However, it is important to notice two smaller trends. First convict leasing, existing mostly in southern states, was officially abolishing such as the report of 1923 states that it has dissipated. However, convicts were redirected to work under public works and ways system (by constructing highways and railroads) or to penal state farms to harvest cotton under the state use system (Shichor (1995)). Thus the share of private convict leasing was distributed between state use and public works and ways systems. Second, contract system was the most popular in 1885, however, due to growth of unions and as a result bargaining power of those forces that were fighting against usage of convict labor, state legislators were trying to substitute old contract system with similar piece-price system under the excuse that it is less harmful in terms of competition with the free labor (US Department of Labor (1914); Sharkey and Patterson (1933)). However, as can be seen, over time the share of these two systems declined from 76.4% in 1886 to 22% in 1932.

Table 1—Evolution of convict labor: Share of total value of goods produced

System	1886	1895	1905	1914	1923	1932	1940
Convict leasing	15	11.4	9	1.8	0	0	0
Contract	70.3	43	48.6	26.2	24	8	0
Piece-price	6.1	19.9	9.4	6.5	16.2	14	0.5
State-account			13.9	36.9	21.6	16.4	15.6
State-use	8.5	25.7	10.7	22.3	18.1	28.2	60.2
Public works and ways			8.4	6.4	20.1	33.4	23.7

Note: State-account, state-use and public works and ways systems were reported together as a public-account system before 1905.
Source: labor camps: US Department of labor.

B. Factual Records on Competition between Convict and Free Labor

Needless to say, that usage of convict labor was a controversial topic. Most of the firms that were using free labor were complaining about the unfair competition that they suffer because of the firms that were using convict labor or prisons that

[10]For the exception of contracts of less than $10000 in value.

were operating as a firm by themselves (US Department of Labor (1887, 1906, 1925, 1933, 1941)).[11] While the list of complaints differs from industry to industry, there are certain issues that were common for most of them.

Probably, the most important complaint was about the low-wage of the prisoners. Prisons either pay too little or did not pay anything at all to the prisoners.[12]

Lower wages meant lower labor costs for the prison or firm employing prisoners, thus making the final goods cheaper. For example, apron manufacturers in Illinois and Ohio (US Department of Labor (1925)) describe the situation as follows:

> "*The prison contractors have recently been selling goods at 98 cents which it would cost us 98 cents to produce. ... In 1919 we employed 100 people. We are now employing 40.*"
>
> "*At first we tried to ignore the prison-made goods, but larger sales of prison aprons were put on here three months ago and the market was demoralized for the last 90 days. Garments that would cost $8 a dozen [$0.66 apiece] to manufacture are retailing here at 79 cents apiece. On our product most nearly similar to the prison-made aprons, our costs are $5.28 for cloth and trimming, 95 cents labor cost, $1.45 overhead, and 60 cents for selling totaling $8.28... Within the last 45 days we have decreased our force 45 per cent. ... We had been producing 3000 dozen a month. We are now making 1600 dozen a month.*
>
> *Our price rates are on the basis of paying 45 cents an hour. If this sort of competition does not ease up, we will have to leave here and move into some county town where we can reduce on labor cost.*"

However, even in the countryside, the labor cost was too high: for example a manufacturer based in a country around the city where the previous Ohio manufacturer was interviewed said: "*Even in a country factory such as this it is impossible to compete with prison products.*"

In many cases the situation was exacerbated due to minimum wage laws: "*Under our [Illinois] minimum wage laws we must pay a beginner $9 per week. She earns about $4 the first week. Instead of the $1 we figure for labor cost, her work cost us $1.50. It takes four weeks before she earns what she is paid and she never makes up the difference because she goes onto piece rates and is paid for what she does. The prison has no labor laws and under their contracts, the amount the contractor pays is reduced in proportion if the output does not measure up to the contract terms.*" (US Department of Labor (1925)).

In most cases, such unfair competition led to the situation that firms using free labor had to "*let them sell their production before we can begin*", as was noticed by a twine manufacturer from Minnesota (US Department of Labor (1925)).

[11] Those reports contain the industry and the state where the manufacturers have their businesses. Some additional information can be inferred from the context, however, they do not report the exact locations.

[12] In addition to faster release as a result of working record, in some states, prisons were obligated to pay lump-sum payment equal to accumulated wage of the inmates. However, on practice prisoners were underpaid or did not receive anything at all (US Department of Labor (1887, 1906, 1925)).

In addition, some manufacturers were arguing, that state does not tax prisons, and often buy new equipment for prison using taxpayers money, thus making competition to be unfair not only in terms of the cost of labor: e.g. all binder twine machinery in Minnesota, Kansas, North Dakota, Missouri, Indiana, Michigan, South Dakota, Wisconsin, and Oklahoma was bought by the governments of their states. Prison industries were exempt from paying federal, state, county and municipal taxes (US Department of Labor (1925); Sharkey and Patterson (1933)). Moreover, "*a prison plant pays freight, and it may pay insurance, but its books show no payment for interest, depreciation, or carrying charges. These costs exist, nevertheless, and become a burden to the taxpayers.*"

However, even if some firms had to close, partially or for good, most of the firms survived. Even if prison-made goods were cheap, their quality was generally inferior to the quality of goods produced by the free labor. Quality was not only low in such industry as clothing, but in such industries that required standardized quality of the goods. For example, one of the largest free-labor manufacturers of twine in Minnesota noted: "*The most popular twine is "Standard" twine which is supposed to run, and is labeled to run, 500 feet to the pound. The free-labor twine is made under laws that require it to fulfill its guarantee, but State owned and operated plant is not amenable to its own State and can not be made to live up to honest mercantile standards, and, in fact, in a great many cases does not.*"

The solution was to switch to production of high-quality goods ("*we are trying to meet the situation by producing a better garment that will command a higher price...*" or *"We have found it impossible to compete in price with prison-made stoves. Our only method is to produce a higher grade article."*) or invent ("*we have to be constantly producing new styles and each new style makes additional expense.*" Firms started to buy better machinery to produce higher-grade goods (*"We have put in every modern machinery and process that we know of to produce our goods at a minimum cost."*), or buy higher quality materials that require less labor input ("*When poorer material or less trimming is used, more work is done.*"), and as a result started to higher more high-skilled workers and fire low-skilled workers. Alternatively, firms that used to have a low capital-labor ratio (thus relying on low-skilled labor) and could not afford to invest more capital would cease to exist. In either case, we will observe the increase in the capital-labor ratio.

Some small manufacturers were suggesting that "if someone business was large enough, it might be possible to fight prison competition...". This quote was made by a small apron manufacturer in Indiana, however, even big companies could not compete with it: e.g. the large plant in the same city in Indiana producing $3mln worth of merchandise annually had to close (US Department of Labor (1925)).

Now, we will look at the situation from the perspective of the low-skilled workers. As affected firms were trying to decrease the wage in order to keep up with the prison-made goods, the well-being of low-skilled laborer deteriorated. Moreover, as they decreased their demand for low-skilled labor (or close) the supply

of low-skilled labor in other non-affected industries increase, thus overall wages of all low-skilled laborers were distorted in all industries. This piece of evidence describe how the demand for low-skilled laborers reacted on prison competition:

> "*We have been forced to go into higher line. One of the worst element in the situation is the difficulty in training girls. When we had a large output of lower grade goods we put new hands on them. They could turn out the dresses rapidly, make better money and have enough showing in quality to hold their interest until they were expert enough to do the fancier garments. Now we cannot afford to produce enough of this class of merchandise for training purposes. Instead, men are being trained to it in prisons. They can never use this training after their discharge as this kind of work is wholly monopolized by women. A new girl put on the higher grade stuff in the factory can not make more than one garment a day and then it is not well done and she is under severe nervous strain. The girls become discouraged and quit and we have it all over again. We have girls crying around here all the time because they can not handle the only work we have for them. ... We have closed one plant with 40 machines, employing 50 girls, where we produced only the cheap goods. It was closed two years ago and we do not expect to operate it again. Prison labor has shot this industry to pieces.*"

Speaking the language of economics, if prison started to contract out prisoners or run a business by itself, it created an adverse shock to returns to labor for the firms in the locality, thus making capital relatively more attractive. In this case, firms started to shift their capital-to-labor ratio, by employing more capital and shrinking the share of labor. As a results owners of capital were benefiting, the same way as few skilled workers who remained employed, while low-skilled workers (in many cases women, black and foreign-born) were worse off either due to unemployment or distorted wages.

Probably, the most harmed population group were not just unskilled workers, but unskilled women, as the number of industries where they were employed was limited and prisons were heavily involved in them. Quoting one of the Michigan clothes manufacturers: "... *There are lots of girls who can't do higher grade work, who never become skilled enough to get on better goods. The incompetent girls are the victims of the criminals in prisons. The unskillful girl is simply out of luck. We used to use this low-end stuff to keep busy in slack times and stock up on them. Now we have to close since we can not stock up in this line and can not keep expensive street dresses in stock.*"

Here, I will provide a case study of New Jersey State Prison in the city of Trenton, Mercer county. One of the oldest prison in the United States it was opened in 1798 under the name of the Penitentiary House. Since then it adopted the Pennsylvanian prison system, where prisoners were serving solitude confinement and were doing some labor in their quarters while not in industrial scales

(Stonaker (1913); Barnes (1918); Jackson (1927)). The first time the prison gain profit for the state was in 1873 when it reported $30000 of surplus earnings (New Jersey Treasury Dept (1873)). By 1886 it was operated under the piece-price system of labor and the value of goods produced by Trenton's prison was equal to $835859.60. The majority (63.4%) of it came from the production of men's "low grade" and "common" clothes, while the rest came from the production of boots and shoes production (30.7%) and brooms and brushes (5.9%) (US Department of Labor (1887)).

At the same time, in the Secaucus, Hudson county, very close to the Jersey City, and since 1863 was operating a Jail and Workhouse at County Farm (State of New Jersey (1863)). By 1886, it was producing output comparable in the value $548740.5 with one in Trenton's prison. However, only 3.8% of its production was in men's clothing industry: they were producing men's clothes under state-use system and not for sale on the open market.[13] Another 2.6% of output came from road construction under the public works and ways system.[14] The rest 94.6% came from the "stone quarrying, cutting, and crushing" under the public account system.

In the Table 2 provide the closest comparison of the clothing industries in the cities of Trenton and Jersey City in 1870 and 1890. As both cities are situated close to each other, both had prisons, however, one of them, plausibly endogenous chose to be involved in the production of men's clothes, while other due to proximity to the stone quarry, become involved in quarrying instead. As can be seen, Trenton already had a small men's clothes industry represented by 22 firms with 8.8 employees on average, while New Jersey had both men's and women's clothes industries with even smaller by size firms, and very different in terms of capital-labor ratio. In 1890, all clothing industries in Trenton were producing $991011 worth of goods, while the local prison was producing clothes worth $530047.2 in 1886. There was only one man's clothing factory, too small to be included in the Census tables as a separate industry, and 37 small firms (6.7 employees on average), involved customary (not low grade) clothes and repairs. At the same time, women clothes industry was booming, with 159 very tiny firms and three factories.

These observations show no prima facie evidence against my hypothesis, since, there is almost no production in the same type of good where the competition with prison is the most severe, while men's clothes industry entirely moved into the "custom work and repairing" where it can produce higher grade/non-common goods. In addition, we can observe, that the capital-labor ratio has tripled in "men's custom work and repairing" industry, while is equal to $314.1 and $411.9 in women's clothes industries.

Jersey City is quite different: in addition to factories producing women's clothes,

[13]While we do not know what exactly they were doing, generally under the state-use labor system prisons were involved in creating clothes for state's inmates and employees. (US Department of Labor (1887))

[14]This also means that it is hard to define the true market value of road construction.

Table 2—Case study of Trenton and Jersey City

1870					1890						
Industry	# of firms	Persons employed	Average wage	Capital/Labor	Industry	# of firms	Males employed	Average wage male	Females employed	Average wage female	Capital/Labor
					Trenton						
Men's clothes	22	180	$178.5	$302.8	Factory product (men)	1*					
					Custom work & repairing (men)	37	149	$577.7	100	$212.8	$1198.5
Women's clothes					Dressmaking (women)	159			153	$292.1	$314.1
					Factory product (women)	3	22	$224.1	20	$175	$411.9
					Jersey City						
Men's clothes	17	61	$397.5	$690.4	Factory product (men)	3	12	$520	26	$356.2	$262
					Custom work & repairing (men)	32	114	$615.5	9	$324.2	$958.7
Women's clothes	8	35	$98.6	$25.6	Dressmaking (women)	3			5	$317.6	$830
					Factory product (women)	4	4	$780	120	$249.6	$254.4

Note: All values are in dollars of 1890. *The firm was too small to be entered separately, and was included in "other industries" category.

Source: 1870: Table XI pages 694-695 of the "Compendium of the Ninth Census". 1890: Table 3 pages 305, 635 of the "Report of Manufacturing Industries of the Eleventh Census".

there also factories making men's clothes. There also a comparable number of firms involved in custom work and repairing of men's clothes. However, the capital-labor ratio of these firms (men's and women's factories) in Jersey City is lower than firms (and women's factories) in Trenton, that is also in line with the hypothesis.

