

# Slavery and Evolution of the Local Economy: Labor Market Institutions and Return to Human Capital\*

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January 2021

## Abstract

This paper examines the dynamic relationship between slavery and the local economy in the long-run. Using county-level data in the US South, I show that slavery induced regional divergence in human capital formation, but the divergence was not evident until the end of Reconstruction. Where slavery was more prevalent, freed blacks began to accumulate human capital more slowly only after the 1870s. I suggest that the legacy of slavery resulted from the interaction between slavery and post-Reconstruction institutional changes. First, labor market laws were selectively applied based on the local history of slavery. Border-county analyses show that places with greater slave-to-population ratios applied anti-enticement laws more intensively and hindered effective use of black human capital. Second, the institutional intervention reduced the return to human capital. Evidence from the 1940 Census indicates that a greater slave-to-population ratio produced a lower return to education for blacks.

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\*I thank Robert Margo, Martin Fiszbein, Samuel Bazzi, James Feigenbaum, Pascual Restrepo, Gavin Wright, Sun Go, Kris Mitchener, participants at Economic History Association Meeting, Korean Economic History Society Meeting, BU Micro Workshop, and Harvard Economic History Lunch for their detailed comments and suggestions. I also thank Celeste Carruthers and Marianne Wanamaker for sharing their data.

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# 1 Introduction

An extensive literature documents the long-run relationship between slavery and economic development (Engerman and Sokoloff, 1997, 2002; Mitchener and McLean, 2003; Nunn, 2008; Acemoglu et al., 2012). Human capital would be one of its most important aspects. In the US, the long shadow of slavery is sharply observed through the racial divide. A series of studies argues that the local prevalence of slavery increased the racial gap in human capital, and this caused regional variations in between-race inequality to the present (White, 2007; Bertocchi and Dimico, 2012, 2014; Reece and O’Connell, 2016).<sup>1</sup>

Despite its significance, it still remains a question how slavery has affected human capital structure at the local level. What caused regional differences in black human capital in the long-run? It might be an extension of initial conditions during the period of slavery. Otherwise, the local history of slavery could have produced different dynamics of human capital formation in the subsequent period. This study supports the latter hypothesis. First, in counties with higher prevalence of slavery, African Americans began to accumulate human capital more slowly on the heels of the post-Reconstruction period. Second, this resulted from a decline in the return to human capital that operated through selective application of labor market institutions.

Using county-level data in the South, I first revisit the long-run relationship between slavery and the local economy. The evidence shows that where slavery was more prevalent in 1860, the education and income levels of African Americans are lower in 2015. To clarify the patterns of regional divergence in the long-run, I estimate the relationship between slavery and human capital formation over time. The results indicate that blacks in counties with greater slave-to-population ratios accumulated human capital more slowly after the Civil War, but such a relationship becomes evident only after the Reconstruction period. I suggest its mechanism consisting of two factors: labor market institutions and return to human capital. First, where the proportion of slaves was higher in 1860, labor market laws and regulations were applied more selectively in the post-Reconstruction period. As a result, blacks in those regions were more likely to be locked in low-skill occupations, even conditional on the level of human capital. Second, since the institutional intervention hindered effective use of their human capital, the former prevalence of slavery reduced the return to human capital for blacks. Evidence from the 1940 Census shows that the relative return to education for blacks became lower in counties with greater slave-to-population

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<sup>1</sup>Many studies discuss differences in human capital structure between the South and the North (Wright et al., 1986; Margo, 1990; Collins and Margo, 2006; Wright, 2006; Genovese, 2014). On top of this, these studies aim at clarifying the relationship between slavery and human capital structure at the local level within the US South.

ratios in the past. Moreover, I show that violations of the separate-but-equal doctrine did not drive the decline in the return to education.

To address potential endogeneity, I construct an instrumental variable (IV) based on the historical relationship between slavery and the four plantation crops: cotton, sugarcane, rice, and tobacco. Exploiting exogenous crop-specific suitability, I estimate the potential acreage share of the four crops in 1859 to instrument the slave-to-population ratio in 1860. One advantage of the IV strategy is that the potential share can be estimated for different periods separately. Using the potential share of the slave crops in 1919 as a falsification IV, I mitigate the concerns that the IV estimates could be biased due to direct effects of the southern plantation.

