Antebellum Slave Revoluts and Urbanization in the Southern United States

Ian Finn*

University of California, Irvine

Abstract

This paper investigates some of the causal factors which fomented slave insurrections, discovered conspiracies and panics in the antebellum Southern United States. The analysis relies on a novel dataset, which is an amalgam of decennial census data and a compilation of incidents of slave unrest as recorded by Aptheker (1993), as well as a theoretical model of slave rebellion. An influential strand within the economic history literature, referred to herein as the Wade hypothesis, which attributes the relative decline of Southern industry and urbanization to the inherent difficulty in supervising slaves in an urban environment, is analyzed. The finding that the probability of a slave insurrection event is not correlated with the degree of urbanization in a given county, even when an instrumental variable strategy is employed to rule out potential endogeneity, is interpreted as evidence against this hypothesis.

*Department of Economics, University of California at Irvine

The man in whose favor no laws of property exist, probably feels himself less bound to respect those made in favor of others. When arguing for ourselves, we lay it down as fundamental, that laws, to be just, must give reciprocation of right; that without this, they are mere arbitrary rules, founded in force, and not in conscience, and it is a problem which I give to the master to solve, whether the religious precepts against the violation of property were not framed for him as well as his slave? and whether the slave may not justifiably take a little from one who has taken all from him, as he may slay one who would slay him?

-Thomas Jefferson

1 Introduction

A cursory review of recorded human history illustrates that free labor is very much a modern phenomenon. Traditionally an absence of clearly defined, enforceable property rights[1] allowed labor market transactions across the globe to exhibit coercion, forceful appropriation or the threat thereof as a means to secure labor from direct producers, whether slave, serf, or bonded laborer. Slavery and forced labor were common practice in labor markets in most ancient civilizations including Egypt, Greece, Rome and Japan.[2] In the feudal era, restrictions on labor mobility and the various customary labor services serfs were obliged to provide landlords, for example the *Gutswirtschaft* in Germany, were a defining feature of the "ties of dependence"[3] that characterized European serfdom.[4] In the typical feudal manor described by North (1981), which to varying degrees was the archetypal method of organizing agricultural production throughout Europe, serfs were forced to toil the lord's holdings without remuneration for an allotted period each week, usually between four and six days. During the European colonial era, slavery was an integral component of plantation economies formed in the Caribbean, parts of Brazil and Colombia[5] and, of course, in the United States.[6] Coercion was also an important factor in the organization of labor in mining operations, encomiendas, as well as the later hacienda system that persisted throughout much of Latin America well into the post-colonial era.[7]

[1] See Skaperdas (1992) for a theoretical investigation of this subject.
[2] Patterson (1982).
[3] Bloch (1964).
[4] See Hagen (1985) for discussion of these labor dues in the case of 16th century Brandenburg.
[5] Curtin (1990).
[6] Fogel and Engerman (1974), Ransom and Sutch (2001).
[7] Lockhart and Schwartz (1983).

More recently, Naidu and Yuchtman (2013) highlight the inherently coercive nature of labor relations in a time and place normally considered to be at the genesis of modern labor relations: nineteenth century industrial Britain. Master and Servant laws which existed in Britain until 1875 made it a criminal offense for employees to breach contracts entered into with their employers, and the resultant restriction on labor mobility had the ambiguous effect of decreasing wages, but also lessening their volatility.[8] Lastly, it should be noted that even today coerced labor is a thriving institution, particularly in the developing world, as the United Nations' International Labor Organization estimates that there are currently 21 million forced laborers worldwide.

To the extent that institutions regulating the extraction of forced labor were prevalent throughout historical time and space, so were instances of organized, violent resistance to their imposition. The Servile Wars of ancient Rome constitute perhaps the most famous example from classical antiquity.[9] In regards to peasant-landlord relations in feudal Europe, Marc Bloch (1970, p. 175) writes "to the eyes of the historian...agrarian revolt appeared as inseparable from the seigneurial regime as is, for example, the strike from large-scale capitalist enterprise." Peasant unrest led to bloody confrontations in Catalonia in 1486, culminating in the Sentence of Guadalupe, as well as the French *Grande Jacquerie* of 1358, peasant revolts in Germany in 1525, England in 1381, Flanders in the 1320's and the convulsions of the Calabrian peasantry from 1469-75. Moreover, Andersen (1996, p. 203) writes that "these were only the major episodes of a continent-wide phenomenon, which stretched from Denmark to Majorca".[10] Moving forward in time, Genovese (1979) provides a detailed chronology of the numerous slave revolts which occurred throughout the New World during the colonial era: examples of rebellion can be found in Hispaniola in 1522[11], Bahia (Salvadore) in Brazil in 1835[12],

[8] This contribution broadens a strand of literature which has typically focused on "labor tying", and the ability of landlords to force peasants into unfavorable contracts, in a purely agricultural context. For example, Genicot (2002) develops a theoretical model in which agrarian peasants benefit from a legal ban on bonded labor agreements because this creates incentives for the development of alternative credit institutions. Similarly, Conning (2004) provides further rigor to Domar's (1970) agrarian model and generates implications regarding landlords' ologopolistic market power in the context of a standard general equilibrium trade model. Acemoglu and Wolitzky (2011) develop a principal-agent model similar to that in Chew (1990) which, attempts to answer a long-standing and, to date unresolved, puzzle in economic history: why it was the case that serfdom persisted well into the 19th century in Eastern Europe (its abolishment in Russia, for example, did not occur until 1861), while in Western Europe it was all but eradicated by the turn of the 16th century. See Aston and Philpin (1985) for an elucidating (and heated) discussion.

[9] *cf.* Mahaffy (1890).

[10] See Hilton (1949), for example, for a close inspection of various peasant revolts, and their politico-economic effects, in England in the centuries leading up to the abrogation of serfdom.

[11] This was likely the first large-scale rebellion conducted by African slaves in the New World.

[12] This revolt was massive in scale, involving several hundred slaves and free Brazilian Africans and, according to Genovese, was nearly successful in capturing the city until the arrival of a superior cavalry force.

throughout Jamaica and Guyana[13], Barbados in 1816, Mexico in 1546, 1570, 1608 and 1670[14], Colombia in 1530 and again in 1550, and Venezuela in 1552. Of course the most famous of these, in large part due to its singular success, is that led by Toussaint L'Ouverture in the colony of Saint-Domingue (now Haiti) beginning in 1791, and culminating in the defeat of French forces at the Battle of Vertieres in 1803.

Slave insurrections, uncovered conspiracies, and panics were also a part of daily life in the plantation economy of the Southern United States, despite the fact that those detailed below rarely achieved their stated aims. As John Hope Franklin (2002, p. 70-71) states, "The slave was never so completely subjugated as to allay all fears that he would make desperate, bloody attempt to destroy the institution which bound him. Slaveholders could never be quite certain that they had established unquestioned control; fear and apprehension were always present." Even insurrections and conspiracies which ended in resounding failure often had long-standing politico-economic ramifications. For instance, in the wake of the failed plot surmised by Denmark Vesey, in which rebels were to lay siege to Charleston, S.C. in 1822, the mobility of urban slaves was severely restricted, and regulations which forbade African Americans, free or slave, from entering certain public spaces were instituted. Wade (1964) asserts that these and other legal restrictions passed in response to outbursts of slave violence were a precursor to the legalized segregation exhibited throughout much of the South in the postbellum era.[15] Yet despite the obvious historical importance of this form of organized resistance, to the best of my knowledge a rigorous empirical analysis of the causal factors influencing slave unrest in the antebellum Southern United States has yet to be undertaken.[16] Several scholars have offered theories regarding the various precipitates of rebellion, ranging from the density of slave populations[17], access to transportation via navigable

[13]"Taken together, the territories (of Essequibo, Berbice and Demerara, Guyana) averaged about one significant revolt, not to mention serious conspiracies, during every two years from 1731 to 1823" (*Ibid.*, p. 33). The greatest of these rebellions occurred in 1763-1764, under the direction of a cooper named Coffy, and involved roughly half the slaves of the entire colony. In Jamaica, "the slaves had risen in 1669, 1672, 1673, twice in 1678, 1682, 1685, 1690, 1733, and 1734", in addition to Tacky's rebellion and the later revolts it instigated in 1765 and 1766 (*Ibid.*, p. 35).

[14]Additionally, in 1537 an elaborate plot to kill all the slaveholders and impose a traditional "African" society was uncovered and suppressed.

[15]Radford (1976, p. 346) makes a similar point with regard to Charleston: "The antebellum attitudes in Charleston survived Reconstruction, and so too did the antebellum residential patterns. It was not until much more recently that backyard residence and backyard attitudes torwad blacks disappeared." Sheldon (1970, p. 33) also notes the legal reaction in Richmond Virginia to the discovery of the Gabriel Prosser conspiracy in 1800, and the resultant tightening of laws regulating manumission.

[16]Perhaps the closest relative to this paper is that of Murshed and Gates (2005), which attempts to empirically isolate contributing factors in the Maoist insurgency in Nepal, which claimed as many as 15,000 lives from 1996-2006. "The concept of horizontal or inter-group inequality, with both an ethnic and caste dimension, is highly relevant in explaining the Nepalese Civil War" (*Ibid,* p. 121).

[17]Genovese (1979), Aptheker (1993), Wade (1964).

waterways[18], and the size of the free African American population[19]. Although each of these seem plausible *prima facie*, their marginal effect on the probability of a slave outburst remains to be empirically verified.

The analysis below focuses on an influential strand within the economic history literature, first put forth by Cairnes (1862) and Wesley (1927), and later reinvigorated by Wade (1964), which attributes the backwardness of Southern industry on the eve of the Civil War to an inherent incompatibility between slavery and urbanization.[20] It is argued that the various freedoms enjoyed by slaves in cities, for example those afforded by the "hiring-out" system, posed such difficulties in controlling slave populations that an ever-present fear of rebellion eventually led urban slaveholders to shed their chattels. If this indeed was the case, then one would expect a higher probability of insurrections, conspiracies or panics in urbanized areas, yet this is not observed in the data. Moreover, an instrumental variable strategy is employed to mitigate the potential endogeneity of urbanization, but this does not substantially alter the result. As a definitive explanation for the reticence of the antebellum South to industrialize remains elusive, we view this as an instructive negative result.

In order to formalize the incentive to rebel faced by slaves in urban and rural environments, as well as the incentives to monitor such behavior by slaveowners, a theoretical model of slave insurrection is also developed. The model is sufficiently general to accommodate Wade's central claim, namely that the primary distinction between town and country within the system of Southern slave labor was the degree to which institutional controls, such as police forces, the legal system, etc. regulated the daily life of slaves. The relatively weaker mechanisms for slave supervision in cities is formalized as an asymmetry in a contest between slaves and their slaveowner. This analysis illustrates that Wade's hypothesis is theoretically consistent for a restricted set of parameter values.

The remainder of the paper is organized as follows: Section 2 gives a fuller description of the Wade hypothesis and how its predictions should manifest themselves in our results, Section 3 develops a positive model of slave insurrection which highlights the incentives faced by slaves and their owner, Section 4 describes the source and scope of data utilized in the empirical analysis, Section 5 describes the empirical strategy and estimates, and Section 5 closes with a brief summary.

[18]Morgan and Terry (1982).

[19]Radford (1976), Sheldon (1970).