The salary of male workers is approximately the same for men industries in Jersey City and men's custom work and repairing industry in Trenton.[15] At the same time, women's wage in those industries is lower everywhere in Trenton than in Jersey, as predicted by our hypothesis.

Jersey City also has three dressmaking firms employing five people, that may be non-representative to draw any conclusions. However, the fact, that there are only 3 firms, at the same time there are 159 small firms in Trenton may be explained by the low wage in Trenton. Women who didn't want to work with a new decreased wage preferred to stay at home and start their own individual business of making customary clothes. That's why we can observe that wages in women's dressmaking industry are approximately similar in two cities. At the same time, the female wage in Jersey City was not distorted and women chose to go to be employed.

Overall, the case study above shows that prison completely drives out industries competing in exactly the same type of goods, and forced firms operating in that industry to invest more in capital and make more special higher grade goods. In addition, a wage of low-skilled workers (females in clothing industry) was lower in a location with prison competition. This gives us two testable hypothesis: we expect counties with a higher value of an output of prison-made goods to increase capital-labor ratio and decrease wage of females in manufacturing.

The long-term consequences of such changes are the main question of this paper, as children of poor unskilled workers had lower chances to succeed in life and leave the poverty trap, while capital-owners sims to benefited from exploiting low-skilled free and convict labor making an example of Marxist ideas.

II. Data

The main source of the data for this paper is a set of US Department of labor reports devoted to Convict labor (US Department of Labor (1887, 1906, 1925, 1933, 1941)). As competition between convict and free labor was a wildly discussed topic at that time, US Bureau of labor decided to inspect all penitentiary facilities in order to determine the level of competitions between goods produced under different convict labor systems and goods produced by free laborers. Approximately every 10 years the Department of Labor was issuing special reports devoted to convict labor, containing meticulously collected information about a number of employed convicts, and output they produced for the whole population

[15]Male's average wage in women's clothes factory is based on the sample of four men only and may be not representative as they are most likely engineers who supervise the machinery.

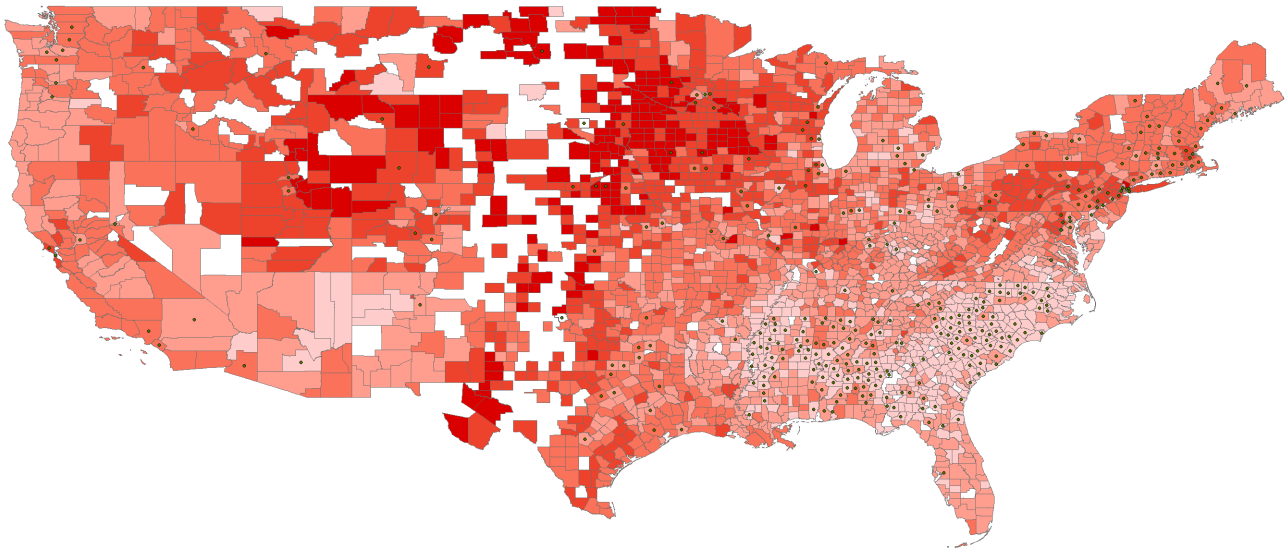

FIGURE 1. LABOR CAMPS AND ABSOLUTE UPWARD MOBILITY

Note: Green dot indicates centroid of the county if there was at least one convict labor camp between 1886 and 1940.
Source: Labor camps: US Department of labor; Absolute upward mobility: Chetty et al. (2014*a*).

of correctional facilities and jails in the United States. In particular they included the following information: locations, type of convict labor system, a number of prisoners, value of output, etc.

The main variable of interest is the value of goods produced ($CLValue_{cst}$) in all labor camp in county c of state s at year $t \in \{1886, 1895, 1905, 1914, 1923, 1932, 1940\}$[16]. In addition, I also use a value of the labor of goods produced, and a number of convicts employed. Despite the fact, that the data available for the independent variable is on the prison-level, I aggregate all convict labor data on the county-level, as all my controls are on the county level.

For the main empirical specification, I use only the cross-section of county-level data for the $t = 1886$. Usage data for convict labor in 1886 may be the best choice since by 1886 usage of convict labor, especially with the involvement of private contractors was ubiquitously accepted in all states with the exception of New York. However, over time other states imposed legislation that was favoring less harmful for the competition stat-use and public works and ways systems. More importantly, this is the first year when the data is available.

In addition, I do not use prison-made output (and convicts employed) under certain types of convict labor. First, I do not take into account "public works and

[16]Similarly, I calculate the value of goods produced for each system of convict labor or for each industry.

ways system" due to two major reasons. First, building railroads and highways is a good thing per se, and even if it takes jobs of free laborers, it is unclear what effect will be stronger overall. Second, because "public works and ways system" was a system that did not require prisoners to occupy the prison and was favoring an increase in incarceration (especially in the Southern states (Blackmon (2009))) it may have other negative effects on the local economy in short and long run. By using the same logic as in the later argument, I do not take into account output produced under "convict leasing" system. Nevertheless, if I use those two measures when I compute variables of interest (county-level value of goods produced and the number of convicts employed) all results become even stronger and bigger in magnitude.

I also do not take into account goods produced under "state-use" system. The volume of products produced under this system is very small and it couldn't harm local firms, both because of the later and because they did not trade goods on the local market, and generally were consuming them within the state's prison system. The inclusion of the goods produced under this system neither make results weaker nor reduce the magnitude of the coefficients of interest. However, as this system should not affect local firms, I find it logical not to include "state-use" convict labor system.

Overall, I stay with "contract", "piece-price" and "state-account" systems of convict labor that cover more than 80% of all convict labor output in 1886. In addition, as the NPA congress praised involvement of private sector into prison industries and selling prison-made goods directly on the open market, these three types of labor were "treated", while "public works and ways" and "state-use" types were not.[17]

All individual and county-level data for controls are taken from US censi (Haines (2004); Ruggles et al. (2015)). The first outcome variable, the capital-labor ratio is computed as the sum of the capital across all manufacturing firms in a county divided by the total wage paid in manufacturing in that county. The second variable – is computed by dividing total wage paid in manufacturing paid to female employees, divided by the number of female employees.

Values for measures of contemporary income and social inequality are taken from Chetty et al. (2014*a*). In particular, I use the same definitions for absolute and relative upward mobility as in their paper. Absolute upward mobility is an expected rank of children whose parents are at the 25th percentile of the national income distribution (i.e. achieving the American Dream). Relative upward mobility (or rank-rank slope) is an association between a child's position in the income distribution and his parents' position in the distribution. In other words, it is the slope from OLS regression of child rank on parent rank within each county: $\rho_{PR} = Corr(P_i, R_i)$, where R_i denote child i's percentile rank in

[17]The "public works and ways" and "state-use" systems were considered as one system at 1870. The situation with "convict leasing" is less obvious, as it was not mentioned in the proceedings of the NPA directly.

the income distribution of children and P_i denote parent i's percentile rank in the income distribution of parents.

III. Empirical Specification and Identification Strategy

In this section, I provide a description of the empirical strategies using to show the causal effect of convict labor on manufacturing firms and motivation of the identification strategies.

A. Identification Strategy

In an absence of endogeneity concerns, naïve OLS county-level cross-sectional model specification can be considered:

$$y_{cs1900} = \alpha + \beta ValueCL_{cs1886} + \gamma \mathbb{X}_{cs1880} + \mu_s + \varepsilon_{cs}, \tag{1}$$

where y_{cs1900} is an outcome variable (capital-labor ratio and average wage of females in manufacturing) in county c in state s at year $t = 1900$; $ValueCL_{cs1886}$ is a dollar value of goods produced by convicts in county c in state s at year $t = 1886$; $\mathbb{X}_{cs1880}$ is a matrix of county-level controls at year $t = 1886$ described in details below, and μ_s are state fixed effects. As it takes time for firms to adapt, I use outcome variable measured at the year of 1900, and controls dated by pre-convict labor date of 1880. The standard errors are clustered at the state level.

Clearly, naïve OLS estimates are prone to endogeneity problem, as convict labor is not exogenous. Even if the reverse causality is not an issue as the outcome variable is measured after the variable of interest, there are several possible sources of endogeneity.

One of the sources of endogeneity comes from the unobserved heterogeneity. Contemporary controls may be affected by the main variable of interest – a value of goods produced by convicts or number of employed convicts. In this case, I use historical controls, that make it more challenging to control on factors that may correlate both with convict labor and intergenerational mobility. Thus, I use total population and urban share in 1880 that, should control for unobserved crime rate, and be proxy for intergenerational mobility at that time. As a majority of the convicts were black and foreign-born white males, I control for the shares of the black and foreign-born population. Also, I add control for slave population in 1860 in order to alleviate concern, that racial attitude toward black affected both contemporary intergenerational mobility and convict labor (especially under convict leasing system) in 1886 (Sellin (1976); Stewart (1998); Soares, Assunção and Goulart (2012)).

The revenue and expenses of prison were directly linked to state's budget, thus state fixed effects can eliminate the concern that the poorer counties could have lower intergenerational mobility for the poorest population, and at the same time

more extensive usage of convict labor that would decrease costs of up-keeping existing prisons and improve its financial situation. However, as a state could install a plant in those prisons strategically in order to stimulate future tax revenues in depressed counties will magnify the coefficient of interest, thus, I control for county tax revenues, as a proxy for the health of the county.

In addition, as prisons appeared in places with higher population and urban share, I use the corresponding controls.

Fixed effects are especially important, as convict labor laws were state-specific, and because states were prohibiting usage of private forms of convict labor and switching to the state use and public works and ways system at different years. Thus, there is a heterogeneity in the number of how many years convict labor affected intergenerational mobility.

Nevertheless, unobserved heterogeneity concern remains, as some important issues cannot be addressed and cause a bias that magnifies the coefficient of interest. First, prison were only involved in low-skilled labor intensive industries and produce more goods where capital-labor ratio is already low. However this type of omitted variable will bias results toward zero against finding of the effect of convict labor on capital-labor ratio. Second, prisons may underreport their output, as they can be afraid that federal or state officials will decide that they are destroying local industries. Alternatively, as all contracts were made on the prison level, corrupted wardens could try to hide some revenues from their state's government. In any case, this bias will make it more difficult for me to find the effect of convict labor on capital-labor ratio and average wage of women in manufacturing.

Most importantly, bad county-level institutions affecting both convict labor and female wage. In addition, as prisons were involved in manufacturing or agricultural production suitable for their locality, and thus if counties' dominating industries are correlated with capital-labor ratio or wages, it will result in an inconsistent estimate.

Concluding all endogeneity issues discussed above, I use distance to Cincinnati, Ohio as an instrument for the value of goods produced by convict labor. But why Cincinnati?

After the American Civil War crime rate increased dramatically, and existing prisons were operated on their capacities. The situation was exacerbated by the fact that states' financial situation was poor as well, and financing of expansion and maintenance of state prison system was not the among states' top priority expenses. While prisoners were tried to be employed in order for them not to be idle during the day, they were mostly involved in creating clothes for in-prison consumption. The only state, where the situation was different was a New York state, where since the creation of prison in Auburn, in the beginning of XIX century, prisoners were employed by private contractors and were manufacturing various goods for the sale on the open market. By 1870, only 7 prisons (all in New York state) with the net benefit (while small) to the state (New York Prison

Association (1871); McKelvey (1936)).

Everything changes in 1870, when the National Prison Association was founded on its first congress in Cincinnati, Ohio. The whole conference was the creation of one visionary man, Reverent Enoch Wines, who was a secretary of the New York Prison Association at that time. Being a deeply religious person, he believed in the rehabilitation of prisoners through education, Bible, and hard labor. He was able to convince the governor of Ohio to help organize the conference in his state, and become the first president of National Prison Association.