The IV estimates confirm previous literature that the local prevalence of slavery has retarded human capital accumulation of blacks. More crucially, I clarify the dynamics of the legacy of slavery. The negative effects of slavery on human capital formation became evident only after the Reconstruction-era. In counties with higher slave-to-population ratios in 1860, African Americans began to accumulate human capital more slowly from the 1880s, while such effect is not observed earlier.

What caused slavery to cast a shadow on human capital structure again? I suggest that slavery induced selective application of labor market laws in the post-Reconstruction period, and this caused regional divergence in the return to human capital. To identify the link between slavery and the labor market, I employ historical data on anti-enticement laws that were a central element of the so-called Black Codes.<sup>2</sup> Exploiting discontinuous changes in enticement fines, border-county analyses show that counties with greater slave-to-population ratios applied the laws more intently to keep blacks in low-skill occupations. Given that the relationship was conditional on literacy status, it suggests that the selective intervention in the labor market prevented blacks from using their human capital effectively.

As a consequence, the return to human capital for blacks declined. Using the 1940 Census, I estimate the relative return to education for blacks for each county separately and assess how it relates to the local prevalence of slavery in the past. The results indicate that the relative return to education for blacks became lower in counties with greater slave-to-population ratios. Furthermore, the relationship is robust to racial differences in educational quality. This suggests that violations of the separate-but-equal doctrine do not confound the relationship between slavery and the return to education.

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<sup>2</sup>The Black Codes refer to a set of laws passed by Southern states after the Civil War for the explicit purpose of restricting the rights and freedom of blacks. Specific examples in the context of slavery are covered in Section 4.1

Many studies document the institutional origins of comparative development (Hall and Jones, 1999; Acemoglu et al., 2002; Banerjee and Iyer, 2005). Among diverse contexts of institutions, this paper adds to the long-run effects of a coercive labor system. Using geographical regression discontinuity, Dell (2010) shows that the Andaman mining mita, which disappeared in 1812, has had long-run negative effects on household consumption and nutritional status of children. Acemoglu et al. (2012) examine the persistent effects of slavery in Colombia. Comparing neighboring municipalities with and without gold mines, they conclude that the historical prevalence of slavery induced greater poverty and less provision of public goods to the present. Adding to the persistent effects of labor repression, this paper expands the literature by clarifying the dynamic relationship between slavery and human capital formation. In particular, I find that the legacy of slavery emerged through the labor market laws in the post-Reconstruction era. This emphasizes that long-run effects of an institution could be thoroughly understood only if considering its interaction with subsequent institutional environments.

This paper also builds on the history of American development. Following the seminal works such as Engerman and Sokoloff (1997, 2002), many studies discuss the negative legacy of slavery in the US (Nunn, 2008; Mitchener and McLean, 2003; Bruhn and Gallego, 2012). Consistent with the conjecture that “the heterogeneous institutional response to the demise of slavery” might be an important channel (Mitchener and McLean, 2003), I clarify the dynamics of local labor market institutions in the post-Reconstruction period. Moreover, their effects on the return to education shed new light on the history of racial disparity in human capital (Margo, 1990; Collins and Margo, 2006; Margo, 2016; Car-ruthers and Wanamaker, 2017). Contrary to traditional views focused on the supply-side of human capital, the analyses on the return to education highlight the roles of individual demand for human capital.

The paper is organized as follows. Section 2 describes the data and estimation strategy, and Section 3 estimates the relationship between slavery and human capital formation. In Section 4, I propose a mechanism based on labor market institutions and return to human capital. Section 5 provides concluding remarks.