[20]It should be noted that Wade's theory continues to be debated in the literature; see, for example, Acemoglu and Robinson (2006).

2 Wade Hypothesis

At least as early as Kaldor (1966) and Rostow (1960) economists have have stressed the importance of industrialization, mechanization and a robust manufacturing sector in sustaining long-run economic growth. It is often argued that industrial sectors, *vis-a-vis* agricultural, enjoy greater labor productivity due to technological spillovers, economies of scale and human and physical capital accumulation.[21] Moreover, at least as early as North (1961), economic historians have recognized that industrialization, mechanization and a robust manufacturing sector were decidedly lacking in the American South on the eve of the Civil War. North's argument rested on the observation that Southern states' comparative advantage in staple crop production could be exploited with relatively little capital investment, in part due to geography. "Efficient development of the cotton trade was accomplished with relatively minor amounts of capital for social overhead investment or dependent industries. Internal transport problems were mitigated by the abundance of rivers in the South."[22]

Numerous scholars following North have similarly noted the backwardness of Southern industry, and the reticence of the region to urbanize. Bateman and Weiss (1981) note that capital per establishment (in dollars) in New England was roughly three times that of Southern states, while capital per capita was almost eight times higher in the former compared to the latter. In a similar vein, Cobb (1984, p. 6) illustrates that in 1860 total manufacturing output in South was less than that of either Pennsylvania, New York or Massachusetts. In regards to urbanization, Genovese (1965, p. 171) and Wright (1986) similarly highlight large disparities between the two regions: in 1860 the urban population of the Lower South was 7% of the total population, while in New England the percentage was 37, and in the Middle Atlantic states 35. A lack of infrastructure in the South, alluded to by North above, has also been emphasized and empirically verified by a number of scholars. The density of railroads, defined as miles of track divided by land area, was three times higher in the North than in Southern states. Estimates regarding canal mileage paint a similar picture.[23] The net effect of these failings was that before the Civil War GDP per capita in the South was 70% of the national average, and this was despite a recent boom in cotton prices. [24]

Though historians and economists have reached a near consensus on the retardation of Southern industry, there is far less agreement as to why exactly this was the case.

[21] *cf.* Chenery et al. (1986), Lewis (1954), Fei and Ranis (1964) and Fagerberg and Verspagen (1999) for a discussion of this "structural change bonus." For recent evidence in favor of this view, see Timmer and de Vries (2008). The authors note that from 1963-2005 South Korea witnessed an average annual productivity growth rate of 4.5%, roughly half of which is attributed to the manufacturing sector.

[22] *Ibid.*, p.125.

[23] Wright (1986, p. 21).

[24] Barro and Sala-i-Martin (1992), Easterlin (1960).

Eugene Genovese (1967) and Barrington Moore (1966), followed by Laraghi (1978), Weiner (1978) and Billings (1979) have advanced an influential Marxist interpretation of Southern society which argues that a dominant planter class successfully opposed the rise of an urban bourgeoisie, due to ideological antipathies, before and after the Civil War. Wright (1986) instead argues that because slaves were a moveable asset, there existed no incentive for plantation owners to support investment in public goods like infrastructure, and manufacturing suffered as a result. Lastly, Claudia Goldin (1976) argues this trend can be attributed to a higher elasticity of demand for slaves in cities. As Goldin notes, "The low rural elasticity indicates that there were few substitutes for slave labor in agriculture. That is, slaves were especially well suited for staple crop production. The high urban elasticity suggests that there were more and closer substitutes for slaves in urban activities..."[25] As a result, fed by a rising demand for products of Southern agriculture, most notably cotton, the increase in slave prices witnessed by much of the South in the decades leading up to the civil war[26] led many urban employers to draw upon these substitutes, namely immigrant labor.

The focus of this paper, however, will be the argument posed by Wade (1964), which asserts that the dual tasks of slave management and supervision were inherently more difficult in an urban environment, and this invoked an ever-present fear of rebellion on the part of urban slaveholders which ultimately rendered slavery and urbanization incompatible. A cursory look at the figure below lends tentative support to this assertion, as *prima facie* there appears to be a relationship between the number of insurrection events, such as outright revolt, discovered conspiracies and panics, and the distance to a major metropolis. Many of the areas which experienced multiple insurrection events during the period under investigation are in close proximity to the 13 Southern cities with populations above 10,000 in 1860. Underlying Wade's premise is the observation that most cities in the South rapidly shed their slave populations in the two decades before the Civil War, which is validated by estimation of Equation 1 below,

$$UrbSlaves_{it} = \alpha + \beta YEAR + \varepsilon_{it} \tag{1}$$

where $UrbSlaves_{it}$ denotes the urban slave population in county i in period t. The results of estimating Equation 1, using decennial census data in 1840 and 1850 described below, is presented in Table 1 below.

[25] Goldin (1976, p. 125).

[26] In Louisiana, for example, the average price of a slave in 1850 was $488, but by 1860 it had jumped to $1,000 (*Ibid.*, p. 72).

Table 1: Downard Trend in Urban Slaves, 1840-1860

	UrbanSlaves
YEAR	-0.0188***
	(-3.72)
_cons	36.08***
	(3.86)
Clustered S.E.	Yes
Fixed Effects	Yes

Clearly there is a downward trend in the number of city slaves during the period of interest. Yet Wade posits that a greater degree of freedom enjoyed by slaves as a result of their urban environs, and the resultant fears of rebellion on the part of slaveowners, ultimately compelled urban masters to shed their chattels. For example, as a result of the widely accepted customs of "hiring-out" and "living out"[27], urban slaves were endowed with a freedom of movement between owner and employer, albeit highly regulated, that nevertheless would have been utterly alien to the plantation field hand.

In addition to more fluid working and living conditions, cities also offered slaves greater opportunities for commingling, perhaps at the local groghouse, church or cabaret, and this also gravely piqued the suspicions of slaveholders.[28] Lastly, and partially as a result of these impediments to slave supervision, urban slaves enjoyed higher rates of literacy on average than their counterparts in the fields. This was viewed as contributing factor in the Denmark Vesey plot in Charleston, S.C. in 1822, as unrest among literate slaves was stoked by the success of the Saint Domingue revolt, as well as deliberations over the Missouri Compromise.[29] Frederick Douglas, comparing the life in Baltimore with his early days as a field hand in the Maryland countryside, aptly summarizes these points, "A city slave is almost a free citizen, he enjoys privileges altogether unknown to the whip-driven slave on the plantation."[30]

Wade argues that the liberties granted to slaves as a result of their urban environs

[27]Under these practice masters who owned more African Americans than they could utilize either at home or in their business hired some to labor-strapped employers. This custom greatly lessened "the rigidity of slavery, allowing a constant reallocation of the labor supply according to demand" (*Ibid.*, p. 38). Goldin (1976, p. 35) also observes that, "not only were urban slaves hired out, but many...lived apart from their place of work. These slaves were allowed to locate their own place of residence and buy their own meals."

[28]According to the editor of the *Daily Delta*, "Should a servile outbreak ever occur in the city of New Orleans we shall have to thank the keepers of these Negro cabarets and club houses for it, within the precincts of whose damned halls, at the dead hour of midnight, heaven knows what plots are hatched against our peace." *New Orleans Daily Delta*, September 10, 1854.

[29]Wade (1964, p. 239).

[30]Douglas (1855, reprinted 2009).

kept slaveholders in a perpetual state of suspicion and fear, and as a result "papers continued to demand increased police vigilance, municipal officials sought wider powers and additional arms from state government, and vigilante committees stood ready to quash the colored rebels."[31] Fears of unrest in the wake of discovered conspiracies were so trenchant among urban slaveholders that slaves, particularly young males, were sold in large numbers to the countryside to reduce the probability of insurrection.[32] This reaction was accelerated by the availability of cheap immigrant labor alluded to by Goldin, as well as the fact that the financial burdens of policing and restricting slave autonomy were increasingly shifted to slaveowners through taxes and permits.[33] According to Wade, these factors led to an inherent and incontrovertible incompatibility between urbanization and slavery that ultimately led to the decline of Southern industry.

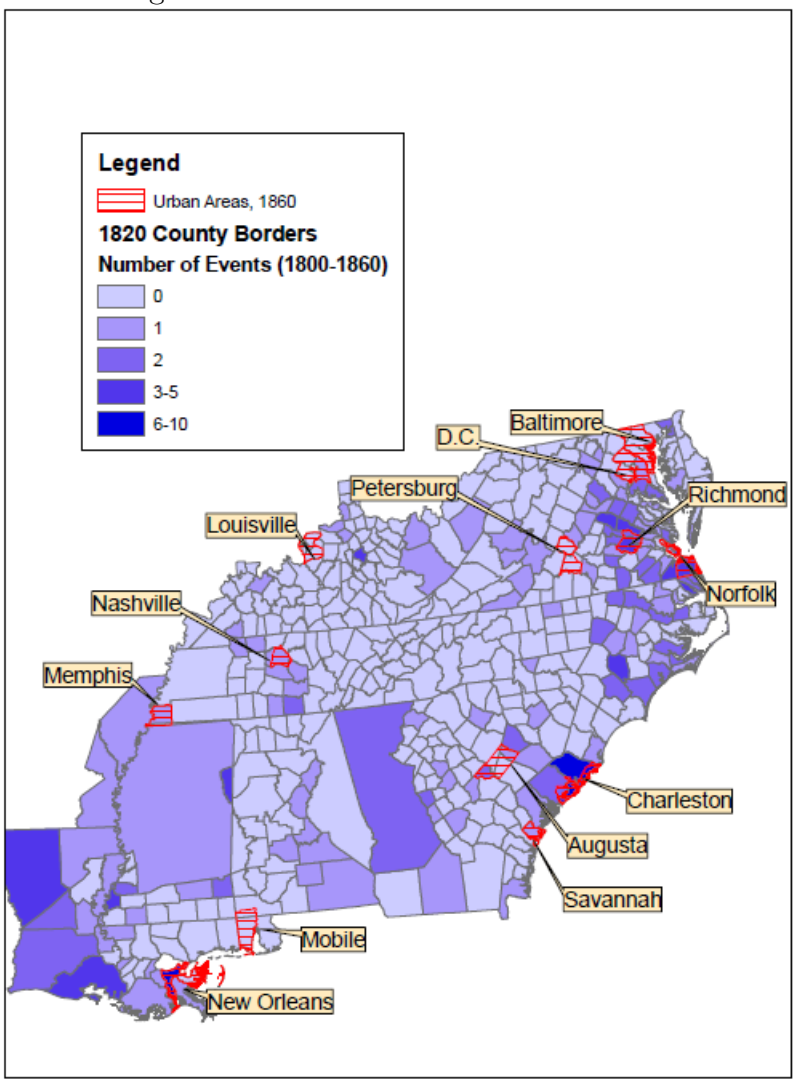
To test this hypothesis, the analysis below investigates whether insurrections, uncovered conspiracies, and panics were in fact more likely to occur in urban settings, and develops a theory to explain these results. If the fear of slave rebellion was greater in cities as Wade suggests, then one should observe a correlation between the degree of urbanization and the prevalence of such events, particularly panics. As will be shown below, however, I do not find any evidence for such a correlation in the data.

[31] Wade (1964, p. 227).