The congress contained a series of lectures about the experience of penitentiaries around the world, and how education and labor rehabilitate prisoners, by awarding them skills that will prevent them to end up in a prison in the future. In particular, reports from prisons of the New York and prisons from Ireland that was already had an extensive history of employing prisoners were presented.

As a result of the congress, in addition to the creation of National Prison Association, a "Declaration of Principles" were created (Wines (1871)). It declared, that *"...we [shall] have imparted to him [prisoner] the capacity for industrial labor and the desire to advance himself by worthy means,..."*. In particular, it suggested that industrial and agricultural departments should be established, as appropriate to the location of the prison, and *"these would be run as efficient business organizations, returning profits to the institution and providing training and craft skills to the inmates."*

Thus, the idea behind the instrument is for those involved in penitentiary services who lived closer to Cincinnati, it was less costly to arrive and get new ideas about the employment of prisoners for industrial purposes. It means, that we expect to have a higher value of goods produced by convict labor and a higher number of employed convicts in 1886 closer to the city where the congress took place in 1870. The Proceedings of the first National Prison Association congress (Wines (1871)) contain the name and origin city of each of 130 participants, thus we know whether penitentiary in particular county was subject to these convict labor ideas. Unfortunately, the fact, that someone visited that conference is already endogenous since those who were more prone to install industrial or agricultural departments within prison were more likely to come and listen to the "success stories". Thus I will only use a county-level number of participants to show, that it is indeed correlated with our outcome variables of intergenerational mobility, convict labor and, distance to Cincinnati.

First, in Column I of Table 3 I present strong negative correlation of the county-level number of conference participants and absolute upward mobility. For the instrument to be the good we need that the whole effect of distance to Cincinnati on upward mobility was through the convict labor. Thus in Column II I also present the same specification but for the sample of 24 states that had representatives on that congress. Similarly, in Columns III and IV I present results for the second outcome variable – relative upward mobility. In Columns V and VI I check if the number of congress participants is correlated with the convict labor,

and indeed, as expected there is a strong positive correlation between the value of goods produced by convict labor and number of participants.

Finally, In Column VII I check the hypothesis, that there were more participants from those places, that were closer to the destination city of Cincinnati: I regress county-level number of conference participants on the log of the distance to Cincinnati. Strong negative correlation remains if I keep only those 24 states that had participants. However, as 33 participants of the conference were from Cincinnati itself, in Column IX I drop county where it is located (Hamilton). The coefficient immediately becomes insignificant. However, a just distance between county centroid and Cincinnati may be a bad approximation of the difficulties of reaching it in 1870, thus in Columns X-XII I employ distance to Cincinnati computed by taken into account railroads existing in 1870. As can be seen in column XII, even after dropping Hamilton county, 1870 railroad-based distance is a significant predictor of the number of congress participants.

In addition, to demonstrate that vising the NPA congress in Cincinnati indeed affected the decision to open industrial or agricultural department within prisons' premises we will return to the case of New Jersey, described in Section I. There was five representatives from New Jersey, one of them were Samuel Allinson, deputy of the New Jersey's governor and the member of the board trustees of the state reform school in Yardville in Mercer County. After visiting the congress, he wrote two papers about discharged prisoners (Allinson (1872)) and about scholastic and industrial education in reform schools (Allinson (1872)). In 1879 he was appointed to a commission on the subject of convict labor in State Prison in Trenton that resulted in a report suggesting expanding usage of convict labor, however when he was a member of the similar commission of the same prison in 1869, convict labor was not mentioned in his recommendations (New Jersey Historical Society (1884)). While we do not know for sure that Samuel Allinson updated his beliefs about convict labor because of the congress in Cincinnati, the information in his obituary (New Jersey Historical Society (1884)) make impression that he became a pro-convict labor activist after 1870, thus emphasizing, that the instrument is indeed plausible and could affect intensity of the convict labor across the United States through the ideas originated at the NPA's first meeting.

Overall, the first stage can be written as follows:

$$(2) \quad ValueCL_{cs1886} = \alpha + \widetilde{\pi}\text{Distance to Cincinnati}_{cs} + \widetilde{\gamma}\mathbb{X}_{cs} + \mu_s + \epsilon_{cs},$$

where $ValueCL_{cs1886}$ is a dollar value of goods produced by convicts in county c in state s at year $t = 1886$; $\mathbb{X}_{cs1880}$ is a matrix of county-level controls at year $t = 1886$, and μ_s are state fixed effects. The second stage looks like:

$$(3) \qquad y_{cs1900} = \alpha + \pi \widehat{ValueCL}_{cs} + \gamma\mathbb{X}_{cs} + \mu_s + \varepsilon_{cs}$$

Table 3—National Prison Association Congress: Panel A

	I	II	III	IV	V	VI	VII	VIII
VARIABLES	Dependent variable:							
	Capital-labor ratio		Absolute upward mobility		Relative upward mobility		Value of goods produced (1886)	
Number of	0.0154***	0.0144***	-0.0219**	-0.0215*	0.000796***	0.000720***	0.0879***	0.0831***
conference participants	(0.00452)	(0.00487)	(0.00988)	(0.0113)	(0.000108)	(0.000107)	(0.0120)	(0.0132)
Sample	All	24 states	All	24 states	All	24 states	All	24 states
Controls	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	2,157	1,290	2,069	1,242	2,069	1,242	2,170	1,292
R^2	0.22	0.20	0.68	0.65	0.49	0.48	0.61	0.61

Table 4—National Prison Association Congress: Panel B

	I	II	III	IV	V	VI
VARIABLES	Dependent variable: Number of conference participants					
Log of distance	-11.86***	-12.02***	-0.77			
to Cincinnati, Ohio	(2.229)	(2.144)	(0.524)			
Log of railroad distance				-18.56	-23.98*	-1.00*
to Cincinnati (1870)				(12.08)	(13.71)	(0.538)
Sample	All	24 states	24 states w/o Hamilton county, Ohio	All	24 states	24 states w/o Hamilton county, Ohio
Controls	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	2,170	1,292	1,291	2,169	1,292	1,291
R^2	0.77	0.78	0.46	0.41	0.48	0.45

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

where y_{cs} is an outcome variable (either capital-labor ratio and average wage of females in manufacturing) in county c in state s at year $t = 1900$; $\widehat{ValueCL}_{cs}$ is a fitted value of dollar value of goods produced in county c in state s at year $t = 1886$; $\mathbb{X}_{cs1880}$ is a matrix of county-level controls at year $t = 1886$, and μ_s are state fixed effects. The standard errors are clustered on the state level.

It is important to note, that even if the "Declaration of Principles" is talking a lot about the providing necessary working skills to the prisoners, National Prison Association was promoting self-sufficiency of prisons and production of goods by prisoners that can be sold on the open market. In terms of the legal type of the convict labor system, they did not promote "public works and ways" and "state-use" systems. In this case, I am estimating not the average treatment effect of the convict labor output on intergenerational mobility, but local average treatment effect of other four systems of labor.

Table 5—IV estimates: Railroad distance to Cincinnati

	I		II		III	
VARIABLES	Independent variable: Log distance to Cincinnati					
Incarceration rates, black males	-0.038	(-1.055)	-0.054	(-1.564)	-0.042	(-1.313)
Incarceration rates, males	-0.015	(-0.728)	-0.006	(-0.273)	0.023	(-0.658)
Incarceration rates, all	-0.007	(-0.248)	0.005	(-0.176)	0.034	(-0.857)
Number of slaves (1860)	-0.044	(-0.520)	0.013	(-0.383)	0.03	(-0.901)
Share black population	0.179	(-1.236)	0.279*	(-1.697)	0.272*	(-1.962)
Share foreign-born population	0.166	(-1.185)	0.18	(-1.558)	0.123	(-1.538)
Share children in school	-0.113	(-1.199)	0.044	(-0.756)	0.051	(-1.236)
Total population	-0.341**	(-2.049)	-0.126	(-1.388)	-0.089	(-1.045)
Urban share	-0.181**	(-2.554)	0.003	(-0.064)	-0.008	(-0.186)
Mean-to-median farm size	-0.05	(-0.535)	-0.092	(-0.979)	-0.106	(-1.396)
Gini (land)	0.135*	(-1.7)	0.067	(-1.013)	0.051	(-0.942)
Manufacturing output	-0.213	(-1.434)	-0.083	(-0.473)	-0.101	(-0.547)
Agricultural output	-0.289*	(-1.846)	-0.116	(-1.579)	-0.134*	(-1.845)
Labor in manufactoring	-0.267**	(-2.495)	-0.075	(-1.415)	-0.019	(-0.489)
Value of gold and silver mines output	-0.001	(-0.045)	-0.084	(-1.239)	-0.087	(-1.264)
Value of coal mines output	-0.056	(-0.503)	-0.07	(-0.571)	-0.062	(-0.501)
Value of iron mines output	0.172	(-0.944)	0.103	(-0.954)	0.112	(-1.045)
Capital-labor ratio	-0.048	(-0.643)	-0.047	(-0.854)	-0.041	(-0.839)
Controls	×		✓		✓	
Geographic controls	×		×		✓	
State FE	✓		✓		✓	

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Another possible concern, about the instrument, that distance to Cincinnati may be correlated to various socioeconomic factors back in 1870. To alleviate this concern, in Table 5 I check if it correlates to socioeconomic factors that may have an effect on convict labor or intergenerational mobility. Columns I, II and III contain beta coefficient and t-statistics for the regression of log distance to Cincinnati on variables related to incarceration, slavery, demographic, inequality and industrial and agricultural outcomes. For example, row 2 of Column I says, that beta coefficient of the regression of the log of distance to Cincinnati on the incarceration rates of males in 1870 without any controls is -0.015, and t-statistics is equal to -0.728. Similarly, in Column II I add a set of control variables and add longitude and latitude controls in Column III. As we can see, distance to Cincinnati is correlated with the share of black population and agricultural output, thus I will control for these variables in the IV section.

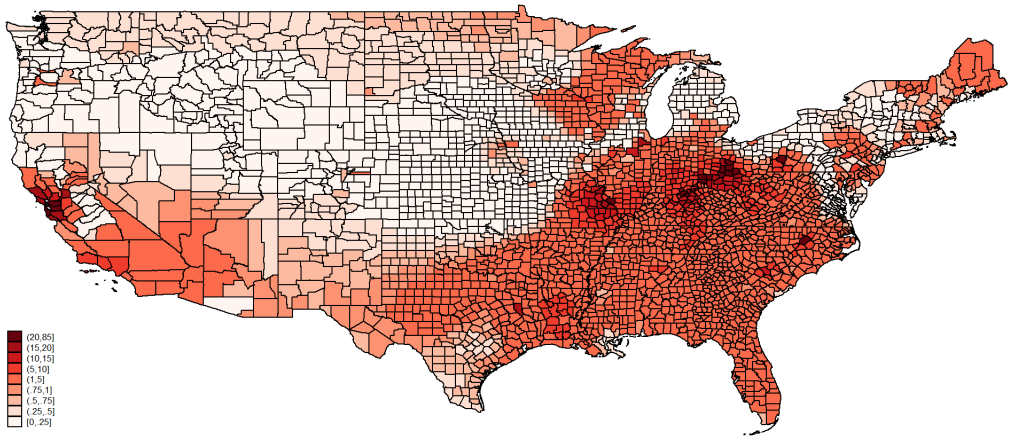

Figure 2. First stages for placebo tests with proximity to all other counties

Note: Figure III.A plots F statistics resulted from the first stage regressions (see Specification 2) with distance to each US county instead of distance to Cincinnati, Ohio. Darker tones reflect higher first stage F statistics.
Source: Distances calculated using NEARSTATA module in STATA (Jeanty et al. (2012)).

Also, exclusion restriction can be violated, if the distance to Cincinnati is correlated to trade or migration patterns that took place after 1870 and before the realization of intergenerational outcomes. In this case, even if the instrument is not correlated to important socioeconomic variables in 1870, it still accumulates other effects that had happened during the century. To take this into account, in robustness section D.1 I use distance to Cincinnati based on the railroad system in 1870, as those distance represents costs of travel to Cincinnati in 1870 only and thus alleviate the exclusion restriction concern.

In addition, there is concern that all results come from the southern states. While from the maps in Section II it is clear, that mid-western and north-eastern

parts of US have quite a few prisons, in Section D.2 I provide a sub-sample analysis that shows that results are not driven by some particular subsample of states.

In Section D.3 I also demonstrate, that the instrument is not spurious, by employing a series of placebo tests. In particular, I show the absence of the predictive power of distances to other industrial cities, such as (relatively close) Chicago, New York, and the capital city of Washington DC on the convict labor outcomes. In addition, I show that the first stage F statistics, based on geographic proximity to Cincinnati, is one of the largest among of all placebo tests substituting proximity to all other counties (See Figure III.A). Thus the effects I measure is specific to geographic proximity to Cincinnati and not to a post-1886 condition affecting the United States overall.

In the rest part of this Section, I first show results of the OLS regressions of convict labor on capital-labor ratio and an average wage of females in manufacturing, then, I employ IV analysis that estimates the causal effect. Finally, the Section is concluded with extensive robustness analysis and placebo tests.