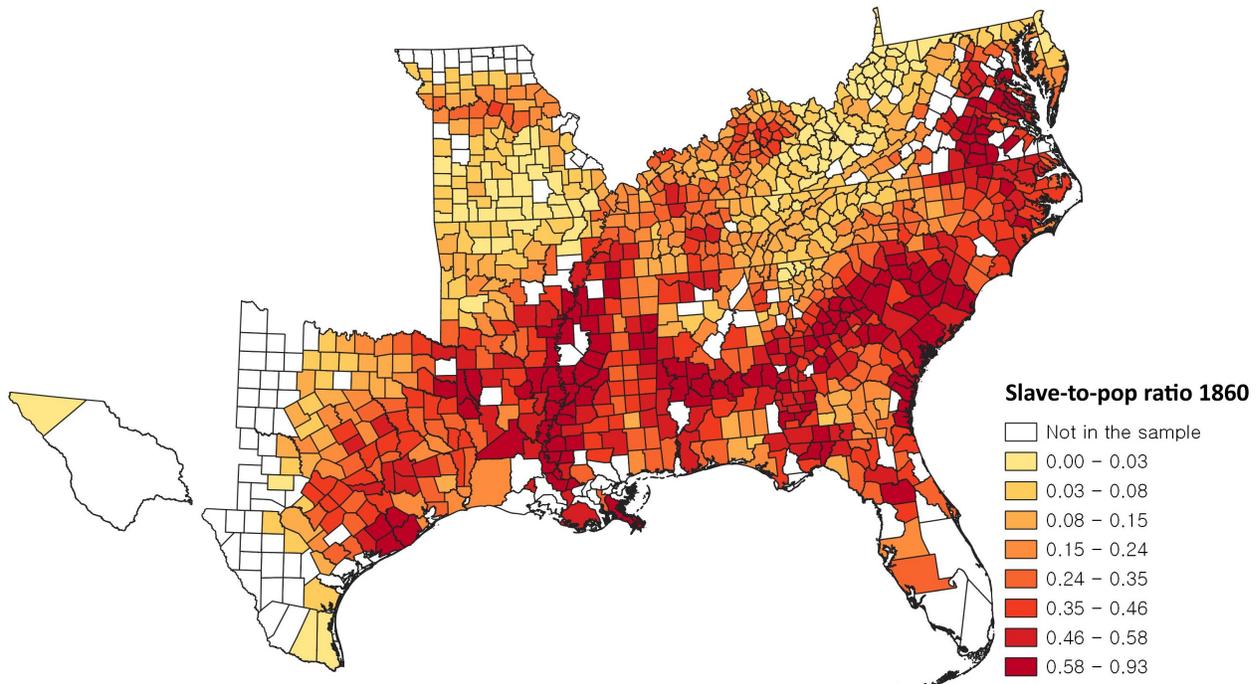
## **2 Data and Estimation Strategy**

### **2.1 Demographic Background**

This paper uses the slave-to-population ratio in 1860 to measure the dependence on slave labor at the county-level. In 1860, slaves and whites occupied 30.59% and 67.25% of

the total population of the South. The remaining 2.16% mostly consisted of free blacks and a few Native Americans. The ratios varied substantially between counties. The county-level average, the minimum, and the maximum of the slave-to-population ratio in 1860 in the sample are 28.98%, 0%, and 92.5%, respectively. As shown in figure 1, the slave-to-population ratio varied significantly even within states.

Figure 1: Slave to population ratio in 1860



Note: The slave-to-population ratio is defined as the total number of slaves divided by the total population. The sample includes counties whose boundaries have not changed significantly in the subsequent period and whose information on crop-specific production is fully available.

A note of caution is that the slave-to-population ratio does not imply intensity of slavery within the black population. In the sample states, free blacks occupy only 6.5% of the total black population in 1860. Moreover, given that there were significant restrictions on the socioeconomic status of free blacks in the antebellum period (Marks, 1981; Bodenhorn, 1999), regional variations in the slave-to-population ratio do not necessarily involve heterogeneity within blacks. In Appendix A, I further show that the estimation results are not confounded by the share of free blacks and other initial socioeconomic conditions.

## 2.2 Estimating Equation and Instrumental Variable Strategy

I build a county-level dataset from various sources. Haines et al. (2010) and Ruggles et al. (2018) provide the digitized US decennial census from which I construct historical socioeconomic variables. Most of the climatic, geographical, and ecological data are from the FAO-GAEZ (IIASA, 2012). The sample consists of 15 states where slavery was legal in 1860.<sup>3</sup> Because county boundaries have periodically changed until their present arrangement, I exclude counties whose area in a comparison year overlaps less than 70% of that in 1860. All outcome variables are adjusted to 1860 boundaries following Hornbeck (2010).

$$y_c = \alpha + \beta \text{Slave}_{c,1860} + \gamma' \mathbf{X}_c + \mu_s + \epsilon_c \quad (1)$$