[32] "Rumors of plots and imminent uprising marked the ordinary routine of every city. If whites learned to live with this anxiety, they could not long forget it. Just as the patrols, whipping posts, and auction blockes reminded Negroes of their servitude, so these symbols made the townspeople aware of their own insecurity." (*Ibid.*, p. 242). Sheldon (1979, p. 36) makes a similar point when describing the reaction of Richmond, VA citizens to a discovered conspiracy during the War of 1812.

[33] Goldin (1976, p. 2).

Figure 1: Insurrections and Urban Areas



3 Model

The following partial equilibrium model analyzes the incentives faced by slaves and slaveowners in deciding how much effort to put for forth toward insurrecting and surveillance, respectively. The ultimate goal of this analysis is to highlight those factors which contributed to or hindered the prevalence of slave revolts, conspiracies and panics in the antebellum South, and how they might differ between urban and rural environments. To this end a contest-success function, common in the theoretical literature on conflict, is used to formalize a basic tradeoff between production and appropriation.[34]

[34]It is often recognized that the work of Haavelmo (1954) was the first to investigate this tradeoff. Later contributions include Tullock (1980), Hirshleifer (1988) and Skaperdas (1992). Skaperdas (1996) and Jia (2008) provide derivations of variants of the functional form employed in this paper, the former via an axiomization approach and the latter using stochastic methods, in which the determination of a "winner" in the contest is noisy. That said, the following theory most closely follows the work of

3.1 Primitives and Assumptions

The model is positive in nature, and parsimoniously depicts an archetypal slave-slaveowner relationship as a sequential game.[35] The set of players is discrete, and consists of a single slaveowner and a set J of identical slaves, each of whom supply a given quantity of labor in homogenous quality. For simplicity it shall be assumed that the set of slaves has a cardinality of J (i.e., $|J|= J$), and that $J > 2$.

The strategy set M of the slaveowner is compact, bounded by zero from below and an arbitrarily large, but finite, Δ from above so that his strategy consists of some $m \in [0, \Delta]$.[36] The choice of m in part determines the quantity of labor the slaveowner is able to forcibly extract from his slaves, and as such represents supervisory efforts such as the employment of overseers tasked with monitoring labor productivity. The strategy space of slave $j \in J$ consists of a compact set bounded by zero from below and 1 from above, which represents all feasible choices of insurrection effort, as well as the decision to *Flee,* and earn a reservation utility π[37], or *Stay* and toil under the slaveowner's purview. Thus, a complete strategy profile is a tuple from the cartesian product $[0, 1]\times[Flee,\ Stay]$. Each slave $j \in J$ is endowed with one unit of a resource, say time or work-effort, the proportions of which, given the decision to *Stay,* are distributed between private production on a personal garden plot or leisure (λ_j), coerced labor (β), and insurrecting[38] ($r_j \in [0, 1]$). Condition (1) expresses this distribution of the peasants'

Grossman (1991), which embeds the decision to insurrect in a general equilibrium setting. In the context of slave revolts, however, Grossman's theory seems inappropriate because it assumes total agricultural production is split between the participants in a successful rebellion.

[35]Utilizing the terminology of Fudenberg and Tirole (1991), it is assumed that all players are endowed with perfect recall and common knowledge, so that they may costlessly observe the history of play in choosing an optimal strategy.

[36]In fact, given the structure of the slaveowner's utility function explained below, it can be shown that the optimal choice of m will always be finite, and thus the assumption of an arbitrary upper bound Δ is somewhat superfluous in ensuring the their strategy set is compact. This results from the assumptions of diminishing marginal product of labor and a constant, finite marginal cost of coercion, denoted μ below.

[37]Which may represent the Von Neumann-Morgenstern expected utility from stealing away and posing as a wage laborer in the nearest city, for example. "It was a unusual planter who could boast that none of his slaves had absconded during a given year. In fact, the vast majority admitted just the opposite, and some complained about 'habitual' runaways, or those who ran off two, three, and four times each year. Traveling through the southern states during the 1850s, Frederick Law Olmsted noted that at virtually every plantation he visited masters complained about runaways" Schweninger (1999, p. 267). Wade (1964, p. 209-20) similarly describes the persistent problem of slave flight in Southern cities as well.

[38]It should be noted that r_j may also signify day-to-day acts of "silent sabotage" such as the maiming of draft animals or destruction of lands, tools and facilities. Daniel Dennett (1849), editor of the *Planter's Banner* in Louisiana, spoke about his slaves as such: "On a plantation they can neither hoe, nor ditch, chop wood, nore perform any king of labor with a white man's skill. They break and destroy more farming utensils, ruin more carts, break more gates, spoil more cattle and horses, and commit more waste than five times the number of white laborers do." As an anonymous contributor to the *South-Carolina Gazette* reported, "Mr. James Gray who work'd his negroes late in his Barn at Night, and the next Morning before Day, hurried them out again, and when they came to it, found it burnt

resource:

$$\lambda_j + r_j + \beta(m, R) = 1. \tag{2}$$

Where $R \equiv \sum_{j \in J} r_j$ to represent the communal nature of resistance efforts.

The timing of the game is as follows[39]:

Stage 1: The slaveowner chooses $m \in M$.

Stage 2: Each slave $j \in J$ chooses *Flee or Stay.* If the slave flees, they receive a reservation utility $\pi \in (0, 1)$, and the slaveowner receives $-\mu m$, where μ represents the marginal cost of supervising labor.

Stage 3: If previously slave $j \in J$ chose *Stay,* they then choose $r_j \in [0, 1]$. Letting $L(\beta)$ represent coerced labor, (T) land[40], (P) the price of agricultural output, (A) a Hicks-neutral productivity parameter and $F: \Re \times \Re_+ \to \Re$ a production technology[41], the payoff functions, if Stage 3 is reached, may be written as:

$$U^S_{j \in J}(r_j, m) = \sum_{j \in J} \lambda_j,$$

$$U^O(r_j, m) = PA * F(L(\beta)), T) - \mu m,$$

where U^S and U^O refer to the payoffs of slaves and the slaveowner, respectively. The utility slave $j \in J$ receives in stage 3 is equal to the proportion of their resource which can be devoted to their private production or leisure.[42] The payoff the slaveowner receives in stage three is equal to the revenue garnered from agricultural production, which takes as inputs labor $L(\beta)$ and land (T), less the costs associated with coercion. Therefore, a slave in stage 2, having observed the choice of the slaveowner $m \in [0, \Delta]$, will only choose *Stay* if $\sum_{j \in J} \lambda_j(R, m) \geq \pi$.[43] The extensive form representation of the game for a single slave $j \in J$ is shown in the figure below.

---

down to the Ground, and all that was in it" (quoted in Morgan 1998, p. 154-5).

[39] In the current setup the slaveowner is the first-mover. It should be noted, however, that comparative statics results are robust to an alternative formulation in which slaves choose their insurrection effort in Stage 1.

[40] It is assumed that the quantity of land endowed to the slaveowner is determined exogenously and utilized costlessly.

[41] F is assumed to be a continuously differentiable neo-classical production function, satisfying positive marginal products, strict concavity in its arguments, positive cross partial derivatives, smooth dependence on its parameters and constant returns to scale.

[42] Ransom and Sutch (2001, p. 83) and Fogel and Engerman (1974, p. 127) note that private garden plots were common among plantation slaves, and their allocation was often used as a tool to stimulate labor effort.

[43] It is assumed that slave $j \in J$ chooses *Stay* if $\lambda_j(m, r_j) = \pi$.

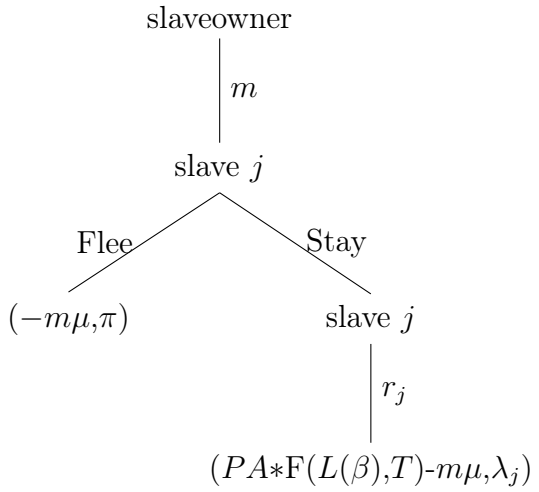


Figure 2: Extensive Form Representation With a Single slave

Lastly, the total quantity of labor the slaveowner is able to forcibly extract from all $j \in J$ depends on the contest-success function $\beta(m, r_j)$, which is borrowed from the economic literature on conflict:

$$L(\beta) = \beta(m, R) * J = \frac{cm}{cm + (1-c)\sum_{j \in J} r_j} J \qquad \text{for } m + R > 0 \text{and } c \in (0, 1). \tag{3}$$

As the functional form for $\beta(m, R)$ plays a critical role in the following analysis, it is worth a brief discussion. It states that the proportion of labor appropriated by the slaveowner from slave $j \in J$ is a function of his individual contribution to coercion (m), the combined level of resistance on the part of slaves $(\sum r_j)$ and the parameter c which determines the relative efficacy of repression versus resistance.[44] Thus $\beta(m, r_j)$ may be considered a conflict technology[45], markedly distinct from those generally encountered in economic theory in that its inputs are combined *adversarially* in the "production" process. Moreover, the parameter c is critically important in determining the relative power between the slaveowner and slaves, as it represents an asymmetry in the effectiveness of revolt versus surveillance efforts. For example, note that when $m = \sum_{j \in J} r_j > 0$, $\beta = c$; and therefore conflict becomes increasingly unbalanced in the slaveowner's favor as c approaches 1. In the present context, less invasive mechanisms of slave control in cities *vis-a-vis* plantations, in particular those beyond the purview of slaveowners, may be represented by a smaller c. As described in Section 2 above, cities offered slaves much

[44] More specifically, it is the *ratio* of coercion to combined resistance that determines β. This can be mostly clearly seen by assuming $c = \frac{1}{2}$, which yields $\beta = \frac{m}{m + \sum r_j}$.

[45] See Hirshleifer (1988); Skaperdas (1992, 1996).

greater autonomy. Lax restrictions on mobility and residence allowed opportunities for socializing and, as a result, coordination between slaves in the plotting of rebellions that affected the balance of power between slave and slaveowner. [46] Finally, the fact that $(\sum r_j)$ is an argument of β is meant to reflect the communal nature of resistance, and assumes coordination and collective action issues have been resolved among slaves.[47]

3.2 Equilibrium and Proposition

The solution concept employed is that of subgame perfect Nash equilibrium (SPNE). Given the primitives of the game a pure-strategy SPNE is guaranteed, but to first narrow down the candidate strategy profiles, an immediate result is useful.

LEMMA 1: *The slaveowner earns a strictly higher payoff when laborers choose "Stay" at their initial decision node.*

PROOF: Consider a strategy $m_f \in (0, \Delta]$ that induces laborers to choose *Flee*, and a strategy $m_s \in (0, \Delta]$ that leads to the choice *Stay*. Suppose by contradiction that the payoff to the slaveowner from m_f is greater than the payoff from m_s :

$$\mu(m_s - m_f) > F(\beta(m_s, R), T) \geq 0.$$

But because $\lambda_j(m, r_j)$ is decreasing in $m \quad \forall\, r_j > 0$, it must be the case that $m_f > m_s$, and thus the above statement is a contradiction because the left hand side is negative.