B. OLS Results

In Table 6 I present results of the OLS regression specifications 1 of the value of goods produced in prisons and capital-labor ratio. All specifications include state fixed effects, as all states had different convict labor and minimum wage requirements. I start with adding only controls for population, urban share and share of the black population in Column I. As expected, the capital-labor ratio is positively correlated with the value of goods produced. I add shares of foreign-born and women in Column II, and the magnitude of the coefficient decreases slightly. I add firm controls, such as output in manufacturing and agriculture, and average capital size of the firms in Column III. The coefficient of interest falls but remain significant. Finally, I add control for the local taxes, and while coefficient continues to decrease in magnitude it remains significant. As we expect, the endogeneity bias the coefficient downward, the result of the OLS regression are encouraging.

In Table 7 I repeat the same regression specification but with the average wage in manufacturing for female workers. Columns I and II report results without firm controls: wage of females in manufacturing is positively correlated with convict labor. By adding firm and tax controls in Columns III and IV the coefficient becomes insignificant from zero, while still remaining positive. This suggesting, that the supposition that convicts labor was appearing in those places where the wage of low-skilled workers (and women) was higher.

Table 6—Convict labor and capital-labor ratio

	I	II	III	IV
VARIABLES	Dependent variable: Capital-labor ratio (1900)			
Log of value of goods produced	0.0750***	0.0670***	0.0438***	0.0355**
(1886)	(0.0168)	(0.0162)	(0.0149)	(0.0161)
Log of population	-0.590***	-0.614***	-0.699***	-0.552***
	(0.146)	(0.134)	(0.171)	(0.174)
Share of black	0.0421	0.154	0.00586	0.138
	(0.834)	(0.824)	(0.822)	(0.827)
Share urban	-0.262	-0.765**	-1.355***	-1.198**
	(0.309)	(0.376)	(0.429)	(0.479)
Share foreign-born		3.230***	2.661*	2.491*
		(1.112)	(1.377)	(1.361)
Share women		-0.0491	-0.575**	-0.557**
		(0.0712)	(0.260)	(0.267)
Output in agriculture,			-0.0447	-0.0545
mln. $			(0.0551)	(0.0542)
Output in manufacturing,			0.00580***	0.00517**
mln. $			(0.00210)	(0.00193)
Average size of firm,			0.284**	0.306***
capital			(0.109)	(0.105)
Log of total local taxes				-0.0649*
				(0.0346)
State FE	✓	✓	✓	✓
Observations	2,424	2,422	2,267	2,259
R^2	0.208	0.210	0.223	0.227

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7—Convict labor and average female wage in manufacturing

	I	II	III	IV
VARIABLES	Dependent variable: Log of average female wage in manufacturing (1900)			
Log of value of goods produced	0.00365**	0.00319**	0.000923	0.000830
(1886)	(0.00143)	(0.00146)	(0.00143)	(0.00146)
Log of population	0.0297***	0.0317***	0.00565	0.00979
	(0.0101)	(0.0101)	(0.0207)	(0.0236)
Share of black	0.162	0.175*	0.168*	0.179*
	(0.100)	(0.101)	(0.0971)	(0.0989)
Share urban	0.112***	0.0795**	0.0814*	0.0822*
	(0.0269)	(0.0331)	(0.0450)	(0.0443)
Share foreign-born		0.117	0.0679	0.0585
		(0.115)	(0.107)	(0.109)
Share women		0.0377*	0.0771**	0.0828**
		(0.0201)	(0.0313)	(0.0328)
Output in agriculture,			0.0165*	0.0162*
mln. $			(0.00922)	(0.00927)
Output in manufacturing,			0.000474*	0.000458
mln. $			(0.000266)	(0.000276)
Average size of firm,			0.0171	0.0185
capital			(0.0123)	(0.0123)
Log of total local taxes				-0.00194
				(0.00374)
State FE	✓	✓	✓	✓
Observations	1,938	1,937	1,866	1,861
R^2	0.416	0.396	0.403	0.404

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

C. IV Results

In this section, I demonstrate that convict labor has an effect on contemporary social mobility due to its effect on the distortion of capital-labor ratio and average wages in manufacturing. Here I omit state of New York, since it actively used convict labor for almost 50 years before the NPA congress and had already issued a legal restriction on it in order to protect firms using free labor by 1886.

In Table 8 I report reduced form regression of distance to Cincinnati on the variable of interest. In Column I I show that the distance is positively related to capital-labor ratio, such as 100% increase in within-state distance to Cincin-

nati decreases capital-labor ratio by 0.25 units. In Column II I add additional geographical controls for latitude and longitude, and the significance remains. In Columns III and IV I show the reduced form regression for average wage of females in manufacturing. The relationship is significant, while slightly smaller in magnitude. In Columns V - VIII, I show, that distance to Cincinnati does not predict average manufacturing wage of males and manufacturing officials and clerks.

Table 8—Distance to Cincinnati: Reduced form

	I	II	III	IV	V	VI	VII	VIII
					Dependent variables (1900):			
VARIABLES	Capital-labor ratio		Log average wage (females)		Log average wage (males)		Log average wage (clerks)	
Log of distance	-0.248***	-0.218**	0.0109**	0.0142**	0.00431	0.00104	0.0129	0.0135
to Cincinnati	(0.0777)	(0.0882)	(0.00411)	(0.00623)	(0.00902)	(0.00955)	(0.0105)	(0.0108)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	×	✓	×	✓	×	✓	×	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	2,259	2,259	1,861	1,861	2,103	2,103	2,258	2,258
R^2	0.23	0.23	0.40	0.41	0.42	0.42	0.79	0.79

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

To show the causal effect of convict labor on medium-run capital-labor ratio and female wage in manufacturing, I use the distance to Cincinnati as an instrument for value of goods produced by convicts. Table 9 contains the results. I repeat the OLS estimates in Column I, this time without the state of New York. The OLS coefficient is almost, the same as in the full sample. In Column II I report the first stage: distance to Cincinnati has a negative effect on convict labor output. F statistics of excluded instrument is equal to 63.4, above the minimum values suggested in Stock and Yogo (2005). Anderson-Rubin p-value is also below 0.01. Despite the full set of controls and state fixed effects, the explanatory power of the instrument remains strong, such as partial $R^2 = 0.037$. All these facts suggest, that the instrument is not weak.

I report the second stage results in Column III. The coefficient is highly significant and positive. One hundred percents increase in the value of prison output increases capital-labor ratio by 0.23 units. In terms of standard deviation, one standard deviation increase in the value of prison-made output increases capital-labor ratio by 17.5% of its standard deviation. The IV coefficient is almost 6.5

times than the OLS one. One possible explanation, is that as was expected, OLS was downward biased. Alternatively, exclusion restriction may be violated: this scenario will be covered in the Section III.E.

Columns IV-VI contain similar specifications as those in Columns I-III, but with additional geographical controls. The magnitude of all the coefficients of interest decrease slightly. First stage F statistics experience moderate decreases to 54.7, and Anderson-Rubin p-value increases to 0.011. These changes a reasonable, since now I also control on longitude and longitude, there is even less variation in the instrument. However, the instrument remains strong, and the second stage coefficient is also significant: one standard deviation increase in the value of prison-made output increases capital-labor ratio by 16% of its standard deviation, thus confirming the hypothesis.

Table 9—Convict labor and capital-labor ratio: IV estimates

	I	II	III	IV	V	VI
VARIABLES	Dependent variable: Capital-labor ratio (1900)					
	OLS	First stage	Second stage	OLS	First stage	Second stage
Log of distance	0.0355**		0.230***	0.0350**		0.210**
to Cincinnati	(0.0161)		(0.0692)	(0.0163)		(0.0840)
Log value of goods		-1.078***			-1.042***	
produced (1886)		(0.135)			(0.141)	
Controls	✓	✓	✓	✓	✓	✓
Geographic controls	×	×	×	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Partial R^2		*0.037*			*0.034*	
F stat of excluded instrument		*63.431*			*54.735*	
Prob > F		*0.000*			*0.000*	
Anderson-Rubin p-value		0.0011			0.0112	
Observations	2,259	2,259	2,259	2,259	2,259	2,259
R^2	0.23	0.66	0.17	0.23	0.66	0.18

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Similarly, I present results for the average wage of women in manufacturing. Columns I and IV report OLS results, similar to those in Table 7. The first stage in Columns II and V while have the same specification as in corresponding columns of Table 9 is slightly different due to the sample as we do not observe women working in manufacturing in some counties. The fist stage is strong, with F-statistics equal to 69.9 and 56.4 in corresponding specifications. Finally, the

second stage coefficient of interest is negative and significant. OLS positive sign has flipped the sign, supporting our hypothesis. Column III suggests, that 100% increase in the value of goods produced decrease wage of women in manufacturing by 1%. Results of the specification in Column VI is similar: 100% increase in the value of goods produced decrease wage of women in manufacturing by 1.3%. In terms of standard deviations, one standard deviation increase in the value of prison-made output decreases average wage of women in manufacturing by 10% of its standard deviation. This results is in line with the expectation of the endogeneity bias, as convict labor become more popular in places with a higher wage of unskilled labor, as "free" convict labor was more important than in places, where the wage of unskilled workers (and women) was already low.

Table 10—Convict labor and average wage in manufacturing (females): IV estimates

	I	II	III	IV	V	VI
VARIABLES	Dependent variable: Log of average wage in manufacturing (females) (1900)					
	OLS	First stage	Second stage	OLS	First stage	Second stage
Log of distance	0.000741		-0.01000**	0.00109		-0.0136**
to Cincinnati	(0.00148)		(0.00411)	(0.00172)		(0.00630)
Log value of goods		-1.090***			-1.043***	
produced (1886)		(0.130)			(0.139)	
Controls	✓	✓	✓	✓	✓	✓
Geographic controls	×	×	×	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Partial R^2		0.037			0.033	
F stat of excluded instrument		69.950			56.441	
Prob > F		0.000			0.000	
Anderson-Rubin p-value		0.0065			0.0196	
Observations	1,861	1,861	1,861	1,861	1,861	1,861
R^2	0.40	0.66	0.39	0.41	0.66	0.39

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

D. Robustness and Sensitivity Checks

In this section, I will address some additional concerns about the validity of the results. First, I will test if my results are driven by some sub-sample of states. Second, I will check the assumptions of the IV estimation and show that all the effect comes through compilers - states that had delegates on the NPA congress. Third, following Conley, Hansen and Rossi (2012), I will relax

exogeneity assumption of the instrument and show that results still hold. Finally, I make a series of placebo tests, to show that convict labor does not affect other important variables.

E. Sub-sample Analysis

In Table 11 I examine if results for capital-labor ratio are driven by some subsample of states.[18] First, in Columns I and II, I show, that result still hold if I include New York state. In Columns III and IV, I drop all "Deep South" states, and keep New York state omitted (hereafter, unless noted otherwise).[19] The coefficient of interest decrease slightly in magnitude but remains significant. In Columns V and VI, I exclude all states that were a part of Confederate States of America (CSA). Again, the coefficient remains significant, while the magnitude drops, suggesting, that the effect on the capital-labor ratio in southern states was bigger than in northern. Finally, I exclude all CSA and border states in Columns VII and VIII.[20] First stage F statistics hike to 83.7, however, results of the second stage remain virtually unchanged: 100% increase in the value of goods produced by prisoners increases the capital-labor ratio by 0.18 units. Table 12 contain results of the similar regression specifications for the average wage in manufacturing for women. These suggest that results are not driven by exclusion of New York or southern states, while the magnitude of the effect is smaller on the subsample of northern states.

F. Sensitivity Checks

In this section, I show, that the IV assumptions are satisfied and that the effect is going through the compliers - states that had delegates on the NPA congress, and does not work without those states. In first six columns of Table 13 I report results capital-labor ratio, while the rest six columns contain regressions with the wage of females in manufacturing. In Column I I only keep the subsample of 24 states that had delegates on the NPA conference. As can be seen, the results are robust, and still significant. Results also hold if I drop CSA states from those that had their representatives. Finally, in Columns V and VI, I show results for other than 24 states that had their representatives. The first stage is weak, and the effect is disappearing in the second stage. Similar results can be observed in Columns VII-XII.

Finally, in vein of Conley, Hansen and Rossi (2012) we relax the exogeneity assumptions of the instruments and examine the bounds we are able to place on the true effect of convict labor on capital-labor ratio and average wage in manufacturing for women. The idea behind the method is simple: if in addition to

[18]Table 11 contains only first and second stages of the 2SLS regressions. OLS and reduced form regression results are available upon request.

[19]I exclude Alabama, Georgia, Louisiana, Mississippi, and South Carolina.

[20]In addition to CSA, I exclude Delaware, Kentucky, Maryland, and Missouri.

