BAD MEN, GOOD ROADS, JIM CROW, AND THE ECONOMICS
OF SOUTHERN CHAIN GANGS

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ABSTRACT

Penology in the Jim Crow South centered on the chain gang. Gangs ostensibly served three purposes: their severity served as a deterrent; their putting convicts to work on roads and other public improvements reduced the taxpayers' costs of infrastructure; and their discriminatory implementation reinforced the social order defined by Jim Crow. Drawing on insights from the economics of crime literature, this paper analyzes whether chain gangs reduced road maintenance costs. Using a fixed-effects design, the analysis finds that the costs of using gangs in road maintenance were marginally lower on average than using wage labor. The results are consistent with county officials choosing between convict and free labor in manner consistent with minimizing taxpayers' costs.

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"Bad men on bad roads make good roads, while good roads make good men."

– Davis (1916, p.41)

1 Introduction

Economists' standard models of crime suggest that socially optimal enforcement of and punishment for violations of the criminal code should be determined by the seriousness of the offense and the effect of punishment on marginal deterrence (Becker 1968; Polinsky and Shavell 1992; Friedman 2001). Recent contributions, however, recognize that law enforcement officials respond to incentives other than minimizing the social costs of crime. Enforcement agents may act on biases, prejudices, and preferences with respect to race, gender, age, or other observable and unobservable (to the econometrician) offender characteristics (Knowles, Persico and Todd 2001; Fryer 2016). Efforts to minimize the social costs of crime are exchanged at the margin for maximizing the utility of agents who act, as least in part, on their own preferences. Enforcement agents, too, may respond to fiscal or financial incentives provided by revenue-maximizing bureaucrats (Makowsky and Stratmann 2009; Makowsky, Stratmann and Tabarrok 2019). Traffic enforcement officers, for example, are more likely to issue traffic citations or impose higher fines for violations when local municipalities experience budget deficits. Officers may target certain individuals in their enforcement efforts when doing so reduces the officers' expected cost of issuing summonses and raises revenues for the municipality.

This paper applies the insights of these three approaches to the study of criminal enforcement to better understand the operation of South Carolina's Jim Crow-era chain gangs. In 1919 South Carolina's counties set between 5 and 133 convicts to work on road maintenance chain gangs (South Carolina Board of Charities and Corrections 1919). The average county had 35 men at work at a given time. The state's larger cities also operated their own convict gangs that worked on the cities' streets. Despite the relatively large number of convicts put to work, there were more miles of road in need of maintenance than gangs could keep in good repair. Counties and cities also hired wage labor to maintain roads and streets. Sometimes gangs and free labor worked

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together; most times they worked separately. The principal question addressed here is whether South Carolina's counties realized any measurable cost savings from convict rather than wage labor in the provision of road maintenance.

Using hand-coded data from the South Carolina Highway Department, this paper analyzes the costs and potential cost savings of employing convicts rather than wage labor in road maintenance. The evidence suggests, contrary to the assertions of contemporaries and historians, that the use of convicts did not necessarily reduce taxpayers' costs of building and maintaining the state's roads. South Carolina's gangs were more efficient at road maintenance than road building, but only if convict road gangs could be maintained at or near optimal size. Statistical evidence reveals that using convicts or road maintenance reduced costs by less than 10 percent. If county road commissioners were conscientious, cost-minimizing agents of taxpayers, they would have equalized the marginal cost of using gangs and wages workers. The evidence points to their acting in this way.

One threat to identification is convict gang use responding endogenously to road conditions and, therefore, labor costs. The choice to treat the use of gangs on specific road sections as plausibly exogenous can be justified in three ways. First, if the endogenous choice of gang versus patrol is the product of county-level time-invariant preferences over the appropriate treatment of criminals, then fixed-effects estimates derived from a short panel will yield unbiased estimates of the costs of employing convict gangs. Second, the choice of whether to have a gang and how to employ them was made at the county level and not the road segment level. Three counties, for example, never authorized the use of convict gangs. Other counties mandated that local roads receive a specific number of days of maintenance regardless of road condition, gang size, and traffic load. Thus, the choice of gang or wage labor did not respond endogenously to cost or road conditions. Third, temporal changes in county gang sizes were driven by factors that influenced the propensity of potential criminals to engage in crime, which is plausibly unrelated to road mileage or condition. One threat to exogeneity, however, is Makowsky and Stratmann's (2009) finding that local law enforcement may step up enforcement efforts in periods of municipal financial stringency, but this would have the effect of increasing gang size not necessarily the choice of gangs or patrols. Exogenous forces determined gang sizes and gang use.

During America's participation in the First World War, for example, average county gang size declined by six to eight convicts. Young men who may have engaged in criminal activity found themselves instead in trenches on the western front. Wages also rose notably during the war. Both effects were completely exogenous to local road conditions and local fiscal conditions, but surely influenced both the choice of young men to engage in crime and the gang convict versus wage labor choices of road supervisors.

Questions of external validity hang over most case studies, but South Carolina's experience was not unique. Davis (1916, p.38) observes that "the question of utilizing convict or prison labor upon works of public improvement … is the subject of legislation in practically every state," and Steiner and Brown (1927/1969) argue that convicts in the South Atlantic states, other than Florida, worked under similar conditions in similarly organized chain gangs. About one-half of North Carolina's counties operated their own convict gangs; counties that did not operate a gang leased their convicts to counties that did (Pratt and Berry 1912). In June 1907 twenty-nine of Georgia's counties worked an average of 20 convicted felons on their roads, either those convicted in that county or leased from other counties. Fifty-six counties worked 1,650 misdemeanants on local roads (Georgia Prison Commission 1907).[1] South Carolina's system is, therefore, representative of the gang system across the South.[2] Although the system evolved over time, the fundamental features of the system were that criminal offenders, both felons and misdemeanants, mostly black men, served their terms of incarceration at hard labor work on roads working under "degrading and humiliating circumstances" (Davis 1916, p.38).

Besides the questions raised by early studies of convict gangs that cast doubt on the alleged cost savings attributable to convict labor, this paper contributes to a several other literatures. It adds to a now-voluminous literature that addresses the inefficiencies and inequities of the South's Jim Crow racial order, including disparate education (Higgs

[1] In addition to working convicts under county supervision, several Georgia counties leased misdemeanants to work at private firms, mostly turpentine makers (Georgia 1907). When abuses of convicts by private contractors were made public, Georgia later prohibited the convict lease system.
[2] Lichtenstein (1993, 1996) studies Georgia's system. Miller (2012) traces the evolution of convict labor in Florida from the post-Civil War convict lease system through the rise and fall of the chain gang and its replacement by the state prison farm. For a description of life on the chain gang, see its depiction by a contemporary federal appeals court in *Jamison v. Wimbish*, 130 F. 351.

1989, Margo 1990), race-based occupational segregation (Donohue and Heckman 1991), residential segregation (Halcoussis and Lowenberg 1998), as well as discrimination in marriage, public accommodation and transportation (Woodward 1957). The average convict gang in South Carolina circa 1920 was 80 percent black; the median gang was 100 percent black. As such this paper touches on, but does not test, the political economy approach to law enforcement discussed by Makowsky and Stratmann (2009). They show that nonresident drivers – those lacking the local franchise and without local political voice – are targeted for moving violations and other traffic citations. Blacks in the Jim Crow South were the equivalent of nonresident drivers. Lacking any political voice, they paid a disproportionate tax imposed for the improvement of local roads, the benefits of which were disproportionately enjoyed by middle- and upper-middle-class white voters and automobile owners.

Institutional background

The public finance of roads

The introduction of mass-produced automobiles in the early twentieth century increased public demand for good, or at least passable, roads. The Good Roads Movement emerged, which called for a rationalization of the nation's road network, the construction of more hard-surface roads, and the improved maintenance of existing roads. Accomplishing all three goals required an overhaul of the road provision and maintenance procedures. As late as the 1920s South Carolina still relied, in part, on the ancient common law system under which every able-bodied man between the ages of 18 and 50 years was required to devote up to ten 10-hour days per year at supervised road maintenance or construction (American Highway Association 1913, p.126). Although county road administrators enforced compliance, local roads were poorly maintained and often impassable in the rainy season.