The estimation follows Equation 1.  $\text{Slave}_{c,1860}$  is the slave-to-population ratio of county  $c$  in 1860.  $\mathbf{X}_c$  is the vector of geo-climatic and ecological conditions that could have affected the prevalence of slavery and the local economy simultaneously (temperature, rainfall, terrain elevation, latitude, longitude, land suitability, distance to major cities, distance to major ports, distance to the railway, distance to the coastal line, and distance to navigable rivers). It is noteworthy that land suitability, which implies the average fitness for agricultural production, is controlled to mitigate bias from overall agricultural suitability.  $\mu_s$  and  $\epsilon_c$  represent state fixed effects and error terms. Lastly, to address the likelihood of spatial correlation, standard errors are clustered on 90mi-by-90mi grid squares following the methodology of Bester et al. (2011).<sup>4</sup>

Initial socioeconomic conditions could also be omitted variables. For example, the slave concentration could be associated with the overall institutional environment with a direct effect on the local economy. Otherwise, correlations between the slave-to-population ratio and regional income level might cause bias through path dependence. Controlling for initial socioeconomic conditions, however, may generate the so-called “bad control problem” (Angrist and Pischke, 2008). Therefore, the baseline specification does not include initial socioeconomic conditions, but Appendix A reports the robustness of the estimates to a large set of initial socioeconomic conditions.

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<sup>3</sup>The sample states are Delaware, Maryland, Virginia, Kentucky, Missouri, Arkansas, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. The sample does not include Western territories. The number of counties in Western territories for which data is available is small, and only four of them had any slaves in 1860. Moreover, the status of legal regulations on slavery was not established until the Civil War.

<sup>4</sup>Clustering on the 15 sample states could over-reject the null hypotheses due to the small number of clusters (Cameron and Miller, 2015). Thus, the baseline specification adopts the grid square approach which provides 112 clusters. When standard errors are clustered on states, statistical significance increases for most of the estimates in the following sections.

Despite a rich set of controls, omitted variables would not be completely eliminated. I exploit exogenous variations in crop production patterns to address potential endogeneity of slavery. Since cotton, rice, tobacco, and sugarcane were heavily dependent on slave labor in the antebellum period, slavery would have been more prevalent where the slave crops were produced more. Thus, if we could isolate exogenous variations in crop production patterns, then it would provide a valid instrumental variable.

The IV strategy exploits exogenous crop-specific suitability. First, following Fiszbein (2017), I estimate the potential share of each crop. Given the crop mix at the county-level, the potential share of a crop represents how much of its acreage share is attributable to relative differences in crop-specific suitabilities. Second, I use the potential share of the slave crops in 1859 to instrument the slave-to-population ratio in 1860.

This approach is distinguished from studies that use cotton suitability as an instrument for the prevalence of slavery (Bertocchi and Dimico, 2014; Acharya et al., 2016; Berger, 2018). One problem with this is that cotton suitability is strongly correlated with suitability of other crops. In the sample counties of this study, the correlation between suitability of cotton and corn is 0.36, and that between suitability of cotton and wheat is 0.31. Furthermore, if the sample excludes Virginia, where cotton farming is hardly suitable, the correlations increase to 0.63 and 0.59 respectively. This suggests that cotton suitability (or suitability of a single crop) could be endogenous due to its correlation with overall agricultural conditions.<sup>5</sup> In contrast, the IV strategy of this paper leverages relative differences in crop-specific suitabilities, conditional on overall land suitability.

Equation 2 estimates the potential share of each crop using the fractional multinomial logit framework. The outcome variable  $\theta_{ic}$  is the acreage share of crop  $i$  in county  $c$  measured in 1859. Because the 1860 Census of Agriculture reports the value and quantity of production only, I convert the amount of production into acreage based on Wright (1899) that reports the amount of production per acre by crop. As Wright (1899) provides statistics under “Hand-method” and “Machine-method” respectively, I apply the “Hand-method” for the amount-to-acreage conversion based on its reference period.<sup>6</sup>

$$\theta_{ic} = \frac{e^{\beta_i \Pi_c}}{1 + \sum_{j=1}^{I-1} e^{\beta_j \Pi_c}} + \xi_{ic} \quad (2)$$