Table 11—National Prison Association Congress

	I	II	III	IV	V	VI	VII	VIII
VARIABLES	Dependent variable: Capital-labor ratio (1900)							
	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage
Log of distance	-1.051***		-1.052***		-1.081***		-1.131***	
to Cincinnati	(0.140)		(0.137)		(0.142)		(0.124)	
Log value of goods		0.259***		0.220***		0.177***		0.176***
produced (1886)		(0.0721)		(0.0562)		(0.0524)		(0.0533)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Sample	with NY	with NY	no "Deep South" states	no "Deep South" states	no CSA	no CSA	no slave states	no slave states
Partial R^2	0.027		0.036		0.039		0.044	
F stat of excl. inst.	56.655		58.938		58.252		83.756	
Prob > F	0.000		0.000		0.000		0.000	
Observations	2,319	2,319	1,905	1,905	1,385	1,385	1,131	1,131
R^2	0.68	0.12	0.66	0.15	0.66	0.17	0.66	0.16

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 12—National Prison Association Congress

	I	II	III	IV	V	VI	VII	VIII
VARIABLES	Dependent variable: Log of average wage in manufacturing (females) (1900)							
	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage
Log of distance	-1.060***		-1.063***		-1.097***		-1.125***	
to Cincinnati	(0.132)		(0.131)		(0.135)		(0.126)	
Log value of goods		-0.0122**		-0.0115**		-0.00967**		-0.00589*
produced (1886)		(0.00554)		(0.00457)		(0.00397)		(0.00316)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Sample	with NY	with NY	no "Deep South" states	no "Deep South" states	no CSA	no CSA	no slave states	no slave states
Partial R^2	0.027		0.036		0.040		0.044	
F stat of excl. inst.	64.773		65.846		65.808		80.003	
Prob > F	0.000		0.000		0.000		0.000	
Observations	1,921	1,921	1,625	1,625	1,263	1,263	1,070	1,070
R^2	0.67	0.42	0.66	0.42	0.66	0.43	0.66	0.42

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 13—National Prison Association Congress

	I	II	III	IV	V	VI	VII	VIII	IX	X
VARIABLES	Dependent variable: Capital-labor ratio (1900)						Dependent variable: Log of average wage in manu			
	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage	First stage	Second stage
Log of distance	-1.063***		-1.091***		-0.195		-1.063***		-1.091***	
to Cincinnati	(0.142)		(0.142)		(0.351)		(0.142)		(0.142)	
Log value of goods		0.200***		0.178***		12.12		-0.0104**		-0.00838**
produced (1886)		(0.0572)		(0.0521)		(21.61)		(0.00425)		(0.00358)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sample	24 states with delegates	24 states with delegates	24 states & no CSA	24 states & no CSA	States without delegates	States without delegates	24 states with delegates	24 states with delegates	24 states & no CSA	24 states & no CSA
Partial R^2	0.041		0.045		0.000		0.041		0.047	
F stat of excl. inst.	56.102		59.452		0.315		62.282		68.270	
Prob > F	0.000		0.000		0.580		0.000		0.000	
Observations	1,351	1,348	1,134	1,131	918	911	1,351	1,198	1,134	1,039
R^2	0.67	0.17	0.68	0.17	0.52	-66.26	0.67	0.44	0.68	0.43

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

exogenous and endogenous variables we add instruments (distance to Cincinnati) its coefficient (γ) required to be equal to zero according to standard IV estimation. However, by relaxing the constraint we can find the bounds for the IV estimate of value of convict labor output (β). If one expects instruments to have direct or indirect positive (negative) effect on the capital-labor ratio (female's wage in manufacturing) ($\gamma_1 < 0$ and $\gamma_2 > 0$) we will underestimate the true effect of the convict labor. This gives the maximum prior for γ_1 and minimum prior for γ_2 . More challenging is to determine the minimum prior for γ_1 and maximum prior for γ_2. Thus we assume, that the maximum (minimum) direct effect of instrument will be not bigger than the size of the biggest effect of one of the control covariates. The covariate with the biggest significant covariate (standardized) is the share of urban population for capital-labor and share of black population for the wage of females in manufacturing. Applying Conley, Hansen and Rossi (2012), I find that the bounds on the strength of β are still below zero (at 95% confidence level). Therefore, even allowing for imperfect exogeneity, the negative effect of convict labor on the average wage in the manufacturing of females and positive effect on the capital-labor ratio is confirmed.

IV. Measuring persistent consequences of Convict Labor

A. Convict Labor and Intergenerational Mobility

Clearly, naïve OLS estimates are prone to endogeneity problem, as convict labor is not exogenous. There are several possible sources of endogeneity. One of the sources of endogeneity comes from the unobserved heterogeneity. Contemporary controls may be affected by the main variable of interest – a value of goods produced by convicts or number of employed convicts. In this case, I use historical controls, that make it more challenging to control on factors that may correlate both with convict labor and intergenerational mobility. Thus, I use total population and urban share in 1880 that, should control for unobserved crime rate, and be proxy for intergenerational mobility at that time. As a majority of the convicts were black and foreign-born white males, I control for the shares of the black and foreign-born population. Also, I add control for slave population in 1860 in order to alleviate concern, that racial attitude toward black affected both contemporary intergenerational mobility and convict labor (especially under convict leasing system) in 1886 (Sellin (1976); Stewart (1998); Soares, Assunção and Goulart (2012)).

The revenue and expenses of prison were directly linked to state's budget, thus state fixed effects can eliminate the concern that the poorer counties could have lower intergenerational mobility for the poorest population, and at the same time more extensive usage of convict labor that would decrease costs of up-keeping existing prisons and improve its financial situation. However, as a state could install a plant in those prisons strategically in order to stimulate future tax revenues in depressed counties will magnify the coefficient of interest, thus , I control

for county tax revenues, as a proxy for the health of the county.

In addition, as western states tend to have a bigger size of the county, I add control for the county land area.

Fixed effects are especially important, as convict labor laws were state-specific, and because states were prohibiting usage of private forms of convict labor and switching to the state use and public works and ways system at different years. Thus, there is a heterogeneity in the number of how many years convict labor affected intergenerational mobility.

Nevertheless, unobserved heterogeneity concern remains, as some important issues cannot be addressed and cause a bias that magnifies the coefficient of interest. Most importantly, bad county-level institutions affecting both convict labor and intergenerational mobility than and now. In addition, as prisons were involved in manufacturing or agricultural production suitable for their locality, and thus if counties' dominating industries are correlated with social mobility, it will result in an inconsistent estimate.

Issues described above tend to magnify the coefficient of interest, while, there is an important source of the bias that can bias it toward zero: the measurement error. As labor camps were afraid that their activity would be subject to state or federal legal restrictions due to unfair competition with firms using free labor, prisons' administration could under-report the value of goods produced. However, it will work against me showing the effect on intergenerational mobility.

Concluding all endogeneity issues discussed above, I propose to use distance to Cincinnati, Ohio as an instrument for the value of goods produced by convict labor. But why Cincinnati?

B. OLS Estimates

First, I start the analysis by showing the results of the OLS regressions. In Table 14 I show the correlation between the value of goods produced by convicts and absolute upward mobility.

Column I contains results for the OLS regression without any controls. The coefficient of interest is negative and highly significant, such as 1% increase in a value of goods produced by convicts in 1886 decrease the probability of moving to the top quintile by 0.22 percentage points. However, if convict camps appeared in those counties because of some factor that is favorable for the coercion of people to labor and thus associated with lower absolute mobility I add controls that in order to alleviate possible bias caused by unobserved heterogeneity. First, if those camps appeared in more populated areas or areas with a high share of the black population that has also higher inequality I add population at 1880 and share of the black population in Columns II and III. The coefficient decreases in magnitude while remains highly significant. In Column IV I add control for the urban share of population, and while the coefficient remains negative, it becomes 4 times smaller than in the Column I. Adding share of foreign-born population, amount of local county taxes, number of slaves in 1860 or land area does not

Table 14—Convict labor and contemporary intergenerational mobility I

	I	II	III	IV	V	VI	VII	VIII
VARIABLES	Dependent variable: Absolute upward mobility							
Log of value of	-0.216***	-0.161***	-0.140***	-0.0456*	-0.0548**	-0.0560**	-0.0559**	-0.0560**
goods produced	(0.0281)	(0.0303)	(0.0252)	(0.0230)	(0.0220)	(0.0236)	(0.0235)	(0.0233)
Population		-0.498***	-0.291*	0.133	0.156	0.109	0.106	0.139
		(0.112)	(0.146)	(0.168)	(0.161)	(0.193)	(0.193)	(0.183)
Share of black			-7.233***	-7.440***	-7.068***	-7.074***	-7.098***	-7.161***
			(0.725)	(0.688)	(0.792)	(0.870)	(0.870)	(0.872)
Share urban				-6.861***	-8.067***	-8.082***	-8.080***	-8.207***
				(1.059)	(1.160)	(1.217)	(1.217)	(1.212)
Share foreign-born					8.163***	7.934***	7.937***	8.249***
					(1.529)	(1.304)	(1.301)	(1.233)
Amount of local						0.0320	0.0323	0.0284
taxes						(0.0450)	(0.0452)	(0.0443)
Number of slaves							0.0171	0.00133*
(1860)							(0.0194)	(0.000673)
Land area								-0.304
								(0.182)
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	2,759	2,374	2,353	2,353	2,353	2,298	2,297	2,295
R^2	0.609	0.642	0.672	0.706	0.718	0.736	0.735	0.736

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

change the coefficient much, such as 1% increase in a value of goods produced by convicts in 1886 decrease the absolute upward mobility by 0.056 percentage points.

However, if we consider relative upward mobility as an outcome, the correlation is less pronounced. In Table 15 I provide results of regression for both number of convicts employed and value of goods produced by convicts on relative upward mobility. While coefficient is still positive, the significance is gone when I add a share of urban population and share of the foreign-born population as controls.

Nevertheless, these results show no prima facie evidence against the theory, that convict labor has a negative persistent effect on the intergenerational mobility of the low-income population and positive effect on the not poorest income groups.

It is important to note, that due to opposition of labor unions, over time convict labor legislation were changes in a direction that assume less involvement of

Table 15—Convict labor and contemporary intergenerational mobility II

	I	II	III	IV	V	VI	VII	VIII
VARIABLES	Dependent variable: Relative upward mobility							
Log number of convicts employed	0.00374***	0.00251**	0.000711	0.000410				
	(0.000664)	(0.00101)	(0.000826)	(0.000808)				
Log value of goods produced					0.00171***	0.00112**	0.000376	0.000235
					(0.000297)	(0.000483)	(0.000368)	(0.000356)
Population		0.00132	-0.00270	0.000898		0.00137	-0.00271	0.000862
		(0.00206)	(0.00172)	(0.00342)		(0.00206)	(0.00172)	(0.00342)
Share of black		0.0865***	0.0839***	0.0866***		0.0863***	0.0838***	0.0865***
		(0.0144)	(0.0141)	(0.0147)		(0.0144)	(0.0142)	(0.0147)
Share urban			0.0759***	0.0797***			0.0758***	0.0796***
			(0.0140)	(0.0157)			(0.0139)	(0.0157)
Share foreign-born			-0.0948***	-0.0933***			-0.0949***	-0.0934***
			(0.0226)	(0.0233)			(0.0226)	(0.0233)
Amount of local taxes				-0.00130*				-0.00130*
				(0.000667)				(0.000669)
Number of slaves (1860)				0.00133*				0.00133*
				(0.000674)				(0.000673)
Land area				0.00605				0.00604
				(0.00364)				(0.00363)
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	2,759	2,353	2,353	2,295	2,759	2,374	2,353	2,295
R^2	0.393	0.428	0.453	0.466	0.393	0.402	0.443	0.466

Note: Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

private contractors (e.g. less convict leasing, contract and piece-price systems), and then gone further by starting to abolish state-account system in favor of state-use and public works and ways system. In Figure A.A1 I depict the size of the coefficient of the effect of the value of goods produced by convict labor and number of convicts employed for years other than 1886. As can be seen, while the coefficients remain negative, their magnitude decreases. Thus, the prevalence of convict labor in 1923 is much less correlated to the contemporary absolute upward mobility than the prevalence in 1886.

C. IV Estimates

Next stage is to elicit the causal effect of convict labor on intergenerational mobility by using the distance to the Cincinnati as an instrument for the convict labor outcomes.

Table16 introduced OLS regression for the sub-sample of all states without New York and value of goods produced under convict leasing, contract, piece-price and state-use systems of convict labor. The specification in Column I has no controls, while in Column II I add a full set of controls from Column VIII of Table 14, plus add value agricultural output, as it is correlated with the distance to Cincinnati. Adding controls make the coefficient to become insignificant, however, by adding longitude and latitude in Column III significance returns.

Columns IV-VII contain similar specifications and show results of the reduced form regressions of distance to Cincinnati on absolute upward mobility. Even in regression with a full set of socioeconomic, geographic controls and fixed effects, the coefficient of the distance to Cincinnati is statistically significant, such as further counties within each state are from Cincinnati, the higher is the absolute upward mobility.