Table 1 presents road statistics from select counties (and state totals) from 1908, a half-decade prior to Henry Ford's introduction of the mass-produced automobile. Several features stand out. First, counties typically had between 500 and 2000 miles of roads, but most counties had few miles that state road officials classified as improved and well maintained. The round numbers themselves point toward local government's

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lack of information on its own roads. Of Abbeville's 1000-odd miles of road, only five miles of those thousand were improved stone; another seven miles were improved gravel road. The remaining 988 miles were unimproved, poorly maintained dirt roads. In 1908, Abbeville County expended about $7,500 in direct outlays on road maintenance; approximately 4,000 men worked four days each year on the roads, a labor contribution that county valued at $9,600. The sum of direct outlays and value of labor requirement amounted to 50 cents per capita or $1.70 per mile. To place Abbeville County's $17,100 annual expenditure in perspective, once states began building improved roads in earnest private contractors billed counties about $4,300 *per mile* for construction of new hard-surface (macadam) roads; regular maintenance costs for hard-surface roads averaged about $440 per mile (Virginia State Highway Commissioner 1915, p.111-113). New gravel roads cost about $2,350 per mile and new sand/clay roads cost about $1,911; regular maintenance costs for existing roads of each type averaged about $250 to $350 per mile. Abbeville's pre-automobile era $17,000 expenditures would not have gone very far toward improving the driving experience whether by auto or horse-drawn wagon. It was sufficient to add about four miles of new hard-surface road per year.

Table 1 South Carolina county-level road statistics, 1908 (select counties)

County	Total miles	Stone miles	Gravel miles	Sand miles	Road levy per $100	Cash outlays	Men on road work	Required days	Value of labor tax
	(miles)	(miles)	(miles)	(miles)	($)	($)	(men)	(days)	($)
Abbeville	1000	5	7	0	5	7500	4000	4	9600
Anderson	2200	0	5	0	10	16000	1000	4	3000
Charleston	700	1	0	0	0	12236	2100	4	5880
Florence	675	2	0	160	10	10000	2700	5	8775
Greenville	1500	4	500	0	10	10000	5000	3	9000
Orangeburg	1100	0	0	200	10	10000	7000	6	25200
Pickens	1000	0	100	0	10	4000	1800	5	5400
Richland	700	2	0	350	10	20000	3200	10	24000
Spartanburg	1500	10	0	0	10	48191	6000	3	13500
Union	550	0	0	100	10	4500	3000	2	3600
York	900	20	15	0	8	8400	4500	4	13500
Total	41830	69	679	1575		334079	116282		411619

In the first decade of the twentieth century few roads were good roads, a fact the American Highway Association (1913) repeatedly illustrated in its annual yearbooks, each of which included multiple photographs of automobiles buried to their axles in mud, sometimes with mules laboring to extricate them. Using an average cost of $250 per mile as typical, Abbeville County's direct and indirect expenditures in 1908 meant it could maintain about 68 miles of its 1000 miles of road. Thus, most of its roads were in disrepair most of the time. Drivers spent much of their time avoiding muddy and rutted roads or stuck in them.

Bad roads imposed substantial costs on the citizenry as a study commissioned by the North Carolina state geologist documented. Following a comprehensive statewide survey of North Carolina's roads, the state geologist provided county-level estimates of the social costs of bad roads (Pratt and Berry 1912). Estimates were based on the difference in the ton-mile cost of hauling goods on improved versus unimproved roads by road type (earth, sand, gravel) multiplied by estimated tonnage of locally produced agricultural and manufactured goods moving across those roads. The numbers, despite the state geologist's belief that they were lower bound estimates, were eye-opening. In Alamance County, located in the state's Piedmont Plateau, for example, the geologist estimated the annual opportunity cost of bad roads at $2.77 per capita in 1911 compared to the county's total expenditures on road maintenance of $1.17. The statewide average per capita costs of bad roads were $4.54. Average per capita personal income in North Carolina in 1910 was about $123 (less than one-half the national average), so bad roads created a loss of at least 3.7% of annual income (Klein 2009; Rhode 2002).

As government officials at every level, from municipal to federal, and their constituents recognized the potential economic gains to be realized from full exploitation of an emergent automobile technology, public investment in road construction and maintenance increased apace. Table 2 provides some evidence from South Carolina that by the early 1920s state and local governments collected revenues earmarked for roads from several sources. Panel A shows that in 1922 the state was responsible for just 1,900 miles of improved roadway. It spent $447,000 raised from

annual taxes on automobiles, in addition to appropriations from general funds to build and maintain its highways.

Table 2 State and county road statistics, 1922		
	Total	Fraction of revenues
Panel A: State highway statistics		
Soft surface miles (#)	1,909.9	
Autos taxed (#)	81,417	
Total state road expenditures ($)	447,260	
Panel B: County road statistics		
Original assessment county road tax ($)	729,692	0.245
Added assessment county road tax ($)	11,093	0.004
Penalty county road tax ($)	10,786	0.004
Commutations ($)	439,750	0.148
Automobile registration fees ($)	527,718	0.177
Federal aid ($)	727,738	0.244
Gasoline tax ($)	530,321	0.178
Notes: expenditures exclude bridge construction costs.		
Sources: miles and expenditures from SC Highway Commission (1922); remaining rows from SC Comptroller General (1922)		

Panel B of Table 2 reveals several notable county-level features. First, most counties imposed a base road levy (percent reported in Table 1) that raised nearly one-fourth of the total county-level revenues available to be spent on roads. Second, if one-fourth of a county's registered voters petitioned for it, county assessors were required to hold a referendum on the imposition of an additional property tax levy of no more than 2 mills (or, $2 per $1,000 assessed value on eligible property), to be spent on road improvements, which would go into effect if approved by a majority vote (American Highway Association 1913, p.127). Such additional levies represented a trivial fraction of road revenues. Third, in lieu of laboring on the roads, eligible, able-bodied men could pay a commutation tax of $1 to $3, depending on county, earmarked for road work. Commutation assessments represented about 15 percent of revenues. Fourth, an additional source of local funds flowed from the state treasury. Eighty percent of all motor vehicle registration fees collected by the state from residents of a county were returned to the county in which the vehicles were registered. Statewide, drivers

registered 81,147 vehicles (cars, trucks and motorcycles) in 1922, which generated $527,700 in fees that represented nearly 18% of county revenues. By the end of the decade, more than 275,000 vehicles were registered, which generated more than $2.6 million in registration fees (South Carolina State Highway Department 1929, p25). Gasoline taxes, in addition, represented 18% of total road revenues.

Additional funding for road construction and maintenance, which accounted for about 25 percent of all revenues, was provided by the federal government under the terms of the Federal Road Act of 1916. South Carolina's apportionment increased from $71,800 in 1917 to $1.4 million in 1921. At decade's end, South Carolina still claimed more than $750,000 in federal funds for the year (SC Highway Department 1929, p.122). State and counties were required to match federal funds from taxes and registration fees to receive federal assistance. Compared to 1908 when counties spent an average of $18,100 per year ($17.70 per mile) on their roads, the $74,400 average annual expenditures ($64.70 per mile) represented a substantial commitment to the provision of a public good. Between 1910 and 1920 the increase in county revenues earmarked for road repairs meant that the average county could increase the miles of road under maintenance from 65 to 230.

A popular alternative to taxation (among law-abiding, taxpaying voters, at least) was to put able-bodied convicts to work on the roads. South Carolina's criminal code of 1912 provided that, in any case in which convicted criminal was subject to a term of incarceration, the sentence be served "at hard labor on the public works of the county in which convicted, if the county maintains a chain gang, without regard to the length of the sentence" (Bethea 1912 v.2, p.244). The only convicts required to be sent to the state penitentiary were those convicted of a capital offense (murder or rape) and those considered physically unable to work at hard labor on a chain gang.

Not only did the state and county save money on prisons and jails when convicts served on chain gangs, the federal government allowed them to leverage these savings. The federal government matched eligible state and county road construction expenses, including expenditures on chain gangs (Myers 1993).[3] Historians have long recognized

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[3] The 1916 Federal Road Act provided that the federal allocation would represent a maximum of 50% of the eligible expenses, not to exceed $20,000 per mile, but federal allocations could exceed the 50% limit for bridges of greater than 20-foot span (SC Highway Commission 1920, p.16).

the connection between the effect of the federal subsidy on chain gang commitments. Even absent the subsidy, the derived demand for well-maintained roads that followed from expanding vehicle ownership and a widening highway network created incentives to set criminal defendants to work on the roads.