Given this equilibrium condition, the left-hand side of the tree diagram in Figure 1 may be disregarded, and an SPNE will be derived by employing the method of backward induction, beginning with optimal choice r, given that *Stay* was played in the previous proper subgame. The optimality problem of the laborer in stage 3, having observed this history of play, is :

$$\underset{r_j \in [0,1]}{\text{Max}} \sum_{j \in J} \lambda_j(m, r_j), \tag{4}$$

$$s.t.\ \beta = \frac{cm}{cm + (1-c)\sum_{j \in J} r_j}.$$

[46] Note that if both total resistance and monitoring efforts are doubled, "output" remains constant.

[47] Previous scholarship has noted the organizing power of ethnicity, for example. "Most contemporary civil wars in developing countries have an ethnic dimension in the sense of well-defined and ethnically distinct groups fighting one another. One reason is that ethnicity resolves the collective action problem of mobilizing groups to fight one another. Ethnicity, whether based on religion, language, or some other form, is a powerful organizing principle, far superior to social class." Murshed and Gates (2005, p. 122).

There are a multiplicity of r_j^* which satisfy the first-order condition to this problem, as only the *total* level of resistance by laborers is important in β, but as a simplifying assumption the symmetric strategy profile in which each laborer devotes an equal proportion of their resources to resistance shall be chosen. That is, it will be assumed:

$$\sum_{j \in J} r_j^* = Jr^*. \tag{5}$$

The reaction function derived leads immediately to the following result.

LEMMA 2:

$$\frac{dr^*}{dm} \text{ is } \begin{cases} \textit{positive} & \forall\, m < \frac{1-c}{4c} \\ \textit{negative} & \forall\, m > \frac{1-c}{4c} \\ 0 & m = \frac{1-c}{4c} \end{cases} \quad \textit{and} \quad r^* \text{ is } \begin{cases} \textit{positive} & \forall m < \frac{1-c}{c} \\ 0 & \forall m \geq \frac{1-c}{c} \end{cases}$$

PROOF: Inspection of laborer best-response function.

Having obtained r^*, and established that any candidate strategy profile must induce the decision *Stay* by peasants, backward induction proceeds by next solving for the optimal slaveowner strategy m^*. In order to prevent slaves from fleeing, any equilibrium m must satisfy:

$$\lambda_j(m, r^*) \geq \pi, \tag{6}$$

As one would expect, this constraint places an upper bound on m in equilibrium. To simplify the exposition, this upper bound will be defined γ.

The optimality problem of the slaveowner can thus be summarized as:

$$\underset{m \geq 0}{\text{Max}}\ (PA) \cdot F(L(m, r^*), T) - \mu m, \tag{7}$$

$$\text{s.t. } m \leq \gamma \quad \text{and}$$

$$\text{s.t. } L(m, r^*) = \beta(m, r^*) \cdot J.$$

Cursory examination of the resulting Kuhn-Tucker conditions reveals the possibility of two cases, an equilibrium in which constraint (6) binds and one in which it does not. Yet due to the unrealistic parameter values required for a non-binding equilibrium, our focus will be on the case in which the slaves' individual rationality constraint binds.[48]

[48]Various simulations have been conducted to investigate which parameter values lead to a non-binding equilibrium. As is evident from the slaveowner objective function, lower and higher values

PROPOSITION 1

In an SPNE in which constraint (6) binds:

1. *A decrease in c will lead to greater equilibrium surveillance effort by the slaveowner.*

2. *A decrease in c has an ambiguous effect on the equilibrium insurrection effort put forth by slaves.* R^* *will* $\begin{cases} increase & if \quad m^* < \frac{1-c}{4c} \\ decrease & if \quad m^* > \frac{1-c}{4c} \\ not\ change & if \quad m^* = \frac{1-c}{4c} \end{cases}$.

PROOF: Part 1 follows from Lemma 1 and the fact that γ is decreasing in c. Part 2 follows directly from Lemma 2.

Proposition 1 offers a convenient mathematical summary of Wade's primary argument, and its intuition is straightforward. If institutional mechanisms for slave controls are weaker, as he argues was the case for Southern cities, then c will decrease and *ceteris paribus* the slaveowner will make a larger personal investment in surveillance, represented by a larger m^*. This does accord with the historical record, as slaveowners in cities often took great pains to mitigate the rebelliousness that city life, according to Wade (1964, p. 209)[49], instigated among slaves. Although public patrols and courts played a role in maintaining control over slave populations, ultimate responsibility lay with the slaveowner. "Discipline on the slave in the specific instance was first exercised by the owner...In the application of public law as well as private rules, the owner constituted the primary agent of enforcement." To this end, Radford (1976) notes the elaborate fortifications built by slaveowners in Charleston in an attempt to maintain the isolation, segregation and subservience of slaves.[50] Moreover, Wade (*Ibid.*, p. 100)

for c and μ, respectively, decrease the returns to applying surveillance efforts, and thus make a non-binding equilibrium more likely. Nevertheless, considered in isolation, a binding equilibrium obtains even when $c = .13$ (which would imply that only 13% of the laborers' time was spent toiling for the slaveowner if both chose equal efforts), and $\mu = 10$, that is, if the marginal cost of production was ten times its price. Moreover, the availability of outside opportunities for slaves (π) should diminish the slaveowner's ability to wantonly extract additional labor, but a binding equilibrium results even for values of $\pi < .01$. The Appendix gives greater detail to the calibration exercise used in these simulations.

[49]"Newspapers and tracts, the gossip around town, even the conversation in the master's house, indicated that many Americans believed slavery to be evil, or at least unjust. This perception resulted in constant unrest among a significant number of urban slaves, an unrest that manifested itself not only in persistent pressure to widen the latitude within slavery but also in sporadic attempts to get outside it by escape or mutiny."

[50]Radford also argues that this system of control was the precursor to state-instituted segregation witnessed in the postbellum period.

highlights the prevalence of volunteer slave patrols, or night watches, among the slaveowning community, particularly in the wake of slave unrest.[51]

Proposition 1 also implies that if the surveillance effort by the slaveowner is above a particular threshold, then less stringent institutional controls, represented by a decrease in c, will lead to a reduction in total insurrection effort by the slaves. As will be shown below, the greater liberties afforded slaves in urban environments did not appear to foment greater rebelliousness on the part of slaves, and thus Proposition 1 offers a plausible explanation. Greater individual efforts by slaveowners to monitor their chattels may have been sufficiently effective to quell subversion among the slave community. The theoretical mechanisms that incentivize slave rebellion and supervision thus established, the remainder of the paper will focus on an empirical examination of Wade's fundamental claim.

4 Data

4.1 Revolts, Conspiracies and Panics

The source most heavily utilized for data on slave insurrections, discovered conspiracies and panics between 1800-1850 is Herbert Aptheker's *American Negro Slave Revolts* (1993). This detailed work is the culmination of over 5 decades of investigation into court minutes, probate records, plantation records (i.e., journal entries, correspondence, etc.), government archives, newspaper articles and various publications. To the best of my knowledge, the only other empirical paper which has drawn upon this compilation is Kilson (1964), which is mainly concerned with the taxonomy of slave revolts, specifically classifying them as either systematic, vandalistic or opportunistic. It should be noted that Kilson arrives at a smaller number for organized slave revolts taking place in the United States during the period of investigation, but this may be attributed to our inclusion of panics and conspiracies as dependent variables. It should also be noted that Aptheker's opus is not without criticism.[52] Though some refer to him as a "pioneering scholar"[53], others have charged that the instances of rebellion documented are either exaggerated or rely on scanty evidence. Kenneth Stampp aptly explains the con-

[51]"In St. Louis the police seemed so inadequate that in the midst of rumored slave unrest, a public meeting urged the establishment of a vigilante network in each ward to enforce the Negro statues. In 1835 a public meeting in Mobile, also reacting to presumed colored agitation, set up 'volunteer companies' in each neighborhood...Such sentiment was sporadic, but is recurrence reflected both the extenf of the anxieties of the white and the inability to find really effective means to control the colored population."

[52]See, for example, the recent exchange between George L. Fishman and Carl N. Degler in the *Journal of American History* (1990).

[53]Rodriguez (2007)

troversy by noting that at the time Aptheker began his research in 1927, the dominant view of the American slave was one of docility, dependence and submission. In fact, over thirty years later slaves were described as such:

> Sambo, the typical plantation slave, was docile but irresponsible, loyal but lazy, humble but chronically given to lying and stealing; his behavior was full of infantile silliness and his talk inflated with childish exaggeration. His relationship with his master was one of utter dependence and childlike attachment: it was indeed his childlike quality that was the very key to his being.[54]

Thus it is sometimes argued (by Stampp included) that Aptheker's book exaggerates instances of militant action on the part of slaves in order to repudiate the paternalistic view of him as "Sambo." To mitigate this tendency, and in line with Wilson's (1964) scholarship, the following analysis distinguishes between "insurrections", "conspiracies" and "panics", to be defined presently.

An "insurrection" is defined as any event in which multiple slaves resorted to violent action to obtain their freedom; this includes instances of "opportunistic" or "vandalistic" rebellion referred to by Kilson. A typical entry in Aptheker which would be classified as an insurrection is as follows:

> In August 1858, about 55 slaves on a plantation...near Coffeesville, Mississippi, decided they would no longer submit to whippings, and became unmanageable. The overseer obtained assistance from his neighbors, but the slaves, armed with axes, hatchets, clubs, scythes and stones, barricaded themselves...One white man was severely injured in attempting to get at the rebellious Negroes. It was only when, after a few days, some seventy-five armed men came to the plantation from surrounding communities that the slaves were overpowered.[55]

A "conspiracy" is defined as any event in which multiple slaves were tried and convicted in a court of law for crimes related to the planning and execution of a revolt. Court records documenting instances of these trials are in large part from the work of Catterall (1998). A typical conspiracy entry, take from the Governor's Papers of Raleigh, NC, is as follows:

> Sir the inhabitants of Sampson have been alarmed with the insurrection of the Negroes - We have ten or fifteen negroes in Jail, and we have such

[54] Elkins (1976, p. 82), reprinted. The inherent laziness of slaves has also been used as evidence the long-standing debate over the viability and profitability of American slavery, *cf.* Cairnes(1969), Ruffin(1857) and Genovese(1965).

[55] Aptheker (1993, p. 351).

> proof that most of them will be bound over to our Supreme Court. We have testimony that will implicate most of the negroes in the county...the people of Duplin County have examined ten or fifteen negroes & found two guilty, and have put them to death...[56]

A "panic" is defined as an event in which fear and suspicion on the part of slaveholders in a particular county or city was rife, but no direct evidence of an insurrection or conspiracy is documented. This variable is important because it captures the *fear* of rebellion that, while in many cases was misplaced, purportedly played a prominent role in the decline of urban slavery. Of this category, by far the largest subset is events related to incendiary fires, such as those which swept Charleston, S.C. in April of 1838, in which 1,000 houses were destroyed at a loss of roughly $3,000,000.[57] As Radford notes, fires of such a large scale were often attributed to the machinations of slaves and free African Americans. "It was widely believed in the white community that a slave revolt would involve arson if only to create a diversion and stretch manpower to its limits. The Charleston Fire Guard, a volunteer force, mobilized during fires to protect the city against any Negro uprisings that might occur."[58] In fact, fear of rebellion in such cases was so acute that the mayor's office instructed the city guard not to aid in firefighting efforts unless absolutely necessary, and instead make preparations for the onset of an insurrection.[59]

An "insurrection event" is defined as one in which either an insurrection, discovered conspiracy or panic occurred. Each instance of these events has been cross-referenced with Rodriguez (2007) and Carroll (1968), and linked with county-level census data to be described below. In the period 1840-1859, in which census data of greater detail is available, there were 17 recorded insurrections, 50 conspiracies and 22 panics. In the entire period under investigation, 1800-1859, there were 52 recorded insurrections, 103 conspiracies and 63 panics. Due to a paucity of reliable records, it is likely that in each time period the number of events is grossly underestimated.[60]

---

[56] *Ibid.*, p. 309.