Table 17 contain the results of the IV regressions. Column I contain the first stage of the 2SLS regression of value of goods produce by convicts on the absolute upward mobility without any controls. The F statistics of excluded instrument is equal to 35.3, and despite the fact, that I add fixed effects, and the identification comes from the within-state variation of distance to Cincinnati, partial $R^2 = 0.058$. Column II shows the result of the second stage: 1% increase in a value of goods produced by convicts in 1886 decrease the absolute upward mobility by 0.58 percentage points. I add socioeconomic controls in Columns III and IV and add geographical controls in Columns VI and VII, however, results remain robust. While adding all those controls make explanatory power of the instrument to fall, such as partial $R^2 = 0.028$, the F-statistics remains high (38.8), and the overall causal effect of convict labor states that 1% increase in a value of goods produced by convicts in 1886 decreases the absolute upward mobility by 0.51 percentage points.

The second prediction from our hypothesis is that convict labor improves relative upward mobility. OLS estimates in the previous section suggested that while the sign of the correlation is positive, it was not significant. In Table 18 I provide

Table 16—OLS and reduced form

	I	II	III	IV	VI	VII
VARIABLES	Dependent variable: Absolute upward mobility					
Log value of goods	-0.321***	-0.0580	-0.0694*			
produced	(0.0704)	(0.0452)	(0.0365)			
Log of distance				0.995***	0.527*	0.434*
to Cincinnati, Ohio				(0.193)	(0.314)	(0.255)
Controls	×	✓	✓	×	✓	✓
Geographic controls	×	×	✓	×	×	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	2,096	2,082	2,057	2,096	2,082	2,057
R^2	0.54	0.66	0.68	0.49	0.66	0.68

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

the OLS and reduced form regression specification similar to those in Table 16 for the exception of the dependent variable. While coefficients of OLS regressions (Columns II and III) become insignificant after adding controls similar to the situation in Table 15, reduced form coefficient is very significant, and has the expected direction: further from Cincinnati - the lower relative upward mobility.

Results of the 2SLS are presented in Table 19. While the first stage in this table is the same as the first stage in Table 17, I report it for the convenience. The effect of convict labor on relative upward mobility become significant, indicating causal effect: 1% increase in a value of goods produced by convicts in 1886 increases the relative upward mobility by 0.0119 percentage points.

Overall these results suggest that convict labor in 1886 has a persistent effect on contemporary intergenerational mobility. It decreases the chances of the poorest population to go up the income distribution, while improving chances of those who are rich.

D. Robustness checks

1. Railroad Distance

One of the most important concerns is that distance to Cincinnati, while not correlated to important factors affecting both convict labor in 1886 and contemporary intergenerational mobility may correlate with some processes that took place after 1886, and affected intergenerational mobility. For example, National Prison Association Congress could affect convict labor in 1886, however, its effect on contemporary intergenerational mobility is nonexistent, and by using distance

Table 17—IV estimates: distance to Cincinnati

	I	II	III	IV	VI	VII
VARIABLES	Dependent variable: Absolute upward mobility					
	First stage	Second stage	First stage	Second stage	First stage	Second stage
Log of distance	-1.694***		-0.940***		-0.863***	
to Cincinnati	(0.294)		(0.135)		(0.123)	
Log value of goods		-0.584***		-0.557*		-0.510**
produced (1886)		(0.129)		(0.315)		(0.242)
Controls	×	×	✓	✓	✓	✓
Geographic controls	×	×	×	×	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Partial R^2	0.058		0.034		0.028	
F stat of excluded instrument	35.313		31.881		38.826	
Prob > F	0.000		0.000		0.000	
Anderson-Rubin p-value	0.000		0.000		0.000	
Observations	2,205	2,096	2,186	2,088	2,161	2,057
R^2	0.39	0.50	0.65	0.59	0.66	0.64

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

to Cincinnati we capture the effect of migration or trade patterns that had happened during the XX century.

To alleviate this issue I introduce the augmented instrument: railroad distance to Cincinnati. This distance takes into account the actual distance a person should undertake to get to Cincinnati in 1870. As railroad system developed significantly since 1870 and may be more correlate with the direct distance from county centroids to Cincinnati, distance computed along 1870 railroad will capture only costs of travel for those NPA delegates. Table 20 provides the result for the IV estimates with the railroad distances. First three Columns show the reduced form, first stage and second stage results for the specification without any controls. F-statistics is equal to 17.4 that is smaller than of similar regression specification in 17 and coefficient of interest almost twice as large. Specification with socioeconomic controls yield the first stage with F-statistics barely higher than the rule of thumb value of 10, and still negative and significant coefficient of interest. Finally, by adding geographical controls, F-statistics become 23.7, with almost comparable value of partial $R^2 = 0.03$, and the coefficient of interest slightly smaller in magnitude than one in IV regression with the straight distance to Cincinnati: 1% increase in a value of goods produced by convicts in 1886 decrease the absolute upward mobility by 0.42 percentage points.

Table 18—OLS and reduced form

	I	II	III	IV	VI	VII
VARIABLES	Dependent variable: Relative upward mobility					
Log value of goods	0.00313***	0.000762	0.000775			
produced (1886)	(0.000724)	(0.000478)	(0.000476)			
Log of distance				-0.0173***	-0.0134***	-0.0108***
to Cincinnati, Ohio				(0.00168)	(0.00366)	(0.00373)
Controls	×	✓	✓	×	✓	✓
Geographic controls	×	×	✓	×	×	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	2,096	2,082	2,057	2,096	2,082	2,057
R^2	0.42	0.47	0.49	0.40	0.48	0.50

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

I repeat the same regressions for relative upward mobility in Table 21. Similarly to the case of the upward mobility, the resulting IV coefficient of the full control specification is smaller than one in Table 19: 1% increase in a value of goods produced by convicts in 1886 increases the relative upward mobility by 0.0058 percentage points. As the instrument remains strong, it suggests, that our concern indeed took place, and the former more conservative estimates should be taken as baseline results.

2. Sub-sample Analysis

Another important issue, that may be important, is to show that results are not driven by particular set of states. To address this issue, In this section I provide sub-sample analysis for the IV estimation.

In Table 22 I provide reduced form, first and second stages for IV regression with distance to Cincinnati and full set of controls on sub-samples of states. First, in Columns I-III I show, that my results are not driven by exclusion of New York state. As can be seen, results remain virtually the same. In Columns IV-VI I test, if my results are driven by Confederate states. The coefficient of interest does not change, and the first stage is significant. Finally, in Columns VII to IX, in addition to Southern states, I also exclude all border states, as all those slaver states could be different in terms of their racial attitude and institution. The magnitude of the coefficient of interest is about 10% smaller than that of the full sample, but it still very similar to the results in Table 17.

Similarly, I report Table 23, that is only differ form Table 22 with the in-

Table 19—IV estimates: distance to Cincinnati

	I	III	III	IV	VI	VII
VARIABLES	Dependent variable: Relative upward mobility					
	First stage	Second stage	First stage	Second stage	First stage	Second stage
Log of distance	-1.694***		-0.940***		-0.863***	
to Cincinnati, Ohio	(0.294)		(0.135)		(0.123)	
Log value of goods		0.0102***		0.0133***		0.0119***
produced (1886)		(0.00191)		(0.00372)		(0.00364)
Controls	×	×	✓	✓	✓	✓
Additional controls	×	×	✓	✓	✓	✓
Geographic controls	×	×	×	×	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Partial R^2	0.058		0.034		0.028	
F stat of excluded instrument	35.313		31.881		38.826	
Prob > F	0.000		0.000		0.000	
Anderson-Rubin p-value	0.000		0.000		0.000	
Observations	2,205	2,096	2,186	2,088	2,161	2,057
R^2	0.39	0.24	0.65	0.16	0.66	0.26

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

strument: I use railroad based distance here. And these results are much more peculiar and worth a discussion. As can be seen in tn Column II, the F statistics of the first stage with included state of New York become 5.37, that means that the first stage is still valid on 5% level (p-value=0.025) however, cast a shadow on the strength of the instrument. However, the reason behind this result is exactly, why New York state was omitted, by the time of the NPA conference, they already actively practiced convict labor and thus, the instrument should not have any affect on the usage of convict labor. More intriguing, the results of the sub-sample regression without Confederate or all slave states yield in IV coefficient that is approximately 25% higher than one based on the full sample. It can be explain by the fact, that among the 24 states that were represented at NPA congress in 1870, there were only few southern states, thus instrument by the logic of IV should not affect convict labor there at all. Thus by excluding states, where instrument shouldn't matter, we estimate the effect of convict labor on compilers only.

Table 20—IV estimates: Railroad distance to Cincinnati

	I	II	III	VII	VIII	IX	X	XI	XII
VARIABLES	Dependent variable: Absolute upward mobility								
	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage
Railroad distance	4.446***	-4.685***		1.722**	-2.243***		1.137**	-2.412***	
to Cincinnati (1870)	(0.597)	(1.158)		(0.702)	(0.742)		(0.467)	(0.502)	
Log value of goods			-0.932***			-0.750*			-0.423**
produced (1886)			(0.244)			(0.439)			(0.196)
Controls	×	×	×	✓	✓	✓	✓	✓	✓
Geographic controls	×	×	×	×	×	×	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Partial R^2		0.091			0.029			0.030	
F stat of excl. instrument		17.382			10.051			23.688	
Prob > F		0.000			0.003			0.000	
Anderson-Rubin p-value		0.000			0.012			0.025	
Observations	2,095	2,204	2,095	2,082	2,186	2,082	2,065	2,169	2,057
R^2	0.53	0.41	0.31	0.69	0.65	0.51	0.71	0.66	0.67

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 21—IV estimates: Railroad distance to Cincinnati

	I	II	III	IV	V	VI	VII	VIII	IX
VARIABLES	Dependent variable: Relative upward mobility								
	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage
Railroad distance	-0.0465***	-4.685***		-0.0234***	-2.243***		-0.0153**	-2.412***	
to Cincinnati (1870)	(0.00926)	(1.158)		(0.00807)	(0.742)		(0.00703)	(0.502)	
Log value of goods			0.00974***			0.0102***			0.00574**
produced (1886)			(0.00212)			(0.00377)			(0.00235)
Controls	×	×	×	✓	✓	✓	✓	✓	✓
Geographic controls	×	×	×	×	×	×	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Partial R^2		0.091			0.029			0.030	
F stat of excl. instrument		17.382			10.051			23.688	
Prob > F		0.000			0.003			0.000	
Anderson-Rubin p-value		0.000			0.012			0.025	
Observations	2,095	2,204	2,095	2,082	2,186	2,082	2,065	2,169	2,057
R^2	0.41	0.41	0.26	0.50	0.65	0.31	0.52	0.66	0.47

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 22—IV estimates: distance to Cincinnati

	I	II	III	IV	V	VI	VII	VIII	IX
VARIABLES	Dependent variable: Absolute upward mobility								
	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage
Log distance	0.594***	-1.065***		0.508**	-0.900***		0.441*	-0.921***	
to Cincinnati (1870)	(0.212)	(0.187)		(0.220)	(0.111)		(0.242)	(0.156)	
Log value of goods			-0.545**			-0.535**			-0.449*
produced (1886)			(0.246)			(0.243)			(0.255)
Sample		With New York			Without Confederate states			Without slave states	
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Partial R^2		0.023			0.030			0.028	
F stat of excl. instrument		34.342			61.493			33.301	
Prob > F		0.000			0.000			0.000	
Anderson-Rubin p-value		0.0109			0.0298			0.0922	
Observations	2,121	2,226	2,113	1,262	1,328	1,257	1,131	1,187	1,126
R^2	0.70	0.53	0.58	0.67	0.69	0.56	0.67	0.66	0.60

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 23—IV estimates: Railroad distance to Cincinnati

	I	II	III	IV	V	VI	VII	VIII	IX
VARIABLES	Dependent variable: Absolute upward mobility								
	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage
Railroad distance	1.181**	-2.047**		1.699***	-2.620***		1.607**	-2.568***	
to Cincinnati (1870)	(0.500)	(0.902)		(0.549)	(0.450)		(0.646)	(0.473)	
Log value of goods			-0.551*			-0.628***			-0.616**
produced (1886)			(0.296)			(0.243)			(0.282)
Sample		With New York			Without Confederate states			Without slave states	
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Partial R^2		0.014			0.034			0.030	
F stat of excl. instrument		5.370			35.968			33.695	
Prob > F		0.025			0.000			0.000	
Anderson-Rubin p-value		0.0247			0.0017			0.0147	
Observations	2,121	2,226	2,113	1,262	1,328	1,257	1,131	1,187	1,126
R^2	0.70	0.53	0.58	0.68	0.69	0.52	0.68	0.66	0.52

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

3. Placebo test

In this section I test if my result are not spurious and caused just by the fact that Cincinnati is an important city. To alleviate this concern, in addition to Figure III.A, that shows F-statistics for all possible distances used as an instrument, I look in greater details on some specific important cities. in Table 24 I try to use distance to other cities as an instrument for the value of convict labor.

In Columns I-III I use as an instrument distance to the capital city – Washington DC. As can be seen, neither reduced form nor second stage coefficient have a correct sign, and nothing is significant, the first stage F-statistics is very small (1.79). A similar situation can be observe in Columns IV-VI where I use distance to Manhattan as an instrument. Finally, in Columns VII-IX I use distance to another manufacturing and financial center – Chicago. All coefficients have correct signs, that can be explain by the fact, that Chicago is relatively close to Cincinnati, while the F-statistics of excluded instrument is below 1, suggesting very weak first stage relationship between the instrument and value of convict labor output.