The extent to which county chain gangs were involved in the construction and maintenance of roads, highways, and bridges in South Carolina during the chain-gang era varied by county. Three counties – Berkeley, Orangeburg, and Saluda – did not operate chain gangs. In a few other counties – Charleston being the most prominent example – gangs worked on new construction projects. In most counties, however, crews of convicted felons and misdemeanants and men who opted to work on the roads rather than pay the commutation tax were, by the early 1920s, responsible only for the repair and maintenance of existing roads (SC Board of Charities and Corrections 1919, p.93). Wage workers were organized into groups labeled "patrols" (SC Highway Commission 1920, p.9). New construction projects in most counties were outsourced to private contractors. Most of the work done by gangs and patrols involved grading smooth the ruts cut into soil and gravel roads by traffic during wet weather, as well as ditching and clearing brush from roadsides. Grading, ditching and clearing involved few skills other than a capacity to work long hours at unpleasant tasks under harsh conditions. Such tasks could be performed by men with little training and less motivation.

In counties with chain gangs, convicts were put to work and counties provided trucks and road grading machines, in addition to mule teams, wagons, hand tools, and, of course, the accoutrements of convict labor, including guards, dogs, weapons, shackles, mobile kitchens, and moveable incarceration units, which resembled railroad box cars set on truck wheels with built-in bunks and prison-style barred doors and windows. Patrols, on the other hand, were made up of men who lived along the roads on which they worked. Counties paid wages to patrollers who worked more than their required labor days and provided them with road drags, some machinery and hand tools, but the patrollers usually furnished their own teams and wagons. The state's highway commissioners reported that "satisfactory patrolmen [were] hard to find" in sufficient numbers to keep the roads in good repair so counties augmented their required labor workers with convicts and wage labor (SC Highway Commission 1920, p.35).

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2.2 Extending South Carolina's road network

Voter demand and federal subsidies led South Carolina to embark on an ambitious road building and improvement program that included both hard-surface and soft-surface roads. The state's plan, approved by the federal government, included a network that connected every county seat with the seats of all adjacent counties. In 1915 South Carolina had virtually no hard-surface roads and few miles of soft-surface roads under state maintenance. By 1930 the state had a substantial network of completed hard- and soft-surface roads, many more miles of road under construction, and an ambitious plan for future construction (see Appendix B for a map (SC Department of Transportation 1930)).

Federally subsidized miles of hard–surface roads increased by more than 1,000 between 1919 and 1929; soft–surface road (soil, sand, gravel) mileage increased by more than 4,000 miles (SC State Highway Department 1929, p. 49). More roads meant more routine maintenance and repair. By the end of the decade, the state was responsible for maintaining more than 5,600 miles of improved roads. Maintenance and repair costs, even when gangs were used, were not inconsequential. In the six months after July 1, 1920 the highway commission reported an annual average cost per mile of road maintained of $323 (approximately $4,000 in 2018 dollars) that did not include the use costs of capital equipment (SC Highway Commission 1920, p.35). Heavy equipment, road marking, and signage were budgeted separately. In the year ending December 31, 1929 the commission reported average annual per mile maintenance costs of $332 for hard–surface roads and $419 for soft–surface roads (SC State Highway Department 1929, Table 10). One tradeoff for the state was the greater initial cost of hard–surface roads versus the higher annual maintenance costs of soft–surface (soil, sand, and gravel) roads, a choice that depended, in part, on anticipated traffic load.[4]

The second tradeoff was wage labor versus convict labor. It is generally accepted by historians that counties saved on labor costs by sentencing criminal

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[4] In 1924 the highway commission reported that high–volume roads were more likely to be hard–surface roads, which complicated direct per–mile comparisons of maintenance costs on hard– and soft–surface roads. It also reported that it was instituting traffic surveys to better allocate maintenance funds based on traffic flows (SC Highway Commission 1924, p. 24).

convicts to work on roads. When the average low-skilled cotton mill hand was paid about $1.25 per day, the cost of housing, clothing, and feeding a convict on the chain gang was just $0.20 per day; the cost of guards added another $0.20 per day and miscellaneous expenses another $0.15 (SC State Board of Charities 1915, p.139). At 55 cents per day, the average daily cost of a convict was more than the 35-cent daily jail fee assessed men and women arrested in Greenville County and held until they were released on bail or recognizance, but it was less than one-half the wages paid non-convict labor (see Greenville County Sheriff's Office 2019). Moreover, most contemporaries believed that punishments meted out for shirking motivated convicts to work more hours and exert more effort per hour than could be reasonably expected from wage labor or patrollers providing their mandatory labor quota. Miller (2012) reports that convicts worked at brisk paces between sunup and sundown with brief meal breaks. Shirkers suffered a range of punishments from denial of food to lashings to time in the box.[5]

Although the public may have believed that convicts represented an inexpensive labor force, informed contemporary observers doubted whether lower provisioning costs translated into genuine cost savings (Steiner and Brown 1969/1927; Pennybacker, Fairbank and Draper 1916). In 1919 Charleston County, for example, maintained two camps housed in permanent structures and decisions about which roads the gangs would build or repair were under central direction (SC Board of Charities and Corrections 1919, p.93). The commissioners believed that Charleston's gangs were reasonably productive. Clarendon County, on the other hand, had 33 school districts and the law required that one of the county's gangs work for no less than 10 days on roads in each district. On the day the commissioners inspected one such gang, they found the convicts working "on the best road in the county, which needed work the least, but which had to be worked for the stated period" (SC Board of Charities and Corrections 1919, p.94). The commissioners recommended that South Carolina impose statewide control of gangs, prioritize repairs across the state,

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[5] When state authorities banned lashings and beatings, gang supervisors instituted use of the sweat box: a 3-foot by 3-foot by 6-foot box, placed in the sun, in which the prisoner was forced to stand for the entire day without food and with limited water (Miller 2012). Most prisoners confined to the box lost consciousness after a few hours. Belligerent convicts and unrepentant shirkers sometimes spent several consecutive days in the box.

and distribute gangs more rationally along the lines of the Georgia model. Nothing came of the recommendation; convict gangs remained under county control throughout.[6]

2.3 Courts and convicts

In theory, men of all ages and races convicted of a crime could expect to find themselves sentenced to convict gangs operated by all but three counties and many cities and towns. Men (and a few women) convicted of misdemeanors and municipal ordinances in a county magistrates' court or municipal police court typically faced the option of paying a fine or serving on a convict gang. A man convicted on a charge of drunk and disorderly in a municipal police court, for example, typically faced 20 days on the city gang or a $10 fine (Greenville City 1910). State law restricted the jurisdiction of police courts to a handful of petty misdemeanors (mostly larceny of goods less than $20), municipal ordinances, and less serious felonies such as simple assault and carrying a concealed weapon for which the maximum penalty was 30 days in jail or on the gang (Bethea 1912 v.2).

South Carolina's Courts of General Sessions tried defendants charged with serious felonies. All men convicted of a felony, except for those convicted of a capital crime (premeditated murder or rape) and those physically incapable of hard labor escaped working on some type of convict gang. State law required that all other convicted felons serve their sentences at hard labor on a county or penitentiary chain gang (Bethea 1912 v.2). If a county did not operate a chain gang, they could send them to a neighboring county that did. Sentences could (and did) range from one year to twenty. In Greenville County (2019), the average defendant charged with murder and convicted of manslaughter was sentenced to 7.39 years (std dev 6.34) on the county chain gang. The average sentence for grand larceny was 2.2 years (sd=2.02); it was 2.1 years (sd=2.24) for housebreaking, which was South Carolina's charge for nonviolent burglary.

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[6] The state put all able-bodied men sentenced to the penitentiary to work, except death-row inmates, as well. Some worked on roads; others worked on various other public works near the penitentiary in Columbia.

Again, in theory, all men convicted and sentenced to serve time were supposed to serve their sentence at hard labor. In practice, however, black convicts served time at hard labor; white convicts may or may or may not have. South Carolina law required that convict gangs be segregated by race, but many counties with black gangs did not have white gangs. A few counties operated racially integrated gangs, which drew sharp rebukes but no penalties from the state's Board of Charities and Corrections when it uncovered the practice. Of the state's 42 counties that operated a gang in 1920, 27 counties had no white convicts serving on one. Only majority white Pickens County in the western Upstate had a majority white 40-convict gang in March 1920.