[57] Radford (1976, p. 332)

[58] *Ibid.*, p. 332. Interestingly, Radford also shows that fears of arson in Charleston were so rampant that the brick and mortar houses, as opposed to wooden, became far more popular in the decades leading up to the Civil War.

[59] "Except for those necessary to carry and guard the caisson, the city guard instead of being required to attend fires should on every alarm repair to the guard house under arms." Charleston *Courier*, 31st March 1840.

[60] Moreover, Wade (1964, p. 194) and Aptheker (1993) note that incidents of slave unrest often went unreported in order to quell widespread panic. "Even at moments of great tension, as in Charleston during the Vesey affair or in St. Louis after the burning of McIntosh, a free black little was revealed, because city officials drew a veil over the vents and secured a news balackout from local editors."

4.2 Census Data

County-level census data used in the empirical analysis below is from two sources: Haines (2010) and the Minnesota Population Center. Up until 1900 censuses in the United States were conducted only on a decennial basis. As a result, for the vast majority of the regressions displayed below census data in any year t is used to explain slave insurrections, conspiracies or panics which occurred in the interval $[t, t+9]$. As an example, census data from 1840 is used to explain events which occurred anytime between 1840 and 1849. It is our hope that these "snapshots" may be used to uncover long-trends that either fomented or hindered slave unrest.

Up until 1840 decennial census data are not particularly detailed and, as one would expect, provide almost entirely demographic information. Independent variables constructed from these datasets and used in panel regressions covering the period 1800-1859 are total population (TotPop), urban population (UrbPop, defined as the population living in an unincorporated city of at least 2,500 people), slave population (SlavePop), white population (WhtPop) and an indicator for whether a county had access to a navigable waterway (NavWater). The independent variable of interest in examining the merits of the Wade hypothesis is county-level urban population, which should be positively correlated with the probability of an event if the theory is correct. Table 10 of the Appendix displays the summary statistics for this panel. Due to data availability constraints, and in order to maintain a balanced panel, states which were not formally included in the Union as of 1800 are not included in these regressions. As a result, Alabama, Mississippi, Louisiana, Texas, Arkansas, Missouri and Florida are omitted. It should be noted that these omissions should not drastically alter results regarding our investigation of the Wade hypothesis, as the only major Southern cities dropped from the analysis are New Orleans, Mobile and St. Louis.[61]

Beginning in 1840 the decennial censuses become much more detailed, both in spatial scope and the variety of variables available. In addition to the population variables described above, the 1840 and 1850 censuses contain information on the value of agricultural output (ValAgProd), value of manufacturing output (ValManProd), and manufacturing employment (ManEmpl) and investment (ManInvest). Moreover, and importantly for the instrument variable strategy employed below, educational variables such as the number of private (PrivSchl) and public schools, enrollment and literacy rates are included in theses censuses as well. These censuses also include data for several of the states necessarily omitted from the 1800-1859 panel.[62] It is because of this

[61] The remaining Southern cities with more than 10,000 residents in 1860 are Savannah, GA, Augusta, GA, Charleston, SC, Memphis, TN, Nashville, TN, Louisville, KY, Richmond VA, Petersburg, VA, Norfolk, VA, Washington D.C. and Baltimore, MD.

[62] It should be noted that, due to data availability constraints, Florida and Texas continue to be

richness of the data in later years that an additional panel, composed of 1840 and 1850 cross-sections, is created in the hopes of broadening the scope of our analysis. Tables 11 and 12 of the Appendix displays the summary statistics for this panel.

A perennial issue which trammels this analysis, or any other attempting to investigate 19th century United States history, is the fact that county boundaries were in a constant state of flux during this period. Persistent territorial expansion in the pursuit of manifest destiny, via the purchase of new lands from foreign governments (Louisiana Purchase) or the dislocation of Native Americans (Creek cessions of 1805,1806,1821 and 1826), made county borders in the period 1800-1860 (and onward) far more fluid than rigid. If the over-riding goal in compiling these data is to create a panel of observations which are consistent through time, then data for a given county in, say, 1840 is effectively useless if its borders were re-organized in 1835.

As a result, following the method outlined in Hornbeck (2010) and Perlman (2013), county borders are adjusted to hold geographical units constant through time for both panels. Using historical U.S. county boundary files[63], county borders in later decades are intersected with those of a base year (1800 for the 1800-1859 panel and 1840 for the 1840-1859 panel) using ArcView GIS software. When later counties fall within more than one base year county, data for each piece are calculated by multiplying the later county data by the share of its area in the base year county. For those later decades, each base year county is then assigned the sum of all the pieces falling within its area. Of course, this procedure relies on the assumption that data are uniformly distributed across a given county, though we do not view this to be particularly unrealistic.

5 Estimation Strategy and Results

In each of the following regressions the dependent variable is an indicator for whether an insurrection, conspiracy, panic or either of these three events occurred in a given county during the period of investigation. The binary nature of these variables leads to some information loss, as sometimes multiple insurrection events occurred within the same county over a nine year period. In the 1800-1859 panel, for example, 30 counties experienced more than one insurrection event over this time frame period, and it should be noted that 8 of these counties contain urban populations. Future research would implement a zero-inflated poisson model such as that developed in Lambert (1992), which would cast dependent variables as counts instead of binaries while ac-

omitted in this panel.

[63]Carville, Hepen, and Otterstrom (1999).

counting for rampant over-dispersion.[64] At the time of writing, however, the author does not have access to a statistical package with the subroutine required to implement such a model.

Instead, a linear probability model (LPM) is utilized in each of the regressions described below, with robust standard errors accounting for the inherent heteroskedasticity that results from these specifications. In the panel regressions county-level fixed effects are utilized unless otherwise stated, as such this specification requires less stringent exogeneity assumptions than a random effects analysis, and because a Hausman test points to the former as the preferred model (results not shown).[65] As a precaution standard errors are also clustered at the county level to control for serial correlation, although the 10-year gap between cross-sections in a given panel should also ameliorate this issue.

5.1 1800-1859 Panel

Estimation in a panel setting has the distinct advantage that biases due to county-level time-invariant omitted variables may be removed and, under a fixed effect regime, no assumption about the arbitrary correlation between covariates and these omitted variables is required. As noted above, however, regardless of how the fixed effects estimator is implemented, either through county dummies or de-meaning observations from a given county, coefficients on time-invariant covariates cannot be identified. To sidestep this issue, NavWater is interacted with year dummies so that its effect in a given time period may still be estimated.

In addition, our panel data allows year indicators to be included in each of the regressions below, thus accounting for time-dependent shocks that might bias coefficient estimates..[66]

The model estimated in each of the regressions below is characterized by Equation (2):

$$I_{i,t\in[t,t+9]} = \alpha + \beta' X_{it} + \gamma\delta_t + \sigma NavWater_i * \delta_t + \Gamma_i + \varepsilon_{it} \tag{8}$$

[64] Over-dispersion is particularly acute in this setting because 90% of counties in the 1800-1850 sample, for instance, never experience an insurrection, conspiracy or panic.

[65] It should be noted, however, that the Hausman test requires strict exogeneity of regressors under both the null and alternative hypotheses, which rules out any feedback from the dependent variable to future values of the independent variables (Wooldridge (2010, p. 288)).

[66] Aptheker argues that economic depression brought on by adverse climate conditions placed a greater work burden on slaves, and thus may have been a precipitate of rebellion. Lingering effects of the disastrous rains which struck Louisiana in 1829, for example, will be controlled for in the specification described in Equation (2)

$$\text{where } I_{i,t\in[t,t+9]} \in \{EvEvent_{i,t\in[t,t+9]}, EvConsp_{i,t\in[t,t+9]}, EvEvent_{i,t\in[t,t+9]}\}$$

is the dependent variable of interest for county i in period $[t, t+9]$, X_{it} is a vector of independent variables of interest, δ_t is a year indicator and Γ_i is a vector of county-level time-invariant omitted variables (fixed effects). Estimation results for this model in the period 1800-1859 are displayed in Tables 2-4 below.

One immediate result from Table 2, in direct contradiction to the Wade hypothesis described above, is that the degree of urbanization in a given county appears to have no statistically significant impact on the probability of an insurrection, conspiracy, or panic. Moreover, Table 3 illustrates that this result is robust to the inclusion of non-linear terms. If the institutional mechanisms put in place to supervise slaves were less effective in urban settings, as Wade (1964), Cairnes (1862), Wesley (1927) and Eaton (1960) claim, one would expect a higher probability of insurrection events in these areas. Particularly damning for this hypothesis is the observation that panics, which supposedly were the impetus for massive reductions in city slave populations, were in fact *less* likely in counties that contained urban populations. It should be noted that a random effects specification lends radically different results, as evidenced by Table 4 below. This is interpreted as evidence for the existence of omitted time-invariant variables that are indeed correlated with the regressors in X_{it}, and thus this specification is considered inferior to that describe by Equation (4). Of note in this table, however, is the fact that the presence of a navigable waterway is highly significant in predicting insurrection events.