In this section, I demonstrated that convict labor in XIX and beginning of XX century has a persistent negative effect on contemporary social mobility and that those affected regions are mole likely to have lower social mobility among the poorest income group and higher income mobility among the higher income quintiles.

V. Identifying Causal Mechanisms

The causal effect of convict labor in late XIX on intergenerational mobility of people, born one hundred years later is a tricky task. First, I consider a county-level cross-sectional model specifications:

$$y_{cs} = \alpha + \beta ValueCL_{cs1886} + \gamma \mathbb{X}_{cs1880} + \mu_s + \varepsilon_{cs}, \tag{4}$$

where y_{cs} is an outcome variable (either absolute or relative upward mobility) in county c in state s; $ValueCL_{cs1886}$ is a dollar value of goods produced by convicts in county c in state s at year $t = 1886$; $\mathbb{X}_{cs1880}$ is a matrix of county-level controls at year $t = 1886$ described in details below, and μ_s are state fixed effects. The standard errors are clustered at the state level.

Usage data for convict labor in 1886 may be the best choice since by 1886 usage of convict labor, especially with the involvement of private contractors was ubiquitously accepted in all states with the exception of New York. However, over time other states imposed legislation that was favoring less harmful for the competition stat-use and public works and ways systems.

TABLE 24—IV ESTIMATES: PLACEBO

	I	II	III	IV	V	VI	VII	VIII	IX
VARIABLES	Dependent variable: Absolute upward mobility								
	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage	Reduced form	First stage	Second stage
	Distance to Washington DC			Distance to New York			Distance to Chicago		
Log distance to	-0.752	-0.583		-1.112*	-1.317		0.367	-0.138	
	(1.052)	(0.366)		(0.618)	(0.986)		(0.279)	(0.169)	
Log value of goods			2.356			0.903			-2.752
produced (1886)			(2.652)			(0.755)			(3.421)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Geographic controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Partial R^2		0.001			0.007			0.000	
F stat of excl. instrument		1.794			1.379			0.613	
Prob > F		0.187			0.246			0.438	
Observations	2,057	2,161	2,057	2,057	2,161	2,057	2,057	2,161	2,057
R^2	0.68	0.67	-1.37	0.68	0.67	0.39	0.68	0.67	-1.95

Note: All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

A. Convict labor and other Correlates of Intergenerational Mobility

In this section, I employ the main correlates of upward mobility from the Chetty et al. (2014*a*) and discuss possible channels of how convict labor camps can affect intergenerational mobility.

While Chetty et al. (2014*a*) does not identify what has the causal effect on intergenerational mobility, they argue, that upward mobility is highly correlated with the following factors: the fraction of working individuals who commute less than 15 minutes to work (segregation), the bottom 99% Gini coefficient (inequality), high school dropout rates adjusted for income differences (school quality), the social capital index, and the fraction of children with single parents (family structure). In Column I of Table 25 provide regression specification similar to one in Table XI of Chetty et al. (2014*a*)[21]. In Column II I add the standardised value of the first principle component of the number of convicts employed in labor camps over 1886-1940, aggregated on the community zone level without any controls. The coefficient is negative and significant, such as one standard deviation in the number of prisoners decreases absolute upward mobility by 6.1% of its standard deviation. In Column III I add all variables from Chetty et al. (2014*a*), and while the magnitude of the coefficient of the number of employed prisoners is halved, it is still highly significant. It can be explained by the fact, that that part of the variation in a number of convicts employed that is driven by income inequality is captured by other covariates. Column IV shows that results are robust to inclusion historical controls that I used in the previous section.

Finally, in Column V I add interactions of main correlates of upward mobility and number of convicts employed in the labor camps. The number of convicts remains significant, and so do other correlates that were significant in Columns I, III and IV. Among the interactions, the one with a fraction of the black population and the fraction of working individuals who commute less than 15 minutes to work are negative and significant. Both variables are related to racial segregation, that can be evidence, that one of the mechanisms of how convict labor camps affect contemporary intergenerational mobility is through racial discrimination. Surprisingly, the interaction with the number of single mothers is positive and significant, however, I do not have any prediction, why it can be the case. The fact, that number of convicts is significant by itself, indicates, that it affect upward mobility through some other channel: possible, human capital.

VI. Conclusion

In this paper, I showed that coercive institutions that had appeared in the United States after the civil war had an effect on the economic welfare of free laborers that were competing with convict labor. Prison labor distorted the capital-to-labor ratio and increased making it easier to exploit working class by capital

[21]Here, in order to be comparable to Chetty et al. (2014*a*) I aggregate data to community zone level, which is bigger than a county.

Table 25—Correlates of Intergenerational Mobility: Comparing Alternative Hypotheses

	I	II	III	IV	V	VI	VII	VIII
VARIABLES	Dependent Variable:							
	Absolute upward mobility				Relative upward mobility			
PCA of value of goods		-0.564***	-0.197*	-0.0997		0.418***	0.182*	0.135
produced over all t		(0.127)	(0.114)	(0.109)		(0.105)	(0.0912)	(0.0874)
Capital-labor ratio				-0.0534***				0.0182
				(0.0197)				(0.0225)
Fraction short commute	0.264***		0.256***	0.236***	-0.0717		-0.0643	-0.0575
	(0.0685)		(0.0705)	(0.0730)	(0.0526)		(0.0537)	(0.0551)
Gini bottom 99%	0.000762		0.00168	0.00249	-0.0278		-0.0286	-0.0289
	(0.0422)		(0.0420)	(0.0407)	(0.0867)		(0.0865)	(0.0860)
High school dropout rate	-0.0811**		-0.0806**	-0.0814**	0.00189		0.00140	0.00167
	(0.0355)		(0.0353)	(0.0350)	(0.0464)		(0.0463)	(0.0463)
Social capital index	-0.0890		-0.0881	-0.0842	-0.172*		-0.173*	-0.174*
	(0.0940)		(0.0929)	(0.0912)	(0.0886)		(0.0888)	(0.0885)
Fraction single mothers	0.0414		0.0418	0.0519	0.142**		0.142**	0.139**
	(0.0432)		(0.0423)	(0.0439)	(0.0657)		(0.0648)	(0.0645)
Fraction black	-0.661***		-0.665***	-0.670***	0.502***		0.506***	0.508***
	(0.0742)		(0.0737)	(0.0737)	(0.0626)		(0.0621)	(0.0619)
Constant	0.274***		0.282***	0.293***	0.0415		0.0338	0.0302
State FE	(0.0751)		(0.0763)	(0.0745)	(0.101)		(0.101)	(0.100)
Observations	821	821	821	821	821	821	821	821
R-squared	0.876	0.660	0.877	0.879	0.696	0.574	0.696	0.696

Note: The table reports beta coefficients. Data for absolute upward mobility, fraction of working individuals who commute less than 15 minutes to work, the bottom 99% Gini coefficient, high school dropout rates adjusted for income differences, the social capital index, the fraction of children with single parents, and contemporary fraction of black is taken from Chetty et al. (2014*a*). All regressions contain constant. Historical controls include log of population at 1880, land gini coefficient at 1880, share of black population at 1880 and log of number of slaves at 1860. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

owners. I found that regions that were exposed to a more severe exploitation of convict labor are still worse off in terms of absolute upward mobility and better of in terms of relative upward mobility.

Interestingly, the private usage of convict labor was allowed again in 1979, thus repeating the mistakes of the previous system of penal labor. This provides additional importance of studying the long-term effects of coercive institutions. My analysis highlights the fact that usage of coercive labor is not only lowering the costs of keeping the prisoners for states but also have an effect on the welfare of all free laborers in the locality of labor camps and thus benefits from its usage should be evaluated accordingly.

REFERENCES

Acemoglu, Daron, and Alexander Wolitzky. 2011. "The economics of labor coercion." *Econometrica*, 79(2): 555–600.

Allinson, Samuel. 1872. *Report of committee on discharged prisoners.*

Barnes, Harry Elmer. 1918. *A history of the penal, reformatory, and correctional institutions of the state of New Jersey: Analytical and documentary.* MacCrellish & Quigley.

Blackmon, Douglas A. 2009. *Slavery by another name: The re-enslavement of black Americans from the Civil War to World War II.* Anchor.

Buggle, Johannes C, and Steven Nafziger. 2015. "Long-Run Consequences of Labor Coercion: Evidence from Russian Serfdom." *Unpublished manuscript.*

Camp, C, and G Camp. 2002. "The Corrections Yearbook 2001." *Middletown, CT: Criminal Justice Institute.*

Chetty, Raj, Nathaniel Hendren, Patrick Kline, and Emmanuel Saez. 2014*a*. "Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States." *The Quarterly Journal of Economics*, 129(4): 1553–1623.

Chetty, Raj, Nathaniel Hendren, Patrick Kline, Emmanuel Saez, and Nicholas Turner. 2014*b*. "Is the United States still a land of opportunity? Recent trends in intergenerational mobility." *The American Economic Review Papers and Proceedings*, 104(5): 141–147.

Conley, Timothy G, Christian B Hansen, and Peter E Rossi. 2012. "Plausibly exogenous." *Review of Economics and Statistics*, 94(1): 260–272.

Dell, Melissa. 2010. "The persistent effects of Peru's mining mita." *Econometrica*, 78(6): 1863–1903.

Dippel, Christian, Avner Greif, and Daniel Trefler. 2015. "The rents from trade and coercive institutions: Removing the sugar coating." National Bureau of Economic Research.

Donaldson, Dave, and Richard Hornbeck. 2016. "Railroads and American Economic Growth: A "Market Access" Approach." *The Quarterly Journal of Economics*, qjw002.

Dyer, Joel. 2000. *The perpetual prisoner machine: How America profits from crime.* Basic Books.

Engerman, Stanley L, and Kenneth L Sokoloff. 2002. "Factor Endowments, Inequality, and Paths of Development among New World Economies." *Economía*, 3(1): 41–88.

Engerman, Stanley L, and Kenneth L Sokoloff. 2005. "Colonialism, inequality, and long-run paths of development." National Bureau of Economic Research.

Fogel, Robert W, and L Stanley. 1974. "Engerman." *Time on the Cross: The Economics of American Negro Slavery*, 2.

Frank, Mark W. 2009. "Inequality and growth in the United States: Evidence from a new state-level panel of income inequality measures." *Economic Inquiry*, 47(1): 55–68.

Fraser, Steve, and Joshua Freeman. 2012. "Locking Down an American Workforce." *The Huffington Post.*

Haines, Michael R. 2004. "the Inter-university Consortium for Political and Social Research. Historical, Demographic, Economic, and Social Data: The United States, 1790-2000 [Computer file]. ICPSR02896-v2. Hamilton, NY: Colgate University." *Ann Arbor: MI: Inter-university Consortium for Political and Social Research [producers].*

Jackson, Henry Theodore. 1927. "Prison labor." *Journal of the American Institute of Criminal Law and Criminology*, 18(2): 218–268.

Jeanty, P Wilner, et al. 2012. "NEARSTAT: Stata module to calculate distance-based variables and export distance matrix to text file." *Statistical Software Components.*

Kapelko, Natalia, and Andrei Markevich. 2014. "The Political Legacy of the Gulag Archipelago." *Available at SSRN 2516635.*

Kapelko, Natalia, Andrei Markevich, and Ekaterina Zhuravskaya. 2015. "The Long-run Effect of Political Repressions: Stalin's GULAG and Elections in Modern Russia."

Markevich, Andrei, and Ekaterina Zhuravskayaa. 2017. "Economic Effects of Coerced Labor: Evidence from the Emancipation of Serfs in Russia."

McKelvey, Blake. 1933. "Penology in the westward movement." *Pacific Historical Review*, 2(4): 418–438.

McKelvey, Blake. 1934. "The Prison Labor Problem: 1875-1900." *Journal of Criminal Law and Criminology (1931-1951)*, 25(2): 254–270.

McKelvey, Blake. 1936. *American prisons: A study in American social history prior to 1915.* University of Chicago Press.

McKelvey, Blake. 1977. *American prisons: A history of good intentions.* Patterson Smith Montclair, NJ.

New Jersey Historical Society. 1884. *Memorial of Samuel Allinson.* Vol. 8, New Jersey historical society.

New Jersey Treasury Dept. 1873. *Report of the Joint Committee on Treasurer's Accounts to the Legislature of New Jersey, with the Treasurer's Report to the Governor on the Finances of the State for the fiscal year ending October 31, 1873.* Trenton N.J.: The State Gazette - Murphy and Bechtel, Book and Job Printers.

New York Prison Association. 1871. *Annual Report of the Executive Committee of the Prison Association of New York.* Albany: The Argus company, printers.

Oliver, Melvin L, and Thomas M Shapiro. 2006. *Black wealth, white wealth: A new perspective on racial inequality.* Taylor & Francis.