Figure 1 maps average quarterly county-level gang populations between September 1915 and June 1920 compiled by the South Carolina Board of Charities and Corrections (1915-1920). The state required that all jails and convict camps be visited by state inspectors each year and that counties provide quarterly reports on gang populations and their racial composition. The Board reprinted the information in their first six annual reports, and those statistics are summarized in the maps. Two features stand out. First, the counties with the largest gang populations were those with large cities. Thus, the largest gang populations are observed in Charleston County on the Atlantic coast; in the Midlands counties of Richland and Aiken; and the Upstate counties of Anderson, Greenville, and Spartanburg. In addition to having cities of 20,000 or more residents, the common thread that connected the Midlands and Upstate counties with the largest gangs was that each was home to multiple textile mills and substantial mill village populations. Efforts to maintain order in the mill villages proved to be a constant challenge to mill managers (Carlton 1982). Keeping order was enough of an issue in mill towns that South Carolina law authorized some mills to employ private security and build jails to lock up arrestees until they could be turned over to either a city police force or sheriff's deputies.

Figure 1
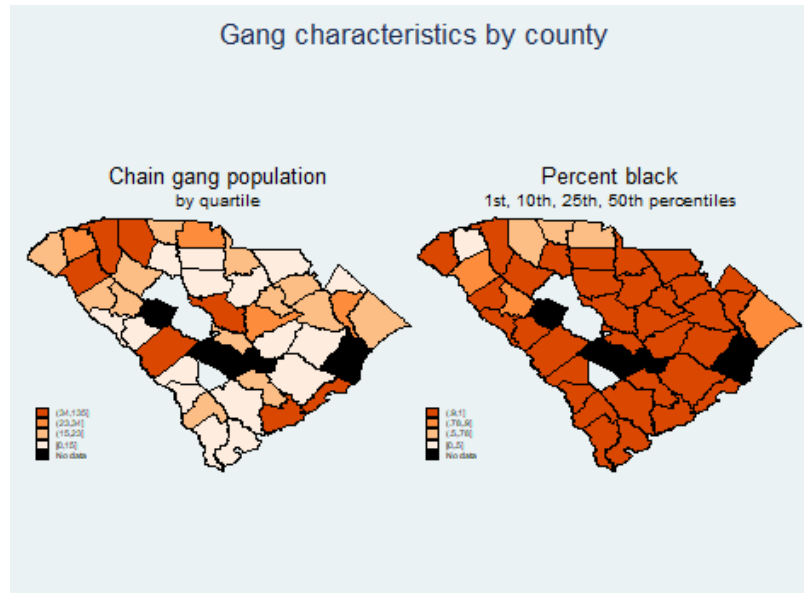
The right-hand graph displays the racially disparate treatment of black men between the ages of 17 and 30 who were sentenced to the county chain gangs at disproportionate rates. The average gang was 87% black; the median gang was 100% black. Criminal activity was not a uniquely black activity, so how did counties maintain mostly or all-black convict gangs? In some cases, whites were deemed physically unfit for hard labor and sent to the state penitentiary. County courts could also send men convicted of noncapital murder, manslaughter, attempted murder, and attempted rape – in effect, any genuinely dangerous convict – to the penitentiary rather than the county gang if the court determined that the dangerous convict might disrupt the operation of the convict gang (Bethea v.2 1912).[7] Court were more disposed to send dangerous white prisoners to the penitentiary than blacks. The different approaches probably followed from social attitudes that allowed gang officers to inflict harsher punishments on disorderly black convicts than white convicts. Most gangs had an officer who served as a "whipping boss," and transcripts of the testimony offered in *Wimbish v. Jamison* (1904) and published in documents submitted to the Supreme Court of the United States (1905)

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[7] Noncapital murder involved a murder conviction in which the jury returned a guilty verdict with a recommendation for mercy, and the state prosecutor and judge accepted the recommendation.

offer graphic depictions of the whippings and beatings suffered by black men on the gang. In 1913, for example, the governor, Cole Blease, learned that a black convict who suffered from epilepsy had received 40 to 50 lashes and been subjected to 30 minutes of electric shocks as punishment for not maintaining the pace of work required by the gang supervisor. Blease considered the convict's treatment to be torture and paroled the convict during good behavior (SC Board of Pardons 1913). Blease reminded the captain of the gang that corporal punishment violated the state constitution, but less severe beatings were common and common knowledge. Courts allowed white convicts to avoid similar treatment by allowing them to serve sentences for less serious felonies in county jails.

The third option was to impose fines in lieu of terms at hard labor, with higher fines for blacks than whites. A much-discussed case from Macon, Georgia in 1904 illuminates the practice (Huebner 2015). Arrested on a drunk and disorderly charge, Henry Jamison was convicted and given the option of serving seven months on the gang or paying a $60 fine, which he was unable to pay, a fact the court appeared to understand. By noon of the day of his conviction he was already shackled and at work on the gang (*Jamison v. Wimbish* 130 F. 351 (1904)). A petition for a writ of habeas corpus was granted and the case argued before Judge Speer of the Southern District Court of Georgia in Savannah. Speer struck down the punishment and his decision challenged the constitutionality of the convict gang system more broadly. The case ended when the Supreme Court of the United States issued a per curiam decision in which it reversed Speer's ruling and remanded with a direction to quash the writ and dismiss the petition (*Wimbish v. Jamison*, 199 U.S. 599, 1905; Supreme Court of the United States 1905). So long as municipal and county courts observed the defendants' constitutional rights, they could impose harsh punishments in discriminatory fashion. And they did.

White voters enlisted the criminal justice system in support of the region's Jim Crow regime of social control. Blacks who found themselves on the wrong side of the law faced harsh punishments that served as a tax the benefits of which accrued mostly to whites, especially those with automobiles and those who indirectly benefitted from better maintained roads. The chain gang, at least as it was implemented in the South, is a case study in the political economy of concentrated benefits and dispersed costs.

3. The economics of convict labor and highway maintenance

    3.1 The road commissioners' economic problem

    Jim Crow-era politicians justified the imposition of hard time on the chain gang for misdemeanants and felons alike to a combination of retributive justice, criminal deterrence, and the fiscal savings of using convict rather than wage labor on road maintenance. This section offers some insights into whether South Carolina realized cost savings from the use of convict labor.

    There are reasons to think that the employment of gang labor on the state's roads was not a cost-saving measure. South Carolina's Board of Charities and Corrections (1919, p.15) reported that "the present chain gang system is both inefficient and unduly expensive." Their conclusion accords with those drawn by Pennybacker, Fairbank and Draper (1916) and Steiner and Brown (1969/1927), who argue that gangs used in road construction, not maintenance as in South Carolina, was more costly than wage labor. Pennybacker, Fairbank and Draper (1916, p.30) argue that the typical county chain gang of 15 to 25 convicts was too small to generate cost savings in the construction of hard-surface roads and too large to generate cost savings on soft-surface roads. Although their argument can be interpreted as a discussion of economies of scale and minimum efficient scale, they do not have counts of gang size or gang labor input. Rather they have miles completed and total costs, and they calculate average costs per mile of completed construction in Virginia between 1909 and 1915. The summary data reported in Pennybacker, Fairbank, and Draper (1916) is plotted in Appendix A. The graphs reveal that convict labor was not less expensive in road construction, regardless of road type (see Figures A1-A3).

    The data reveal, however, that average costs per mile of grading roads, the principal employment of South Carolina's convict gangs that repaired roads, was minimized at just more than $1,000 per mile for an approximately 15-mile section of road in Virginia (see Appendix Figure A4). Whereas the Virginia data reports costs of new construction, South Carolina's convicts mostly repaired and (re-)graded already-constructed roads, so it is possible that the minimum efficient length of road per gang was greater than 15 miles and it is likely that the costs per miles were lower.