Table 2: Free African Americans, Slave Density and Insurrection Events

	EvInsurrect	EvConsp	EvPanic	EvEvent
UrbPop	1.61e-08	-0.00000289	-0.00000513	-0.00000209
	(0.01)	(-0.74)	(-1.45)	(-0.52)
FreeBlk	-0.00000149	0.0000199	0.0000262	0.0000116
	(-0.10)	(0.87)	(1.23)	(0.46)
Slvdensity	0.118	0.188*	0.132	0.274*
	(1.63)	(1.80)	(1.34)	(1.79)
1810 Indicator	0.00194	-0.0229	-0.00652	-0.0123
	(0.12)	(-0.91)	(-0.36)	(-0.42)
1820 Indicator	-0.00863	-0.0644***	-0.0255	-0.0701**
	(-0.56)	(-2.74)	(-1.62)	(-2.31)
1830 Indicator	-0.0184	-0.0281	-0.00215	-0.0144
	(-1.22)	(-0.92)	(-0.10)	(-0.38)
1840 Indicator	-0.0187	-0.0782***	-0.0312*	-0.0926***
	(-1.24)	(-3.24)	(-1.73)	(-2.94)
1850 Indicator	-0.00593	-0.0386	-0.0261	-0.0327
	(-0.29)	(-1.23)	(-1.30)	(-0.83)
NavWater*1810	-0.0622**	-0.0393	0.0272	-0.0444
	(-2.25)	(-0.88)	(1.02)	(-0.93)
NavWater*1820	0.0284	-0.0540	0.0538**	0.0179
	(0.94)	(-1.31)	(1.99)	(0.37)
NavWater*1830	-0.0130	-0.0384	0.0474	-0.00894
	(-0.43)	(-0.81)	(1.36)	(-0.16)
NavWater*1840	-0.0186	-0.0385	0.00523	-0.0302
	(-0.70)	(-0.90)	(0.27)	(-0.63)
Fixed Effects	Yes	Yes	Yes	Yes
Clustered S.E.	Yes	Yes	Yes	Yes
t stats in parentheses	* p<0.10	** p<0.05	*** p<0.01	

Table 3: Linear and Non-Linear Effect of Urbanization on the Probability of an Insurrection Event, Fixed Effects

	EvInsurrect	EvConsp	EvPanic	EvEvent
UrbPop	-0.00000754	0.000000303	-0.0000123	-0.00000480
	(-1.17)	(0.04)	(-1.44)	(-0.55)
UrbPop^2	1.26e-10	-3.91e-11	1.43e-10	1.14e-11
	(1.18)	(-0.27)	(0.93)	(0.06)
UrbPop^3	-4.85e-16	2.33e-16	-4.09e-16	1.18e-16
	(-1.18)	(0.39)	(-0.63)	(0.14)
SlavePop	-0.000000619	0.0000122**	-0.00000107	0.00000850*
	(-0.26)	(2.10)	(-0.39)	(1.81)
1820 Indicator	0.00149	-0.0708***	-0.0115	-0.0639**
	(0.10)	(-2.99)	(-0.78)	(-2.23)
1830 Indicator	-0.00471	-0.0401	0.0179	-0.00862
	(-0.33)	(-1.25)	(0.87)	(-0.24)
1840 Indicator	-0.00440	-0.0894***	-0.00956	-0.0856***
	(-0.31)	(-3.47)	(-0.60)	(-2.98)
1850 Indicator	0.0104	-0.0566*	-0.00109	-0.0287
	(0.53)	(-1.75)	(-0.06)	(-0.81)
Fixed Effects	Yes	Yes	Yes	Yes
Clustered S.E.	Yes	Yes	Yes	Yes
t stats in parentheses	* p<0.10	** p<0.05	*** p<0.01	

Table 4: Linear and Non-Linear Effect of Urbanization on the Probability of an Insurrection Event, Random Effects

	EvInsurrect	EvConsp	EvPanic	EvEvent
UrbPop	0.00000867**	0.0000129**	0.0000196***	0.0000303***
	(2.20)	(2.26)	(3.36)	(4.42)
UrbPop^2	-1.53e-10**	-2.52e-10**	-4.17e-10**	-5.80e-10***
	(-2.21)	(-2.28)	(-2.53)	(-3.41)
UrbPop^3	6.04e-16**	1.05e-15**	1.82e-15**	2.39e-15***
	(2.00)	(2.15)	(2.21)	(2.93)
SlavePop	0.00000575***	0.00000431***	-0.000000103	0.00000851***
	(3.92)	(3.18)	(-0.08)	(5.10)
NavWater	0.0190**	0.0275**	0.0233**	0.0532***
	(2.28)	(2.57)	(2.56)	(3.44)
1810 Indicator	-0.0309**	-0.0379*	0.0121	-0.0329
	(-2.16)	(-1.74)	(0.91)	(-1.39)
1820 Indicator	0.000405	-0.0876***	0.00833	-0.0643***
	(0.03)	(-4.37)	(0.59)	(-2.68)
1830 Indicator	-0.0344**	-0.0437*	0.0294	-0.0275
	(-2.06)	(-1.93)	(1.58)	(-1.00)
1840 Indicator	-0.0391***	-0.0947***	-0.0217*	-0.119***
	(-2.73)	(-4.76)	(-1.77)	(-5.10)
1850 Indicator	-0.0305*	-0.0683***	-0.0224	-0.0853***
	(-1.79)	(-3.15)	(-1.54)	(-3.32)
Random Effects	Yes	Yes	Yes	Yes
Clustered S.E.	Yes	Yes	Yes	Yes
t stats in parentheses	* p<0.10	** p<0.05	*** p<0.01	

5.2 1840-1859 Panel

Panel data spanning the period 1840-1859 is utilized to estimate a model identical to that described by Equation (2) above, with the notable exception that the enhanced richness of the data in these later years allows for more covariates of interest to be included in the vector X_{it}. In addition, Alabama, Mississippi, Louisiana, Arkansas and Missouri are now included in the sample, and therefore so are the cites of Mobile and New Orleans. Tables 5 and 6 below provide mixed evidence for the Wade hypothesis. Table 6 implies no statistically significant relationship between a county's urban population and the probability of an insurrection, discovered conspiracy or panic. As before, the correlation actually appears to be *negative* in some cases, and this accords with the alternative view of Claudia Goldin that slaves within Southern cities were no more difficult to supervise than those without, and thus fears of insurrection were not the deciding factor in the decline of urban slavery in the South. To maintain consistency with the 1800-1859 panel, Table 5 also illustrates results from a specification which al-

lows for non-linear correlations. Once again, there appears to be no correlation between urbanization and insurrections or panics. However, there is a significant negative correlation between discovered conspiracies and urbanization. This may be interpreted as tentative evidence in favor of Wade's claim that slave management was less stringent in southern cities. If this was indeed the case, and slave surveillance was more difficult in an urban environment, then one would expect the detection of conspiracies to be more difficult than in a plantation setting. Thus this finding does provide some support for the argument that the parameter c should be smaller in southern cities, as was argued for in the setup of Proposition 1.

Table 5: Linear and Non-linear Effect of Urbanization on the Probability of an Insurrection Event

	EvInsurrect	EvConsp	EvPanic	EvEvent
UrbPop	-0.00000369	-0.0000329*	0.0000108	-0.0000160
	(-0.45)	(-1.96)	(0.70)	(-0.65)
UrbPop^2	1.38e-11	5.02e-10	-1.95e-10	1.33e-10
	(0.11)	(1.91)	(-0.83)	(0.35)
UrbPop^3	7.23e-18	-1.81e-15	7.49e-16	-3.49e-16
	(0.02)	(-1.87)	(0.86)	(-0.24)
SlavePop	0.0000106	-0.00000161	0.000000548	0.0000126
	(1.24)	(-0.19)	(0.19)	(1.09)
1850 Indicator	-0.000886	0.0309***	-0.00558	0.0216
	(-0.10)	(3.43)	(-1.06)	(1.67)
NavWater*1850	-0.00470	-0.00693	0.0153	-0.00383
	(-0.38)	(-0.36)	(1.21)	(-0.16)
Clustered S.E.	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes
t statistics in parentheses	* p<0.05	** p<0.01	*** p<0.001	

Table 6: Free blacks, slave density and Insurrection Events

	EvInsurrect	EvConsp	EvPanic	EvEvent
UrbPop	-0.000000611	0.00000381	0.000000499	-0.00000116
	(-0.41)	(1.25)	(0.37)	(-0.33)
Freeblk	-0.00000885	-0.0000943***	-0.00000870	-0.0000398
	(-1.33)	(-4.47)	(-1.01)	(-1.26)
Slvdensity	0.163	0.202	0.123	0.530*
	(1.24)	(0.81)	(1.20)	(1.90)
1850 Indicator	0.00463	0.0256***	-0.00658	0.0227*
	(0.71)	(2.75)	(-1.27)	(1.95)
NavWater*1850	-0.00529	-0.0139	0.0180	-0.00602
	(-0.42)	(-0.72)	(1.41)	(-0.25)
Clustered S.E.	Yes	Yes	Yes	Yes
County F.E.	Yes	Yes	Yes	Yes
t stats in parentheses	* p<.1	** p<.05	*** p<0.01	

5.3 Instrumental Variable Strategy

A valid criticism that may be leveled at much of the foregoing analysis is that the urban population within a given county is not strictly exogenous in the manner articulated by Wooldridge (2010). It is certainly plausible, particularly in the 1800-1859 panel, that omitted variables correlated with a county's urban population have an independent impact on the probability of an insurrection event, therefore biasing each of the results presented thus far. Perhaps laws regulating manumission in a particular county were made more stringent in response to a growing urban population, and this led to greater unrest and outbursts of violence among the slave population.[67] To counter the adverse effects of this potentiality in the 1840-1859 panel, private school enrollment is instrumented for the urban population, and the first and second stage results from these regressions are presented in Tables 7-9 below.

Any instrument must satisfy two conditions in order to be valid, namely relevance and excludability. The first of these conditions mandates that the instrument, conditional on any included control variables, must be strongly correlated with the endogenous variable, in this case a county's urban population.[68] Table 7 displays results from the first-stage regression of urban population on private school enrollment (PrivSchl). As is evident, the instrument is highly correlated with UrbPop indicating, as one might expect, that in the years 1840 and 1850 private schools were far more rare in rural areas. It should also be noted that the F-statistic from this regression is 22.87, well above the

[67] Wade provides some evidence for this claim.

[68] Indeed if this is not the case, the cure may be worse than the disease. See Stock et al. (2002) for a discussion of the adverse effects of "weak" instruments.

Table 7: First Stage Regression

	UrbPop
PivSchl	3.475***
	(4.01)
ManProduct	0.00175***
	(3.45)
ValAgProduction	-0.000148
	(-0.81)
ManEmpl	0.660
	(1.48)
WhtIllitPop	0.334**
	(2.58)
SlavePop	-0.0506
	(-0.69)
_cons	143.2
	(0.57)
N	1445
t stats in parentheses	* p<.1
*** p<.01	** p<.05

widely accepted lower-bound of 10.

In order for this instrument to satisfy its exclusion restriction, it must be the case that, conditional on any included controls, private school enrollment does not have any *independent* impact on the probability of an insurrection. As a first step in arguing for the excludability of private school enrollment, it should be noted that laws banning the literacy of slaves in many states precluded their association with any schools, private or otherwise. One might argue that high private school enrollment in a given county may be indicative of relatively abundant income, which may have a partial effect on the probability of an insurrection event. To counter this possibility, the value of manufacturing output, agricultural output, manufacturing investment and manufacturing employment are included as controls, the idea being that these serve as reasonable proxies for income. Lastly, as a further precaution any effects that higher private school enrollment may have on literacy rates among the white population is also controlled for, although it is not immediately clear why this would affect the incidence of slave rebellion.

The results presented in Tables 8 and 9, differentiated by the inclusion of either fixed or random effects, offer a final rebuke of the Wade hypothesis. Although the sign on UrbPop is positive when the dependent variables are EvConsp, EvPanic or EvEvent, in each of the regressions the correlation is not statistically significant. Moreover, the random effects specification in Table 9 implies that discovered conspiracies were more likely the larger the urban population. For the reasons argued above, this provides

against the claim that slave surveillance was more difficult in cities. As a result, the notion that for reasons of control insurrection events were more prevalent in cities as opposed to rural areas is simply untenable, and does not accord with the data under any of the specifications described.