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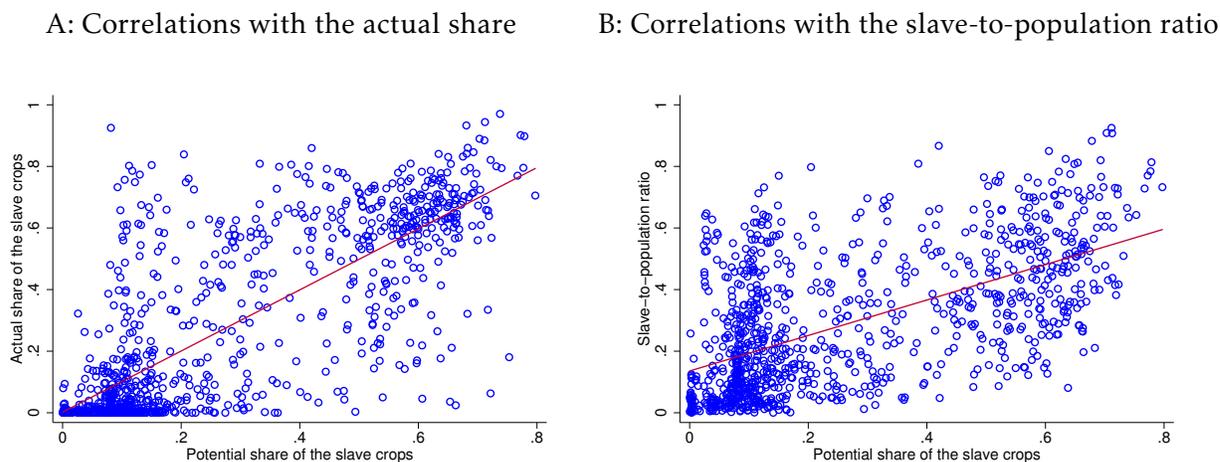
<sup>5</sup>Another issue is that the studies mentioned above use cotton suitability based on soil conditions that could be affected by land use. To avoid the potential endogeneity, I use the maximum attainable yields computed from the climatic data only.

<sup>6</sup>The hand-method refers to primitive production technologies that range from 1829 to 1872 depending on the crops, while the machine-method is based on the period between 1893 and 1896. Among the crops reported in Wright (1899), 12 crops whose production information is available in the 1860 Census of Agriculture are used in Equation 2.

$\Pi_c$  is the vector of crop-specific suitabilities at the county-level. Crop-specific suitability is measured by the maximum attainable yield from the FAO-GAEZ (IIASA, 2012). The model of the FAO-GAEZ estimates the attainable yields using a set of microclimate variables such as diurnal temperature range, wind speed at 10m height, wet-day frequency, relative humidity, and sunshine fraction. To match the agricultural conditions in the mid-19th century, I use the attainable yields estimated under rain-fed conditions with intermediate input levels. The county-level data is constructed using GIS software.

The estimated potential share  $\hat{\theta}_{ic}$  extracts exogenous variations in the crop mix resulting from micro-climatic crop suitability.<sup>7</sup> I use the summation of the potential shares of cotton, sugarcane, rice, and tobacco ( $\hat{\theta}_{cotton,c} + \hat{\theta}_{sugar,c} + \hat{\theta}_{rice,c} + \hat{\theta}_{tobacco,c}$ ) as an IV. Figure 2 depicts that the share of the slave crops in 1859 is a strong predictor of the slave-to-population ratio in 1860.

Figure 2: Relevance of the instrumental variable



Note: The actual/potential share measures the acreage share of cotton, tobacco, rice, and sugarcane.

Despite the strong relevance of the IV, its exclusion restrictions could be a concern. If the potential share of the slave crops had direct effects on the local economy, then the IV estimates would be biased. For instance, conditional on slavery, low-skill intensity of the slave crops might have reduced demand for human capital.<sup>8</sup> Otherwise, higher

<sup>7</sup> Assume farmers maximize  $\pi_{ic} = \beta_i \Pi_c + u_{ic}$  where  $\pi_{ic}$  is the profit from growing crop  $i$  at county  $c$ . If  $u_{ic}$  follows the type I extreme value distribution, then  $E[\theta_{ic}|\Pi]$  is derived as the optimal probability of growing crop  $i$ . Crop choice in a simple theoretical model can be found in Jung (2020).

<sup>8</sup> As briefly discussed above, bias due to agricultural suitability is not expected to arise. Because land suitability is controlled, the IV strategy effectively compares counties whose relative suitability for the slave crops are different, but whose overall agricultural conditions are identical. Robustness to initial farm productivity in Appendix A strengthens this interpretation.

labor intensity in agriculture could be a factor retarding industrialization in the long-run (Vollrath, 2011). To address the concerns about exclusion restrictions of the IV, Section 3.3 employs the potential share of the slave crops in 1919 as a falsification IV. By showing that the potential share of the slave crops in the 20th century does not produce comparable results, the falsification tests validate that the IV estimates are not biased due to direct effects of the southern plantation.