    The early twentieth-century discussions of the efficient use of gangs on road focus on two features familiar to economists: fixed costs and scale economies. Gangs,

regardless of their size at a given moment operated with a basic infrastructure that included either a permanent or moveable camp made up of food preparation, sleeping and sanitary facilities, however rudimentary the latter often was, as well as tools, mules, and machinery. Gangs also operated under the supervision of armed guards, typically one daytime guard per approximately 15 convicts, a night-shift guard for the entire camp, and a gang superintendent or manager (Pennybacker, Fairbank and Draper 1916). Gangs also usually employed a cook and an animal minder, although these functions were sometimes assigned to trustees, or long-term convicts who showed no inclination to run away and had not violated camp rules.

Given the nontrivial fixed costs, average fixed costs per convict will decline throughout the relevant range. The direct per convict variable costs of basic maintenance were low and approximately constant; meals consisted mostly of corn, pork, dilute coffee and, perhaps, some fresh vegetables and fruit in season. Clothing was basic and uniform, namely work clothes of medium-weight duck or denim with the characteristic wide horizontal black and gray stripes so that there was no mistaking convicts and patrollers. The use of guards and mules were lumpy in that contemporary descriptions depict expansion paths along a near-Leontief-type production function; that is, efficiency implies approximately fixed proportions between guards and convicts (1:15), as well as between basic hand tools, likes shovels or rock hammers, and convicts (1:1), mules and convicts, and road graders and convicts, and so on.

Assume for simplicity that the only inputs to chain gangs are guards and convicts, subject to a fixed-proportion technology, while the only inputs to wage-labor patrols are wage workers and supervisors subject to a standard continuous production function, such as one the results from a Cobb-Douglas-type technology. Assume, too, that the costs of maintaining subsistence among gangs are low and approximately constant, and that gang members themselves exhibit relatively low productivity due to constant turnover of the gang workforce, as well as the poor health and low incentives for diligent effort among convicts.[8]

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[8] Steiner and Brown (1969/1927) and Pennybacker, Fairbank and Draper (1916) report high rates of venereal disease, including advanced cases of syphilis, among convict road gangs; tuberculosis was not uncommon. One of Pennybacker, Fairbank and Draper's many recommendations was to separate diseased from healthy convicts, and to treat diseased convicts before putting them to work.

Figure 2: costs and demands for gang- and patrol-maintained roads
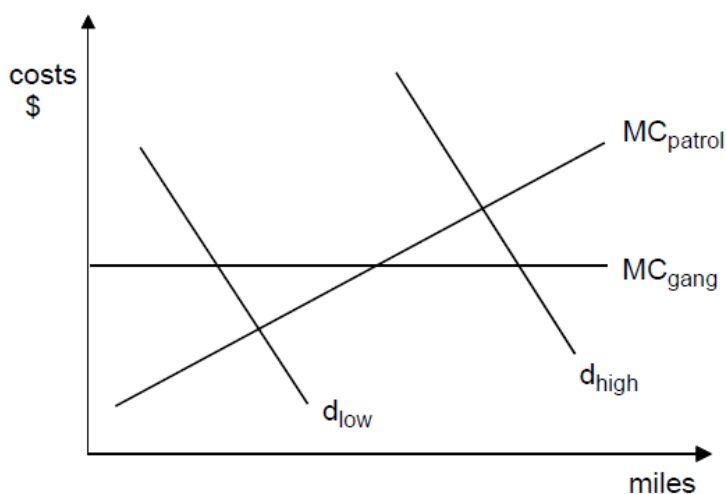
The economic decision-makers options can be illustrated with a graph as in Figure 2. There is a constant but relatively high marginal cost curve for chain gangs. If, in addition, we assume that a guard is added instantaneously every time the convict-to-guard ratio exceeds the optimal ratio, the marginal cost curve will exhibit a discontinuity or spike at those points (i.e., 16 convicts, 31 convicts, and so on if the ratio is 15:1). Assume, as well, diminishing marginal productivity in wage-labor patrols, which will yield the standard U-shaped marginal and average cost curves that are rising in the relevant range of miles under repair. If Pennybacker, Fairbank and Draper's (1916) interpretation is correct, the marginal cost of wage labor is below the marginal cost of convict labor when only short sections of road are under repair, which requires few workers. The marginal cost of wage labor is above the marginal cost of convict labor when long sections, requiring more labor, are under repair. In the intermediate region, near the intersection of the two cost curves, cost-minimizing administrators may be indifferent between gangs and patrols or they may use some of each either separately or together. Appendix Figure A5 reveals a positive correlation between county road mileage and convict population in 1917. A simple OLS regression of log miles on log gang size implies a positive, but not statistically significant, elasticity of

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convicts to miles of +0.08. Counties with more miles of road under maintenance had more convicts.

The economic problem facing southern administrators was to minimize road maintenance costs given local taxpayers' preferred quantity and quality of a county's roads, which yielded a demand for workers, whether wage labor or convicts. Given the relative marginal costs of wage and convict labor, maintenance projects with only few miles under repair are expected to have employed mostly wage labor. Projects with many miles under repair are expected to have employed mostly convicts. Counties with projects of intermediate length will have used some combination of wage and convict labor if the demand curve for road maintenance is such that it passes through the marginal cost curves near the intersection of the horizontal gang cost curve and the rising wage-labor cost curve.

3.1 The road commissioners' solution

Data come from four of the South Carolina Highway Commission's Annual Reports (1921 - 1924) that tabulated enough data to test the hypothesis. The commission reported cost and mileage data by road section under maintenance by county and labor force type. Although some counties relied exclusively on wage labor and patrols or convict labor, most counties employed a combination of convict and wage labor, sometimes on the same road sections. Table 3 provides the basic statistics where the unit of observation is the road section under repair. The sample is restricted to soft-surface roads, which was the type of road maintained by chain gangs. The average section under maintenance was 34.4 miles and average cost per mile was $351.30. Approximately one-fifth of the state's road were worked by gangs alone; 42% of roads were worked by wage-labor patrols alone, and the remaining 36% were maintained by a combination of convicts and wage workers. The commission's annual reports also rated the quality of the road under maintenance, most of which were rated "Fair" to "Good." Less than one-tenth of road sections maintained received higher ratings, which points to counties prioritizing maintenance on lower quality roads.

**Table 3 Summary statistics for SC road maintenance, 1921-1924**

Variable	Mean	Std. Dev.	Min	Max
Cost / mile	351.302	119.640	124.020	619.290
ln (cost / mile)	5.799	0.364	4.820	6.429
Soft surface miles	34.380	30.628	0.200	129.100
ln (soft surface miles)	2.949	1.306	-1.609	4.861
Gang	0.213			
Gang and patrol	0.358			
Patrol	0.429			
Fair condition	0.135			
Fair-good	0.323			
Good	0.450			
Good-excellent	0.082			
Excellent	0.011			

Notes: 317 road sections.

Sources: SC State Highway Commission (1921-1924)

Figure 3 presents a scatterplot of cost per mile of road maintenance against miles of road under maintenance from the commission's reports. Regrettably, the commission did not record the number of workers or hours worked on the road sections, but it is not unreasonable to assume that miles and worker-days are functionally related. Black diamonds represent gangs, blue squares represent wage-labor road patrols, and red circles the sections worked by both. Three lines in corresponding colors trace out the estimated central tendencies of per-mile costs using a quadratic functional form and no additional covariates. The resulting curves are U-shaped and the 95% confidence intervals (not plotted) all overlap, but the curves suggest that wage labor was marginally less costly per mile than gangs on short road sections and that gangs were marginally less costly per mile than wage labor on longer road sections.