Table 8: Two-Stage Least Squares with County Fixed Effects

	EvInsurrect	EvConsp	EvPanic	EvEvent
UrbPop	-0.0000127	0.0000269	0.0000102	0.0000136
	(-0.68)	(1.90)	(0.89)	(0.51)
Slvdensity	-0.109	0.256	0.108	0.242
	(-0.76)	(0.86)	(0.84)	(0.76)
Freeblk	-0.0000289	-0.0000999***	-0.00000763	-0.0000531*
	(-1.92)	(-5.67)	(-0.43)	(-1.96)
ValManufactProduct	2.97e-08	-3.61e-08	-5.46e-08	-5.67e-08
	(0.67)	(-0.98)	(-1.18)	(-0.80)
ValAgProduction	-2.57e-08	4.06e-08	-2.06e-08	2.26e-09
	(-0.80)	(0.89)	(-0.79)	(0.04)
ManEmpl	0.0000257	-0.0000107	0.0000322	0.0000512
	(1.05)	(-0.59)	(0.95)	(1.19)
WhtIllitPop	-0.0000184	-0.0000412	-0.00000423	-0.0000661
	(-0.88)	(-1.54)	(-0.27)	(-1.89)
SlavePop	0.0000134	-0.00000948	0.00000280	0.00000692
	(1.37)	(-0.79)	(0.39)	(0.37)
1850 Indicator	0.0101	0.0262*	0.00327	0.0386*
	(1.16)	(2.13)	(0.46)	(2.36)
NavWater*1850	-0.00916	-0.0118	0.0167	-0.00689
	(-0.65)	(-0.58)	(1.25)	(-0.26)
Fixed Effects	Yes	Yes	Yes	Yes
Clustered S.E.	Yes	Yes	Yes	Yes
t stats in parentheses	* p<0.05	** p<0.01	*** p<0.001	

Table 9: Two-Stage Least Squares with County Random Effects

	EvInsurrect	EvConsp	EvPanic	EvEvent
UrbPop	-0.00000370	0.0000214*	-0.00000179	0.00000898
	(-0.31)	(1.87)	(-0.22)	(0.57)
Slvdensity	-0.00360	0.0574**	0.0270	0.0696*
	(-0.20)	(2.12)	(1.46)	(1.77)
Freeblk	-0.00000137	-0.0000339	0.0000188	-0.00000187
	(-0.08)	(-1.17)	(1.13)	(-0.07)
ValManufactProduct	-1.23e-09	-3.25e-08	-4.83e-09	-2.60e-08
	(-0.04)	(-0.84)	(-0.12)	(-0.66)
ValAgProduction	-2.56e-08	8.01e-08	-1.89e-08	3.28e-08
	(-0.60)	(1.35)	(-0.63)	(0.46)
ManEmpl	-0.000000265	-0.0000281	-0.0000173	-0.0000295
	(-0.01)	(-0.98)	(-0.34)	(-0.58)
WhtIllitPop	-0.0000237**	0.0000192	0.00000199	-0.0000159
	(-2.27)	(1.42)	(0.19)	(-0.90)
NavWaterway	0.0149*	0.0364***	0.00495	0.0514***
	(1.80)	(3.23)	(0.53)	(3.73)
TotPop	0.00000414	-0.00000702	0.00000288	0.000000459
	(0.92)	(-1.34)	(0.93)	(0.07)
1850 Indicator	0.00976	0.0216**	-0.00671	0.0275**
	(1.60)	(2.01)	(-0.80)	(2.04)
NavWater*1850	-0.00956	-0.0138	0.0176**	-0.0124
	(-0.79)	(-0.64)	(2.06)	(-0.58)
Random Effects	Yes	Yes	Yes	Yes
Clustered S.E.	Yes	Yes	Yes	Yes
t stats in parentheses	* p<.1	** p<.05	*** p<0.01	

6 Conclusion

The goal of this paper has been to critically examine an influential strand of the economic history literature which argues that an inherent incompatibility between slavery and urbanization was the fundamental factor in explaining the South's reticence to industrialize in the antebellum period. A theoretical model has been developed to formalize the incentives faced by slaves in deciding the effort to put forth toward rebellious activities, as well as the incentives faced by slaveowners in deciding how vigorously to quell them. This model can be used to mathematically represent the argument made by Richard Wade, namely that the various freedoms granted to urban slaves made the task of their supervision vastly more difficult. Although Wade's argument is theoretically consistent for a given set of parameter values, an empirical analysis of slave revolts in the antebellum period is more damaging. In the overwhelming majority of specifications investigated, a positive and statistically significant relationship between the degree of

urbanization in a given county and the probability of insurrection, conspiracies or panics was not uncovered. Thus, to the extent that problems of slave management in Southern cities led to greater rebelliousness among the slave community, Wade's hypothesis does not appear to be valid.

References

[1] Acemoglu, D. and James A. Robinson. "Persistence of Power, Elites and Institutions." *NBER Working Paper,* 2006.

[2] Acemoglu, D. and A. Wolitzky (2011). "The Economics of Labor Coercion." *Econometrica*, vol. 79, no. 2, p. 555-600.

[3] Anderson, Perry. *Passages from Antiquity to Feudalism.* London: Verso, 1996.

[4] Aptheker, Herbert. *American Negro Slave Revolts.* New York: International Publishers, 1993.

[5] Aston, T.H., and Philpin, C.H.E., eds. *The Brenner Debate: Agrarian Class Structure and Economic Development in Pre-Industrial Europe.* Cambridge: Cambridge University Press, 1985.

[6] Bardhan P. (1983). "Labor-Tying in a Poor Agrarian Economy: A Theoretical and Empirical Analysis." *Quarterly Journal of Economics*, vol. 98, no. 3, p. 501-514.

[7] Barro, Robert J. and Xavier Sala-i-Martin (1992). "Convergence." *Journal of Political Economy*, vol. 100, p. 223-251.

[8] Bateman, Fred and Weiss, Thomas. "Comparative Regional Development in Antebellum Manufacturing." *The Journal of Economic History*, vol. 35, no. 1, p. 182-208.

[9] Billings, Dwight B. *Planters and the Making of a "New South": Class, Politics, and Development in North Carolina, 1865-1900.* Chapel Hill: University of North Carolina Press, 1979.

[10] Bloch, Marc. *Feudal Society, Vol. 1: The Growth of Ties of Dependence.* Chicago: University of Chicago Press, 1964.

[11] Bloch, Marc. *French Rural History: An Essay on its Basic Characteristics.* Oakland: University of California Press, 1975.

[12] Cairnes, John Elliott. *The Slave Power.* 1862. New York: Harper (Torchbook Edition), 1969.

[13] Carroll, Joseph C. *Slave Insurrections in the United States: 1800-1865.* New York: Negro Universities Press, 1968.

[14] Carville, Earle, John Heppen, and Samuel Otterstrom. *HUSCO 1790-1999: Historical United States County Boundary Files*. Baton Rouge: Louisiana State University, 1999.

[15] Chenery, H., S. Robinson and M. Syrquin. *Industrialisation and Growth: A Comparative Study*, *World Bank*. Oxford: Oxford University Press, 1986.

[16] Chwe, M. (1990). "Why Were Workers Whipped? Pain in a Principal-Agent Model." *Economic Journal*, 100, p. 1109-1121.

[17] Catterall, Helen. *Judicial Cases Concerning American Slavery and the Negro*, 5 vols. New York: William S. Hein & Co., 1998.

[18] Cobb, James C. *Industrialization and Southern Society, 1877-1984*. Lexington: University of Kentucky Press, 1984.

[19] Conning, J. (2004). "On the Causes of Slavery or Serfdom and the Roads to Agrarian Capitalism: Domar's Hypothesis Revisited." *Working Paper.*

[20] Cronon, W. (1991). *Nature's Metropolis: Chicago and the Great West*. New York: Norton, 1991.

[21] Curtin, P.D. *The Rise and Fall of the Plantation Complex*. Cambridge, Cambridge University Press, 1990.

[22] Domar, E.D. (1970). "The Causes of Slavery or Serfdom: A Hypothesis." *Journal of Economic History*, vol. 30, p. 18-32.

[23] Douglas, Frederick. *My Bondage and My Freedom*. New York: Miller, Orton & Mulligan, 1855 (reprinted 2009).

[24] Eaton, Clement (1960). "Slave-Hiring in the Upper South: A Step Toward Freedom." *Mississippi Valley Historical Review,* vol. 46, no. 4, p. 663-678.

[25] Easterlin, Richard A (1960). "Interregional Differences in Per Capita Income, Population, and Total Income, 1840-1950" in *Trends in the American Economy in the Nineteenth Century, Studies in Income and Wealth*, vol. 24, Princeton University Press, 73-140.

[26] Elkins, Stanley. *Slavery: A Problem in American Institutional and Intellectual Life*. Chicago: University of Chicago Press, 1976.

[27] Engerman, Stanley L., and Kenneth L. Sokoloff (2002). "Factor Endowments, Inequality, and Paths of Development Among New World Economies." *NBER Working Paper no. 9259.*

[28] Engerman, Stanley L., and Kenneth L. Sokoloff (2006). "The Persistence of Poverty in the Americas: The Role of Institutions," in Samuel Bowles, Steven N. Durlauf, and Karla Hoff, eds., *Poverty Traps*, Princeton: Princeton University Press, 2006.

[29] Fagerberg, J. and B. Verspagen. "Modern Capitalism in the 1970s and 1980s" in M. Setterfield ed., *Growth, Employment and Inflation.* Basingstoke: MacMillan, 1999.

[30] Fei, J.C.H. and G. Ranis. *Development of the Labor Surplus Economy: Theory and Policy.* Homewood, Il.: Irwin, 1964.

[31] Fishman, George L. and Degler, Carl N (1990). "Letters to the Editor." *The Journal of American History*, vol. 77, no. 1, p. 375-394.

[32] Fogel, Robert W. and Engerman, Stanley L. (1971). "The Relative Efficiency of Slavery: A Comparison of Northern and Southern Agriculture in 1860." *Explorations in Economic History*, vol. 8, 353-367.

[33] Fogel, Robert W. and Engerman, Stanley L. *Time on the Cross: The Economics of American Negro Slavery.* New York: Little, Brown & Company, 1974.

[34] Franklin, J.H. *The Militant South, 1800-1861.* Champaign, IL: University of Illinois Press, 2002.

[35] Fudenberg, Drew and Tirole, Jean. *Game Theory.* Cambridge, MA: The MIT Press, 1991.

[36] Genicot, G. (2002). "Bonded Labor and Serfdom: A Paradox of Voluntary Choice." *Journal of Development Economics*, vol. 67, no. 1, pl 101-127.

[37] Genovese, Eugene D. *The Political Economy of Slavery: Studies in the Economy & Society of the Slave South.* New York: Pantheon, 1965.

[38] Genovese, Eugene D. *From Rebellion to Revolution.* Baton Rouge: Louisiana State University Press, 1979.

[39] Goldin, Claudia D. *Urban Slavery in the American South: 1820-1860.* Chicago: University of Chicago Press, 1976.

[40] Grossman, H.I. (1991). "A General Equilibrium Model of Insurrections." *The American Economic Review,* vol. 81, no. 4, p. 912-921.

[41] Haavelmo, T. *A Study in the Theory of Economic Evolution.* Amsterdam: North-Holland, 1954.

[42] Hagen, W.W. (1985). "How Mighty the Junkers? Peasant Rents and Seigneurial Profits in Sixteenth-Century Brandenburg." *Past and Present*, no. 108, p. 80-116.

[43] Haines, M.R. (2010). Historical, Demographic, Economic, and Social Data: the United States, 1790-2002 [Computer file].

[44] Hilton, R.H. (1949). "Peasant Movements in England before 1381." *The Economic History Review*, vol. 2, no. 2, p. 117-136.