Research Foundation, Laogai. 2006. "Laogai Handbook: 2005-2006."

Roback, Jennifer. 1984. "Southern labor law in the Jim Crow era: exploitative or competitive?" *The University of Chicago Law Review*, 51(4): 1161–1192.

Ruggles, Steven, Katie Genadek, Ronald Goeken, Josiah Grover, and Matthew Sobek. 2015. "Integrated Public Use Microdata Series: Version 6.0 [Machine-readable database]." *Minneapolis: University of Minnesota.*

Sellin, Johan Thorsten. 1976. "Slavery and the penal system."

Shapiro, David. 2011. *Banking on bondage: Private prisons and mass incarceration.* American Civil Liberties Union.

Sharkey, Charles F., and George D. Patterson. 1933. *Laws Related to Prison Labor in the United States as of July 1, 1933.* Washington: United States Government Printing Office.

Shichor, David. 1995. *Punishment for profit.* Sage Publications.

Soares, Rodrigo R, Juliano J Assunção, and Tomás F Goulart. 2012. "A note on slavery and the roots of inequality." *Journal of Comparative Economics*, 40(4): 565–580.

State of New Jersey. 1863. *Acts of the eighty-seventh Legislature of the State of New Jersey.* Newark N.J.: E.N. Fuller, Daily Journal Office.

Stewart, Gary. 1998. "Black codes and broken windows: The legacy of racial hegemony in anti-gang civil injunctions." *Yale Law Journal*, 2249–2279.

Stock, James H, and Motohiro Yogo. 2005. "Testing for weak instruments in linear IV regression." *Identification and inference for econometric models: Essays in honor of Thomas Rothenberg.*

Stonaker, CL. 1913. "Prison Labor Reform in New Jersey." *The ANNALS of the American Academy of Political and Social Science*, 46: 154–160.

US Department of Labor. 1887. *Second Annual Report of the Commissioner of Labor: Convict Labor.* Washington: Government Printing Office.

US Department of Labor. 1906. *Tventieth Annual Report of the Commissioner of Labor: Convict Labor.* Washington: Government Printing Office.

US Department of Labor. 1914. "Federal and State Laws Relating to Convict Labor." *63d Congress, 2nd Session*, 494.

US Department of Labor. 1925. *Convict Labor in 1923.* Washington: Government Printing Office.

US Department of Labor. 1933. *Prison Labor in the United States 1932.* Washington: United States Government Printing Office.

US Department of Labor. 1941. *Prison Labor in the United States 1940.* Washington: United States Government Printing Office.

van der Linden, Marcel, and M Rodríguez García. 2016. "On Coerced Labor: Work and Compulsion after Chattel Slavery." *Studies in Global Social History.*

Wagner, Peter, and Brigette Sarabi. 2003. *The prison index: Taking the pulse of the crime control industry.* Prison Policy Initiative.

Whitehead, John W. 2012. "Jailing Americans for Profit: The Rise of the Prison Industrial Complex." *Huffington Post. Retrieved on July*, 31: 2015.

Wilson, Walter. 1933. *Forced labor in the United States.* International Publishers New York.

Wines, E.C. 1871. *Transactions of the National Congress of Penitentiary and Reformatory Discipline held at Cincinati, Ohio, October 12-18, 1870.* Albany: The Argus company, printers.

Wright, Gavin. 1978. *The political economy of the cotton South: households, markets, and wealth in the nineteenth century.* WW Norton.

Appendix

A1. Intergenerational Mobility and Pre-Civil War Prisons

Another issue may arise if we just want to elicit the effect of the existence of prison in the past on the contemporary intergenerational mobility. Prison's location by itself can be endogenous, and the distance to Cincinnati does not help us to determine where the prison will more likely appear, but only to what extent will they exploit prison labor. In this case, prison may be founded either in places with such unobservables that correlate (e.g. human capital) with worse intergenerational mobility that will magnify the results of OLS regression and are not captured by the instrument. Alternatively, if prisons were built in places where intergenerational mobility is higher (e.g. more urban places) it will bias OLS coefficient toward zero. For example, Shichor (1995) articulates, that prisons in XVIII and XIX centuries appeared in locations with high crime rate and/or high population. Even if we control on population and initial incarceration rates, some unobserved heterogeneity concerns remain since when convict labor was introduced, prison location could be also determined by unobserved economic factors.

Why convict labor was used in some counties but not in other counties? In most cases, prison labor was used inside the walls of correctional facilities that were created long before the start of the industrialization and were build due to population or crime concerns (Shichor (1995)). In this case, if state laws were allowing using convict labor by private contractors they still had to employ them inside those already built prisons. Those pre-Civil War prisons were built without any thought about future using for production of goods and thus can be considered exogenous, conditional on the local population.

I use IV approach to address this problem. Assuming that (i) before convict labor become popular, indeed the only two determinants of the prison location where population and crime rate (Shichor (1995)), and that (ii) before the Civil War convict labor usage was not under the consideration of state's penitentiaries (McKelvey (1934)), I use dummy for prisons that were built before the Civil War as an instrument for dummy for the location of convict labor camps in the future. Thus, I use pre-Civil War prisons to instrument location of post-Civil War prisons, such has the first stage looks like:

$$Prison_{cs} = \alpha + \widetilde{\pi} OldPrison_{cs} + \widetilde{\gamma}\mathbb{X}_{cs} + \mu_s + \epsilon_{cs}, \tag{A1}$$

Second stage:

$$AUM_{cs} = \alpha + \pi \widehat{Prison}_{cs} + \gamma \mathbb{X}_{cs} + \mu_s + \varepsilon_{cs} \tag{A2}$$

where AUM_{cs} is absolute upward mobility in county c in state s; $OldPrison_{cs}$ is the dummy if prison existed before the Civil War in county c in state s; $Prison_{cs}$ is the dummy if prison existed in county c in state s at for all $t \in T$; $\mathbb{X}_{cs1886}$ is matrix of county level controls for $t = 1880$, and μ_s are state fixed effects. The standard errors are clustered on the state level.

In Table A1 I show the results for the specification above. We can see in Column I that OLS estimates based on the dummy for labor camp for all cross-sections of convict labor data. Results suggest, that labor presence of camp decreases absolute upward mobility by 1.3%. Column II shows the reduced form. The instrument has a negative effect on social mobility, while smaller in magnitude. Columns III and IV show the first and second stage if 2SLS. The F-statistics of excluded instrument is equal to 34.26 that is big enough to argue the strength of the instrument. The IV estimate is 66% higher in its magnitude than OLS coefficient, such as labor camp decreases absolute upward mobility by 2.1%. It suggests that the overall direction bias of OLS regression was downward.

Nevertheless, if one do not believe in the assumption that pre-Civil War prison construction was only based on the population and crime rate, she may think about this regression with a grain of salt. As can be seen partial $R^2 = 0.43$, that is basically mean, that the instrument is not very different from potentially endogenous variable and still may be subject to the same endogeneity concerns. Nevertheless, this table provides an important reduced form relationship between plausibly exogenous pre-Civil War prisons and contemporary upward mobility.

Table A1—IV estimates with pre-Civil War prisons

	I	II	III	IV
VARIABLES	OLS	Reduced Form	First Stage	Second Stage
Prison dummy in 1886	-1.28***			-2.13***
	(0.27)			(0.66)
Prison dummy		-1.05***	0.487***	
if built before Civil War		(0.26)	(0.08)	
F-stat of excluded instrument				34.26
Partial R squared				0.43
Anderson-Rubin p-value				0.000
Controls	✓	✓	✓	✓
Fixed Effects	✓	✓	✓	✓
Observations	2338	2338	2338	2338
R^2	0.69	0.69	0.65	0.69

Note: Columns I-III computed with OLS. Column IV computed with 2SLS. Dependent variable in Columns I, II and IV is absolute upward mobility. Dependent variable in Column III is log of number of prisoners employed. The instrumented variable is log of number of prisoners employed, the instrument is interaction of land inequality in 1870 (gini) and log of value of iron and coal mines in 1880. Constant, log of population at 1880, land gini coefficient at 1880, share of black population at 1880 and log of number of slaves at 1860 are used as controls. All columns contain constant. Robust clustered by state standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2—Evolution of Convict labor: Share of Employed Convicts

System	1886	1895	1905	1914	1923	1932	1940
Convict leasing	20	14	6	3	0	0	0
Contract	30	24	23	16	7	3	0
Piece-price	6	10	5	4	4	6	0
State-account	20	24	14	20	16	10	5
State-use			12	14	22	22	26
Public works and ways			5	7	12	12	13
Not Employed	24	28	35	36	39	47	56

Note: State-account, state-use and public works and ways systems were reported together as public-account system before 1905.
Source: labor camps: US Department of labor.

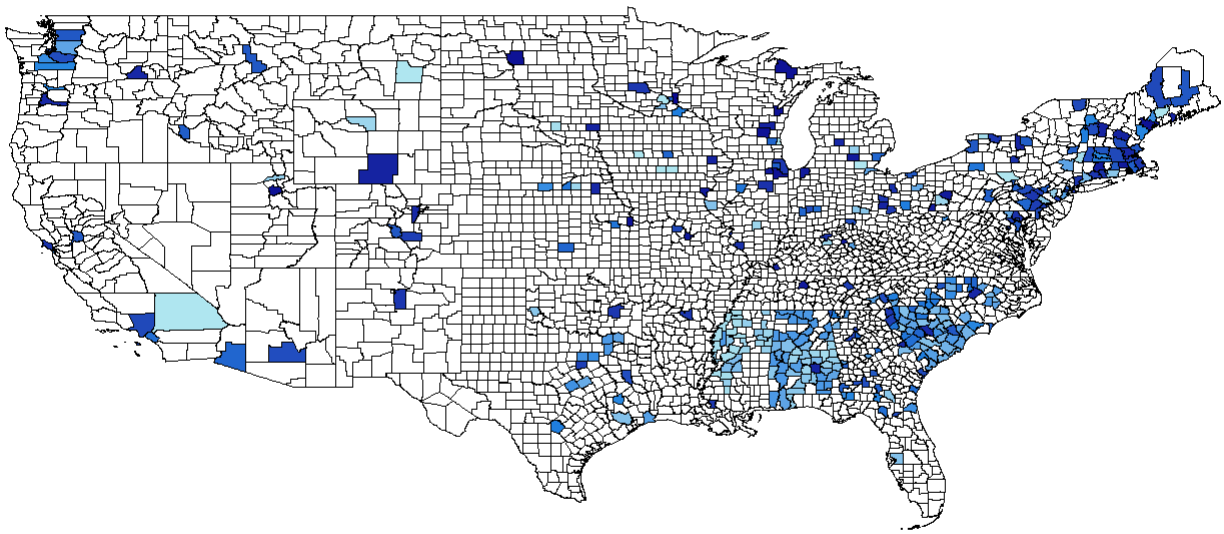

Figure A1. Value of Goods Produced per Convict Employed: Total

Note: Blue color indicates value of goods produced per convict employed in 1940 dollars.
Source: labor camps: US Department of labor.

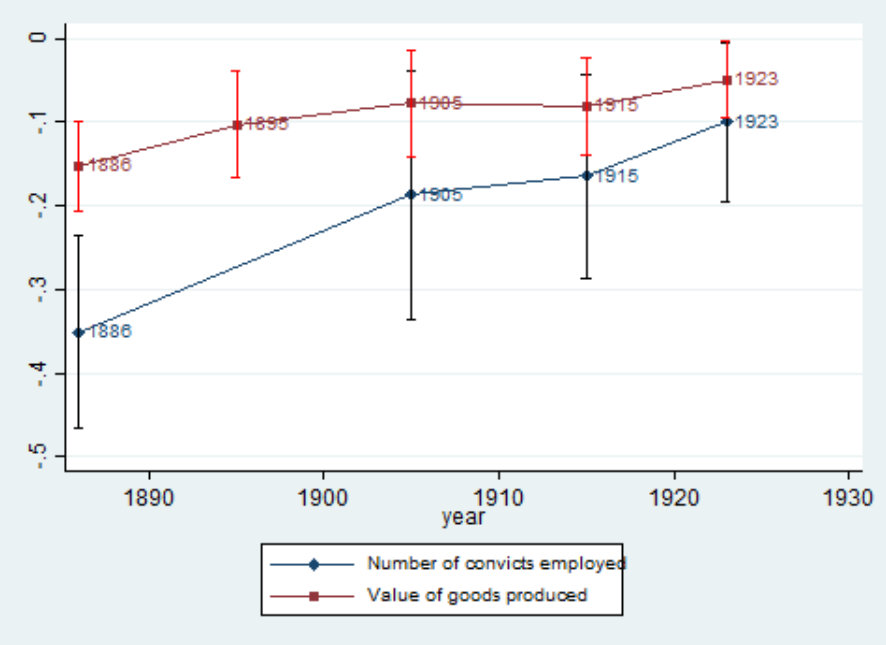

Figure A2. Convict Labour and Absolute Upward Mobility Over Time

Note: Blue color indicates value of goods produced per convict employed in 1940 dollars.
Source: labor camps: US Department of labor.