Figure 3: Average costs per mile of road maintenance
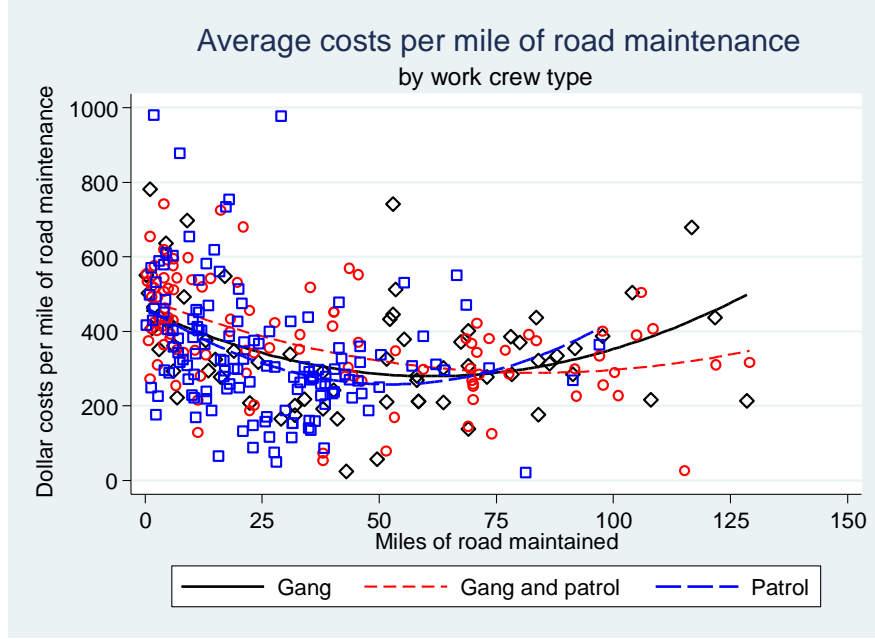
A formal empirical analysis of the cost data involves testing whether the annualized maintenance cost per mile is lower for gangs than for patrols or combinations of gangs and patrols (the reports do not provide information on the average number of men working on gangs or patrols, which will tend to attenuate the estimated effects). To test the hypothesis, I estimate the following fixed-effect regression from a multi-year panel of road section-level data:

$$\ln(costpermile)_{ct}$$
$$= \alpha + \beta_g gang_{ct} + \beta_{gp} gang/patrol_{ct} + \beta_m \ln(miles)_{ct}$$
$$+ \gamma_{condition} + \gamma_{months} + \gamma_{county} + \gamma_{year} + \varepsilon_{ct}$$

The labor variable is a pair of indicator variables; the first – *gang* — equals one if the road crew is a gang, and zero otherwise; the second – *gang/patrol* — equals one if the road crew is a combination of gang and patrol and zero otherwise. The excluded category is the patrol. If the use of convicts reduced the costs of road maintenance, the coefficients will be negative. Because the unit of observation is the road section

repaired there are multiple observations for most counties in most years. If a county worked more than one road crew, there is an entry for each such crew. Reported work crews included gangs, patrols, and combinations of gangs and patrols. It is not clear whether gangs and patrols worked together or separately, but some segments worked by gang–patrol combinations were less than two miles in length, which suggests that they coordinated their efforts if they did not work side-by-side.

The coefficient on the natural logarithm of miles variable will indicate any (dis)economies of scale in road maintenance. Cost (dis)economies may also be captured in the *Months* fixed effects, which take on values between 1 and 12 and account for the number of months a gang or patrol worked on a given road segment. Steiner and Brown (1927/1969) and Pennybacker, Draper and Fairbanks (1916) agree that it was costly to move gangs and camps between work sites. The longer a gang worked out of one base, the lower were relocation costs and down time. The regressions also include fixed effects for road condition (excluded category = fair), year (excluded category = 1921), and county. County fixed effects capture all relevant time-invariant factors within a county that influence the per-mile cost of road maintenance, but these results need to be interpreted cautiously because not every county employs each type of road crew.

Table 3 provides key summary statistics for the road maintenance cost data. The average cost per mile was $351 and the average maintenance crew maintained about 34 miles of soft-surface roads. The regression analysis considers only soft-surface roads for two reasons: (1) counties were directly responsible for relatively few miles of hard-surface roads, some counties had none; and (2) as discussed earlier, construction and maintenance costs were considerably different for hard- and soft-surface roads. The data also reveal that about 21 percent of soft-surface roads were maintained exclusively by chain gangs. Another 36 percent were maintained by a combination of gangs and free-labor patrols; and 43 percent were maintained by patrols alone. Thus, it was not the case that most county roads in the state were maintained by chain gangs. Twice as many counties relied on patrols alone as counties that relied on gangs alone. Finally, the state highway commission classified a county's roads as either Fair, Fair-Good, Good, Good-Excellent, or Excellent. Few sections of road were deemed excellent; most were considered good or just marginally so.

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Table 4 Estimated effects of labor type and road characteristics on road maintenance costs

	(1) OLS	(2) OLS	(3) FE	(4) FE	(5) FE	(6) FE
Gang	0.004	0.082	-0.105	-0.072	-0.085	-0.127
	(0.973)	(0.399)	(0.451)	(0.528)	(0.487)	(0.289)
Gang / patrol	0.160*	0.153**	0.025	-0.073	-0.070	-0.049
	(0.089)	(0.049)	(0.776)	(0.257)	(0.340)	(0.555)
ln(miles under maintenance)		-0.162***	-0.169***	-0.089***	-0.094***	-0.085**
		(0.000)	(0.000)	(0.005)	(0.003)	(0.022)
Constant	5.722***	6.183***	5.958***	5.411***	5.437***	5.539***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	314	314	314	314	314	314
R-squared	0.017	0.147	0.329	0.400	0.406	0.451
County FE			60.08***	193.41***	50.83***	228.33***
Year FE				15.85***	13.13***	11.03**
Road condition FE					3.11**	1.25
Months FE						1.42

Dependent variable is ln(costs per mile) of road maintenance on reported road sections
Regressions estimated with standard errors clustered on county; p-values in parentheses
Numerical values reported in fixed effects rows are tests of joint significance
*** p<0.01, ** p<0.05, * p<0.1

Table 4 presents the regression results. The dependent variable is the natural logarithm of maintenance costs per mile. Fixed effects controls are entered stepwise and tests of joint significance of the fixed effects are reported in the relevant row-column cell. Column 1 includes only two indicator variables for road crew type (the excluded category is Patrol). This regression points to no cost advantage for counties that used gangs or patrols and gangs, instead of patrols alone. Column 2 includes the natural logarithm of miles of roads under maintenance to capture any economies in maintenance. Columns 3 through 6 sequentially add County, Year, Road Quality, and Months Worked fixed effects. Column 6 includes all the fixed effects.

The first feature to note is the positive coefficients on Gang and Gang/Patrol indicator variables in the first two columns. The first column does not control for miles under maintenance and the second does not include county fixed effects, which should capture all the time-invariant county-level factors not included in the

regressions. Pennybacker, Fairbank and Draper (1916) and Steiner and Brown (1927/1969), for all intents, draw their conclusions on the inefficiency of gang labor from an analysis that corresponds to Column 2, without any fixed effects. The cross-sectional OLS results are consistent with their conclusion that gangs were more costly than patrols. After controlling for miles under maintenance, the use of gangs increased costs by about 8.2 percent, though the estimate is imprecise. Both early analyses opposed the concurrent use of convicts and patrollers because maintaining discipline was a challenge when the two types worked together, which raised supervision costs and reduced labor effort. And the OLS results are consistent with their conclusions. Mixed gang-patrol work crews raised costs by an estimated 15 to 16 percent.

The second feature to note is the apparent existence of economies of scale around the average length of road section maintained. Coefficient estimates in columns 3 through 6 point to a cost elasticity between -0.085 and -0.169. That is, holding the type of labor force constant, a ten percent increase in mileage reduced per mile costs by about 8.5 to 17.0 percent.

The third feature to note is the importance of controlling for unobserved county-level factors and road conditions that affected costs. Once county fixed effects are included (Column 3), the elasticity per mile costs to miles under maintenance was -8.5%, which points to cost economies in maintenance.

Compared to the use of patrols, the data provide some limited evidence that the use of gangs in combination or alone reduced road maintenance costs in a statistically significant or economically meaningful fashion. The fixed effects estimates point to lower per mile costs of gangs of between 7.2 and 12.7 percent, though the estimates are not precisely estimated. Using gangs and wage labor or patrols in combination reduced per miles costs by 5.0 to 7.0 percent.[9]

The empirical findings reported here are not consistent with Pennybacker, Fairbank and Draper (1914) and Steiner and Brown (1969/1927), who argued that convict gangs were so grossly inefficient that their use inflated road building and maintenance costs. South Carolina's Board of Charities and Corrections (1919, p.15),

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[9] Tests of the equality of coefficients across models (columns 2 and 6) fail to reject the null of equal coefficients on the Gang variable, but they reject the null (p-value = 0.02) of coefficient equality on the Gang/Patrol variable.

too, wrote that "the present chain gang system is both inefficient and unduly expensive." South Carolina's commissioners contended that gangs were too small and the labor turnover too high to provide cost-effective road maintenance. But in offering this conclusion, it appears that the Board members overlooked the statistics they reported elsewhere. Their returns from county gangs between 1915 and 1920 reveal that most convicts were sentenced to relatively long terms on county convict gangs. The vast majority served terms longer than six months; some men were sentenced to terms exceeding five and even ten years. If there were any learning-by-doing efficiencies to be captured in working a mule-drawn road grader, digging ditches, and clearing roadside brush, it is hard to believe that the learning would not occur with the first few weeks of a six-plus-month term on the gang. It does not appear to be the case that gangs were notably less efficient than wage labor when deployed in gang-appropriate employments. It also does not appear to be the case that they were more efficient, on average.