### 3 Slavery and Human Capital Formation

This section examines the relationship between slavery and human capital formation. The IV estimates suggest two facts. First, in line with the existing literature, the local prevalence of slavery shows a long-run negative relationship with human capital of blacks. Second, more crucially, the regional divergence in human capital formation became evident only after the Reconstruction era. Where the slave-to-population ratio was higher in 1860, the rates at which blacks accumulate human capital slowed down as of the post-Reconstruction period.

#### 3.1 Revisiting the Legacy of Slavery

Table 1 revisits the long-run effects of slavery on the local economy. The outcome variables are obtained from the 2011-2015 American Community Survey (ACS) estimates. Because the sample excludes counties whose margin of error is larger than its estimate, the sample size for the black population becomes smaller. The estimates for the white sample hardly change when the sample counties are matched to the black sample.

Column 1 shows that where the slave-to-population ratio was higher in 1860, the education level of African Americans is lower in 2015. A one percentage point (PP) increase in the slave-to-population ratio caused a 0.33 PP increase in the share of black adults without a college education.<sup>9</sup> The decline in the education level relates to lower income. According to Column 3, a one PP increase in the slave-to-population ratio induces a 0.89% decrease in per capita income of the black population. The standardized coefficients show the magnitude of the effects more clearly. A one standard deviation (SD) increase in the slave-to-population ratio corresponds to a 0.51 SD increase in the share of low-educated adults, and a 0.33 SD decrease in per capita income of African Americans. In contrast, the effects of slavery on the white population are smaller and less significant.

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<sup>9</sup>The outcome variable is the share of the population whose education levels are less than or equal to a high school diploma. The sample consists of adults aged 25 and more.

This suggests that the long-run effects of slavery on the between-race inequality are in essence attributable to the spatial divergence of the black population.

Table 1: Slavery and regional divergence of blacks in the long-run

<i>Dependent variable</i>	(1)	(2)	(3)	(4)
	Share of adults w/o college education 2015		log per capita income 2015	
	Black	White	Black	White
Slave to Pop ratio	0.353** (0.160)	0.039 (0.104)	-0.869** (0.400)	0.046 (0.203)
<i>N</i>	885	924	885	924
F-stat	24.80	25.33	24.79	25.33
Predetermined controls	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y

Notes: Robust standard errors clustered at the 90mi-by-90mi grid squares are shown in the parentheses. The outcome variables are obtained from the 2011-2015 ACS estimates. Because the sample excludes counties whose margin of error is larger than its estimate, the sample size of the black population is smaller. The coefficients of the white sample hardly change when its sample counties are matched to the black sample.

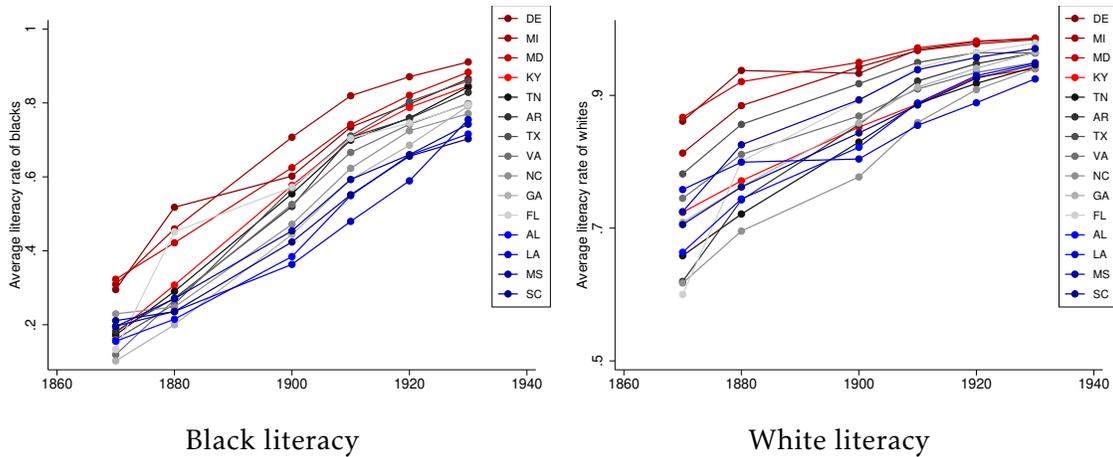
### 3.2 Slowdown in Human Capital Accumulation