[45] Hirshleifer, Jack (1988). "The Analytics of Continuing Conflict." *Synthese*, vol. 76, no. 2, 201-233.

[46] Hornbeck, R. (2010). "Barbed Wire: Property Rights and Agricultural Development." *The Quarterly Journal of Economics*, vol. 125, no. 2, p. 767-810.

[47] Kaldor, N. *Causes of the Slow Rate of Economic Growth of the United Kingdom, An Inaugural Lecture*. Cambridge: Cambridge University Press, 1966.

[48] Kilson, Marion D (1964). "Towards Freedom: An Analysis of Slave Revolts in the United States." *Phylon*, vol. 25, no. 2, 175-187.

[49] Krugman, Paul R. (1991). "First Nature, Second Nature, and Metropolitan Location." *NBER Working Paper No. 3740*.

[50] Lambert, D. (1992). "Zero-Inflated Poisson Regression, With an Application to Defects in Manufacturing." *Technometrics*, vol. 34, issue 1, p. 123-149.

[51] Lewis, A. (1954). "Economic Development with Unlimited Supplies of Labour." *The Manchester Schools of Economic and Social Studies,* vol. 22, p. 139-191.

[52] Lockhart, J. and S.B. Schwartz. *Early Latin America: A History of Colonial Spanish Latin America and Brazil*. Cambridge: Cambridge University Press, 1983.

[53] Luraghi, Raimond. *Rise and Fall of the Plantation South*. New York: New Viewpoints, 1978.

[54] Mahaffy, J.P. (1890). "The Slave Wars Against Rome." *Hermathena*, vol. 7, no. 16, p. 167-182.

[55] Minnesota Population Center. *National Historical Geographic Information System*: *Version 2.0*. Minneapolis, MN: University of Minnesota 2011.

[56] Moore, Barrington Jr. *Social Origins of Dictatorship and Democracy: Lord and Peasant in the Making of the Modern World*. Boston: Beacon Press, 1966.

[57] Morgan, Philip D. and George D. Terry (1982). "Slavery in Microcosm: A Conspiracy Scare in Colonial South Carolina." *Southern Studies,* vol. 21, p. 121-145.

[58] Mukherjee, A. and Debraj Ray (1995). "Labor Tying." *Journal of Development Economics*, vol 47, no. 2, p. 207-239.

[59] Murshed, S.M. and S. Gates (2005). "Spatial-Horizontal Inequality and the Maoist Insurgency in Nepal." *Review of Development Economics*, vol. 9, no. 1 p. 121-134.

[60] Naidu, S. and N. Yuchtman (2013). "Coercive Contract Enforcement: Law and the Labor Market in Nineteenth Century Industrial Britain." *The American Economic Review*, vol. 103, no. 1, p. 107-144.

[61] North, Douglas. *The Economic Growth of the United States.* Englewood Cliffs, NJ: Prentice-Hall Inc., 1961.

[62] North, Douglas. *Structure and Change in Economic History.* New York: WW Nortorn & Company, 1981.

[63] Rodriguez, Junius P., editor. *Encyclopedia of Slave Resistance and Rebellion.* Westport, CT: Greenwood Press, 2007.

[64] Patterson, O. *Slavery and Social Death: A Comparative Study.* Cambridge: Harvard University Press, 1982.

[65] Perlman, E. "Dense Enough to be Brilliant: Patents, Urbanization and Transportation in Nineteenth Century America." *Working Paper.*

[66] Ransom, Roger L. and Richard Sutch. *One Kind of Freedom: The Economic Consequences of Emancipation.* Cambridge: Cambridge University Press, 2001.

[67] Radford, John P. (1976). "Race, Residence and Ideology: Charleston, South Carolina in the Mid-Ninteenth Century." *Journal of Historical Geography*, vol. 2, no. 4, p. 329-346.

[68] Ruffin, Edmund. *The Political Economy of Slavery.* Washington: L. Towers, 1857.

[69] Rostow, W.W. *The Stages of Economic Growth: A Non-Communist Manifesto.* Cambridge: Cambridge University Press, 1960.

[70] Schweninger, Loren (1999). "Counting the Costs: Southern Planters and the Problem of Runaway Slaves, 1790-1860." *Business and Economic History*, vol. 28, no. 2, p. 267-275.

[71] Sheldon, Marianne B. (1970). "Black-White Relations in Richmond, Virginia, 1782-1820." *The Journal of Southern History,* vol. 45, no. 1, p. 27-44.

[72] Skaperdas, S. (1992). "Cooperation, Conflict, and Power in the Absence of Property Rights." *The American Economic Review*, vol. 82, no. 4, p. 720-739.

[73] Skaperdas, Stergios (1996). "Contest Success Functions." *Economic Theory*, vol. 7, 283-290.

[74] Stampp, Kenneth M. (1971). "Rebels and Sambos: The Search for the Negro's Personality in Slavery." *The Journal of Southern History*, vol. 37, no. 3, p. 367-392.

[75] Stock, J.H., J.H. Wright, and M. Yogo (2002). "A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments." *Journal of Business and Economic Statistics,* vol. 20, p. 518-529.

[76] Timmer, M.P. and G.J. de Vries (2008). "Structural Change and Growth Accelerations in Asia and Latin America: A new Sectoral Data Set." *Cliometrica,* 2008.

[77] Toman, J.T. (2005). "The Gang System and Comparative Advantage." *Explorations in Economic History*, vol. 42, p. 310-323.

[78] Wade, Richard D. *Slavery in the Cities.* New York: Oxford University Press, 1964.

[79] Weiner, M. *Social Origins of the New South: Alabama, 1860-1885.* Baton Rouge: Louisiana State University Press, 1978.

[80] Wesley, Charles H. *Negro Labor in the United States, 1850 to 1825.* New York: Vanguard Press, 1927.

[81] White, Halbert (1980). "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica*, vol. 48, no. 4, p. 817-838.

[82] Wish, Harvey (1939). "The Slave Insurrection Panic of 1856." *Journal of Southern History*, vol. 5, p. 206-222.

[83] Wooldridge, Jeffrey M. *Econometric Analysis of Cross Section and Panel Data.* Cambridge, MA: MIT Press, 2010.

[84] Wright, Gavin. *Old South, New South.* New York: Basic Books, 1986.

7 Appendix

7.1 Summary Statistics Tables

Table 10: Summary Statistics for 1800-1859 Panel, by Year

Independent Variable	UrbPop	SlavePop	WhtPop	TotPop
1800				
mean	144.4388	2959.529	5890.273	9050.863
standard deviation	1300.242	3667.885	3875.219	6205.702
min	0	31	447	478
max	18824	41945	26478	57480
1810				
mean	281.9609	3775.293	7048.538	11150.21
standard deviation	1955.689	4023.97	4177.765	6563.28
min	0	123.8357	557	1835
max	24711	45385	27983	63179
1820				
mean	303.4893	4513.092	8060.868	12949.37
standard deviation	1895.105	4719.964	4904.557	7649.975
min	0	163.1934	620	1608
max	24780	57221	31997	80212
1830				
mean	598.089	5262.96	9206.175	14974.3
sd	2952.073	5206.187	6003.769	8861.17
min	0	228	633	1570
max	30289	61902	38161.85	86338
1840				
mean	1158.209	5275.984	10065.28	15967.33
standard deviation	6864.665	5079.84	9173.694	11959.75
min	0	91	604	1456
max	100033.7	58539	110198.2	139556.4
1850				
mean	1841.893	5960.253	12104.88	18791.91
standard deviation	11192.56	5298.854	13718.53	16453.57
min	0	34	599	1546
max	165287.8	44376	179804.5	215723.8

Table 11: Population Statistics for 1840-1859 Panel, by Year

Independent Variable	UrbPop	SlavePop	WhtPop	TotPop
1840				
mean	637.2774	3326.502	6210.327	9824.855
standard deviation	5753.379	4086.69	5812.114	8936.076
min	0	3	384	821
max	102313	58539	105331	134379
1850				
mean	1093.656	4079.889	7581.049	11975.83
standard deviation	8743.838	4512.572	8931.344	11719.13
min	0	29	395	1314
max	169054	44376	174853	210646
Total				
mean	865.4668	3703.196	6895.688	10900.34
standard deviation	7402.233	4319.91	7563.49	10472.8
min	0	3	384	821
max	169054	58539	174853	210646

Table 12: Agricultural, Manufacturing and Education Statistics for 1840-1859 Panel, by Year

Independent Variable	ValManProd	ManInvest	ManEmpl	ValAgProd	PrivSchl
1840					
mean	65549.84	70585.42	247.264	469382.9	74.80758
standard deviation	282374.9	225823.1	593.3811	459252	151.2863
min	0	0	0	0	0
max	5881778	4294702	11229	2845941	2372
1850					
mean	234003.4	126430	213.8188	634524.2	131.5627
standard deviation	1361218	520948	1087.001	513602.6	367.7554
min	0	0	0	34561	0
max	2.45e+07	9929332	23863	4069086	7244
Total					
mean	151058.1	98932.52	230.287	553209.8	103.6169
standard deviation	993102.2	404397.8	879.1472	494377.7	284.0282
min	0	0	0	0	0
max	2.45e+07	9929332	23863	4069086	7244

7.2 Calibration Procedure for Numerical Analysis

In the simulations alluded to in Footnote 48 the price of agricultural output P is normalized to unity, and in accordance with a perfectly competitive benchmark the marginal cost of production, μ, is assigned the same value. The amount of arable land available to the slaveowner, T, is also set to unity, but it should be noted that the analysis is extremely robust to the value assigned to this parameter, even when augmented by three orders of magnitude. The production technology is assumed to be Cobb-Douglas, and the assumption of constant returns to scale is retained. The existence of increasing returns to scale in slave production has been the subject of intense debate and empirical work[69], but because an overwhelming consensus on this important technical issue has yet to be reached, the assumption of constant returns is retained as a useful starting point. Following Fogel and Engerman (1971) an output elasticity of slave labor of .6 is employed throughout.

The sweeping spatial scale of this exercise clearly precludes a value of J that is appropriate in all contingencies. Peter Kolchin estimates that while 71.9% of American slaveowners in 1860 owned between 1-9 slaves, 2.6% owned between 50-199, and 2.4% of slaves toiled on plantations with more than 199 slaves.[70] Though its techniques are summarily denounced by Fogel and Engerman (1971a), the assumption of 50 slaves per slaveowner used in Sydnor (1933), as well as a number of other articles in this period which attempted to quantify the profitability of a "representative plantation", will be utilized. Once again, however, the arbitrariness of this designation is mitigated by the robustness of our results to the value ultimately assigned. More specifically, the direction of changes in slaveowner and laborer indirect utility in response to parameter fluctuations, as well as the type of equilibrium obtained (binding or otherwise) is robust to changes in J by 3 orders of magnitude.

The reservation utility of laborers,π, is calibrated to reflect estimates of the amount of time slaves spent each week in the service of their employers. Given a rough estimate of 6 days per week, a value of .42 for π seems most appropriate. Lastly, the parameter A has been omitted from the analysis, (i.e., set equal to 1) both out of a desire for parsimony and because a reasonable estimate could not be gleaned from extant econometric studies.

[69] cf. Fogel and Engerman (1974) and Metzer (1975) for arguments in the affirmative. Russell (1966) provides conflicting evidence.

[70] Kolchin (1987, p. 54).