The results are consistent with a hypothesis that state and county authorities and road repair managers chose a road crew type – gang, patrol, or a combination – that they believed to be the low-cost option for a given maintenance project. If managers were cost minimizing agents of taxpayers, they would have equalized the marginal cost of a mile of road repair across labor types. The data here are average, rather than marginal costs, but the long-run equilibrium in a competitive market equates the two. We cannot say that road supervisors were not acting in a cost-minimizing fashion in choosing between convict gangs and wage workers or patrollers.

The available data does not afford an opportunity to determine whether putting convicts to work on the roads, housing them in substandard quarters, and feeding them a nutrient-deficient diet of corn and pork was less expensive than warehousing them in county jails and state prisons. But assessments of South Carolina's county jails provided in the annual reports of the Board of Charities and Corrections (1919) depict jail conditions that were no less wretched than gang conditions – damp, drafty, poorly maintained structures, filthy linens, inadequate sanitary facilities, and bad food – that could not have been much more costly to taxpayers to operate than convict labor camps. If convicts were at least as productive as wage workers when employed on road maintenance projects, taxpayers may have

saved some money by putting them to work. But if convicts were not at least as productive at road work, on average, as wage labor and were no less costly to taxpayers than warehousing them in rudimentary, unsanitary jails, southerners must have believed that gangs served some purpose other than cost-saving, criminal deterrence, perhaps, or retributive justice. That issue is the subject of future research.

4 Concluding comments

A host of studies have documented the costs and economic inefficiencies associated with the South's black codes. Higgs (1989), for example, finds that the early twentieth-century racial wage gap was due, in part, to southern states' discriminatory provision of educational resources. Donohue and Heckman (1991) document that the wage gap was due, in part, to discriminatory hiring and job assignments that were eliminated only through federal affirmative-action enforcement. Jim Crow also included zoning laws designed to exclude blacks from public goods-rich communities and neighborhoods (Halcoussis and Lowenberg 1998). In general, southern black codes constructed walls between the races in marriage, education, employment, public accommodation, and transportation (Woodward 1957). In the balance, discriminatory white southerners, through their Jim Crow policies, introduced economic inefficiency and reduced both black and white welfare (Wright 1999).

This paper investigates one aspect of discriminatory law enforcement and penology in the Jim Crow South, which is a relatively understudied source of the region's economic inefficiency. The results generate two broad conclusions. First, it is no surprise to find that the harshest punishments for criminal offenses were reserved for young, disfranchised black men. The sanitized Hollywood images of the South's Jim Crow-era chain gangs as racially integrated and relatively nonviolent does not fairly depict the systematic legal (corporal punishment was legal) and extralegal (brutal beatings were not) violence reserved for black men serving on predominantly or wholly black convict gangs.

Second, chain gangs were at least as productive as wage workers in maintaining South Carolina's roads and may have been marginally more so. Contrary to the assertions of the gangs' early twentieth-century critics, gangs were competitive with

wage labor. County administrators and road supervisors found ways to use convicts in ways that made them serve the interests of local taxpayers.

References

American Highway Association. 1913. *The Official Good Roads Year Book of the United States.* Washington, D.C.

Becker, Gary S. 1968. Crime and punishment: an economic approach. *Journal of Political Economy* 76(2), 169-217.

Bethea, Andrew J. 1912. *Code of Laws of South Carolina 1912,* v.1. Charlottesville, Virginia: Mitchie Company.

Bethea, Andrew J. 1912. *Code of Laws of South Carolina 1912,* v.2. Charlottesville, Virginia: Mitchie Company.

Davis, J. C. 1916. Prison labor on works of public improvement. *Iowa Bulletin of State Institutions.* Des Moines: Board of Control of State Institutions, pp. 38-43.

Donohue, John and James Heckman. 1991. Continuous versus episodic change: the impact of civil rights policy on the economic status of blacks. *Journal of Economic Literature* 29(4), 1603-43.

Friedman, David D. 2001. *Law's Order: What Economics Has to Do with Law and Why It Matters.* Princeton: Princeton University Press.

Fryer, Roland G Jr. 2019. An empirical analysis of racial differences in police use of force. Journal of Political Economy 127(3), 1210-1261.

Georgia. Prison Commission of Georgia. 1907. *Tenth annual report of the prison commission of Georgia.* Atlanta: Lester Book & Stationery Company.

Glaeser, Edward L. and Bruce Sacerdote. 1999. Why is there more crime in cities? *Journal of Political Economy* 107(S6), 225-258.

Greenville City (SC). 1910-1911. *Greenville Police Court Docket.* Record No. L1037009. South Carolina Department of Archives and History, Columbia, SC.

Greenville County (SC) Sheriff's Office. 2019. Historical Records. Jail Books. Available at

https://www.greenvillecounty.org/apps/Historical_Records_Search/Default.aspx.
Last accessed November 2019.

Halcoussis, Dennis and Anton D. Lowenberg. 1998. Local public goods and Jim
Crow. *Journal of Institutional and Theoretical Economics* 154(4), 599-621.

Higgs, Robert. 1989. Black progress and the persistence of racial economic
inequalities, 1865-1940. *The Question of Discrimination: Racial Inequality in the
U.S. Labor Market*, 9-31. Edited by S. Shulman and William Darity, Jr.
Middletown, CT: Wesleyan University Press.

Huebner, Timothy S. 2015. Emory Speer and federal enforcement of the rights of
African Americans, 1880-1910. *American Journal of Legal History* 55(1), 34-63.

Klein, Alexander. 2009. Personal income of U.S. states: estimates for the period
1880-1910. University of Warwick: Warwick Economic Research Papers No.
916.

Knowles, John, Nicola Persico and Petra Todd. 2001. Racial bias in motor vehicle
searches: theory and evidence. *Journal of Political Economy* 109(1): 203-229.

Lichtenstein, Alex. 1993. Good roads and chain gangs in the progressive South: 'the
negro convict is a slave.' *Journal of Southern History* 59(1): 85-110.

Lichtenstein, Alex. 1996. *Twice the Work of Free Labor: The Political Economy of Convict
Labor in the New South.* London: Verso.

Makowsky, Michael D. and Thomas Stratmann. 2009. Political economy at any speed:
what determines traffic citations? *American Economic Review* 99(1): 509-527.

Makowsky, Michael D., Thomas Stratmann, and Alex Tabarrok. 2019. The serve and
collect: the fiscal and racial determinants of law enforcement. *Journal of Legal
Studies* 48(1), 189-216.

Margo, Robert A. 1990. *Race and Schooling in the South, 1880-1950: An Economic History.*
Chicago: University of Chicago Press.

Miller, Vivien M. L. 2012. *Hard Labor and Hard Time: Florida's 'Sunshine Prison' and Chain
Gangs.* Gainesville: University Press of Florida.

Myers, Martha A. 1993. Inequality and the punishment of minor offenders in the early
20th century. *Law & Society Review* 27(2): 313-344.

Pennybacker, J. E., H. S. Fairbank, and W. F. Draper. 1916. Convict labor for road
work. *U.S. Department of Agriculture Bulletin No. 414*. Washington, D.C.: GPO.

Polinsky, A. Mitchell and Steven Shavell. 1992. Enforcement costs and the optimal magnitude and probability of fines. *Journal of Law and Economics* 35(1): 133-148.

Pratt, Joseph Hyde and H. M. Berry. 1912. *Highway work in North Carolina, containing a statistical report of road work during 1911.* Economic Paper No. 27. Raleigh: E. M. Uzzell, State Printer.

Rhode, Paul W. 2002. Gallman's annual output series for the United States, 1834-1909. NBER working paper no. 8860.

South Carolina State Board of Charities and Corrections. 1915. *First Annual Report of the State Board of Charities and Corrections.* Columbia: Gonzales and Bryn: State Printers.

South Carolina State Board of Charities and Corrections. 1919. *Ninth Annual Report of the State Board of Charities and Corrections.* Columbia: Gonzales and Bryn: State Printers.

South Carolina State Board of Charities and Corrections. 1920. *Tenth Annual Report of the State Board of Charities and Corrections.* Columbia: Gonzales and Bryn: State Printers.

South Carolina State Comptroller General. 1922. Annual Report.

South Carolina State Highway Commission. 1920–1924. *Annual report of the state highway commission.* Columbia: Gonzales and Bryan, State Printers.

South Carolina State Highway Department. 1925–1929. *Annual report of the state highway department.* Columbia: state printer.

Steiner, Jesse F. and Roy M. Brown. 1969/1927. *The North Carolina Chain Gang: A Study of County Convict Road Work.* Montclair, N. J.: Patterson Smith. Reprint of original 1927 Chapel Hill: University of North Carolina Press.

Supreme Court of the United States. 1905. *Transcript of record: E. A. Wimbish, Superintendent of the County Chain Gang, Appellant, vs. Henry Jamison, Appeal from the District Court of the United States for the Southern District of Georgia.* Filed January 11, 1905.

Virginia State Highway Commissioner. 1915. *Ninth Annual Report of the State Highway Commissioner to the Governor of Virginia.* Richmond: Davis Bottom, Superintendent Public Printing.

Woodward, C. Van. 1957. *The Strange Career of Jim Crow.* New York: Oxford University
Press.

Wright, Gavin. 1999. The civil rights revolution as economic history. *Journal of Economic
History* 59(2), 267-89.

Appendix A: Average construction costs per mile by road type in Virginia, 1909-1915

Figure A1: Average construction costs per mile on sand roads in Virginia, 1909-1915

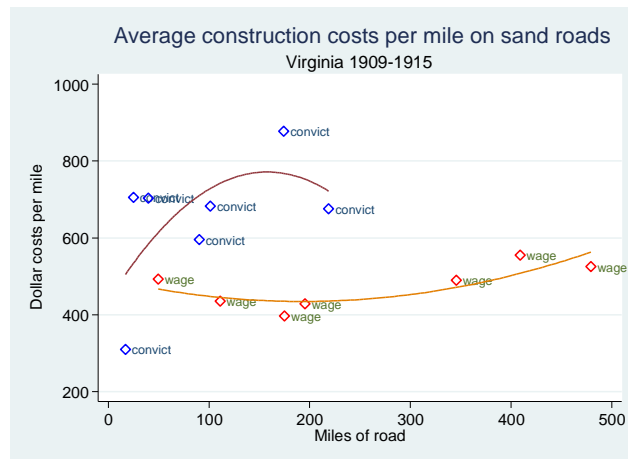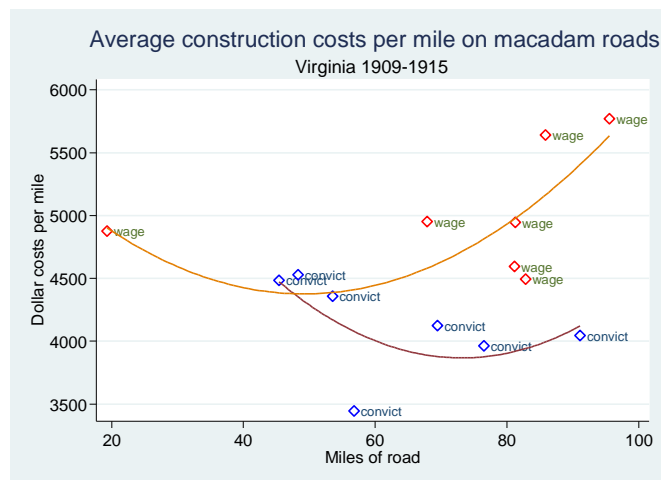Source: Pennybacker, Fairbank, and Draper (1916)

Figure A2: Average construction costs per mile on macadam roads in Virginia, 1909-1915

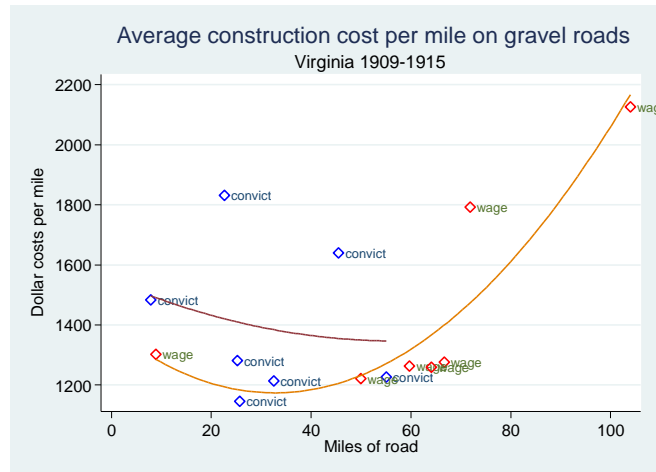Figure A3: Average construction costs per mile on gravel roads in Virginia, 1909-1915

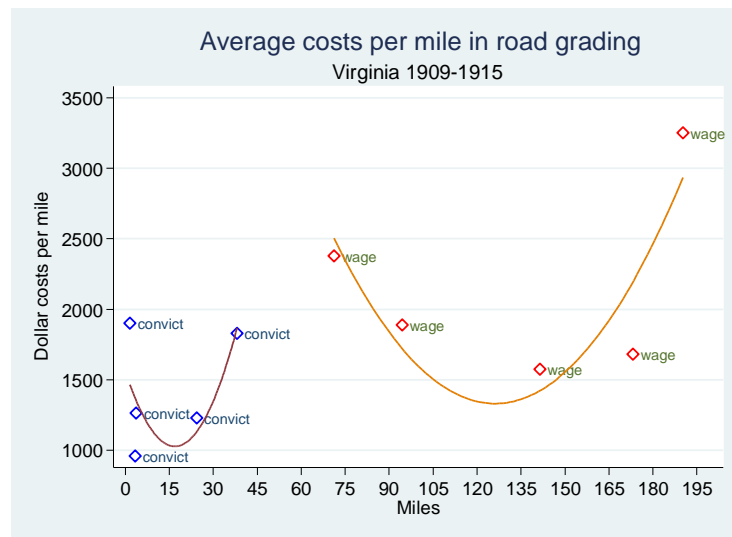Figure A4: Average construction costs per mile on road grading in Virginia, 1909-1915
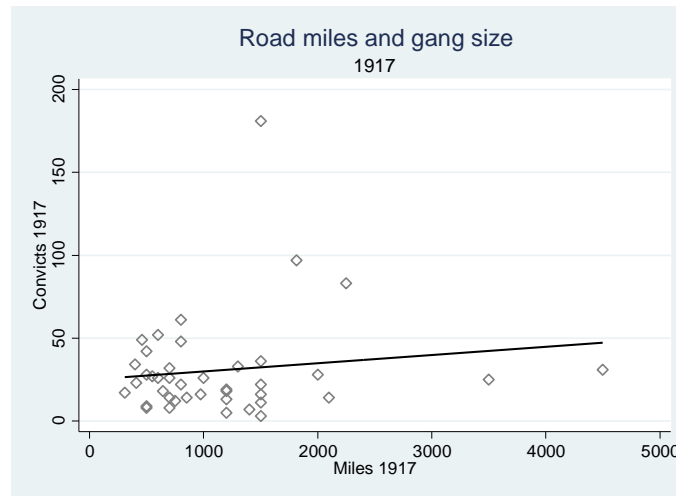
Figure A5: County level road miles and convict gang size in South Carolina, 1917

Appendix B:

South Carolina improved highway and road network completed and under construction in 1930

ROAD MAP
of
SOUTH CAROLINA
STATE HIGHWAY SYSTEM
SHOWING
CONDITION OF STATE ROADS
AS OF
SEPTEMBER 1 1930
SCALE OF MILES