About the long-run decline in human capital of blacks, there could be two different hypotheses. On the one hand, regional divergence after the abolition of slavery can be a cause. Since teaching slaves to read or write was outlawed in the antebellum South, the level of human capital of blacks could have been homogeneously low across counties. In this case, the long-run effects of slavery should be a result of regional divergence after the Civil War. On the other hand, it could be an extension of initial conditions. For example, if greater dependence on slavery was associated with stricter prohibition on education for slaves, the long-run relationship might be little more than the persistence of initial differences.<sup>10</sup>

<sup>10</sup>Slaves were not entirely isolated from education. Slaves could have chances to learn how to read and write through various channels including anti-slavery activists, ex-slaves, or slaveowners with religious purposes (Anderson, 1988). If the slave concentration had been correlated with the extent of informal education for slaves, then it might have affected human capital structure of blacks in the later period. However, such a hypothesis is not consistent with the break in the coefficients as of 1880 in Table 2. Also,

This section supports the first hypothesis. I address that the long-run effects of slavery occurred through the dynamics of human capital accumulation, which became evident as of the late 19th century. Figure 3 illustrates a suggestive pattern using the progress of black and white literacy rates from 1870 to 1930 at the state-level. In terms of the slave-to-population ratio in 1860, the top (bottom) 4 states are in blue (red), and the other states are in gray colors.

Figure 3: State-level literacy rates from 1870 to 1930



Note: Literacy rates indicate the proportion of the population aged 10 and above who can read and write.

The left figure displays the divergence of black literacy across states, which becomes more apparent when the border states (Delaware, Missouri, and Maryland) are excluded. Black literacy in 1870 had no clear relationship with the prevalence of slavery. Slavery was most prevalent in South Carolina and Mississippi in 1860, but their literacy rates in 1870 were in the middle among the southern states. This suggests that when blacks began to accumulate human capital after the Civil War, the local prevalence of slavery did not cause significant regional differences. After the 1870s, however, black literacy rates began to increase more slowly where slavery was more prevalent in the past. The divergence of the gray and blue dots over time suggests that human capital accumulation of freed blacks lagged behind in the states with higher prevalence of slavery. In contrast, no similar pattern is observed for white literacy. The right figure shows that white literacy had converged fast in the postbellum period.

free blacks who occupied 6.5% of the total black population in 1860 might be another source of initial differences. In this regard, Appendix A confirms that controlling for the share of free blacks does not affect the results significantly.

Table 2: Slavery and regional divergence in black literacy

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent variable: Black literacy rates in</i>						
	1870	1880	1900	1910	1920	1930
Panel 1: Aged 10 and above						
Slave to Pop ratio	0.263 (0.231)	-0.315*** (0.132)	-0.422*** (0.099)	-0.351*** (0.100)	-0.147* (0.086)	-0.197** (0.085)
F-stat	25.01	25.30	24.58	24.63	24.67	24.43
Mean	0.18	0.28	0.51	0.64	0.72	0.79
Std. Dev.	0.19	0.13	0.12	0.11	0.09	0.08
N	912	918	905	904	893	890
Panel 2: Aged 10 to 19						
Slave to Pop ratio	0.210 (0.273)	-0.270 (0.164)	-0.434*** (0.125)	-0.338** (0.134)	-0.119 (0.112)	-0.158* (0.085)
F-stat	19.10	19.65	24.54	24.50	24.70	24.36
Mean	0.21	0.33	0.60	0.73	0.83	0.89
Std. Dev.	0.21	0.15	0.16	0.13	0.11	0.08
N	894	906	893	885	875	870
Predetermined controls	Y	Y	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y	Y	Y

Notes: Robust standard errors clustered at the 90mi-by-90mi grid squares are shown in the parentheses. The outcome variables are the proportion of African Americans who can read and write, computed from the complete-count census data in each decade. Panel 1 uses the whole sample of blacks aged 10 and above, and Panel 2 restricts the sample to blacks aged 10 to 19. Counties whose number of relevant observations is less than 10 are excluded.

Adding to the suggestive patterns in Figure 3, Table 2 provides causal evidence using the IV strategy. The outcome variable of Panel 1 is the proportion of blacks aged 10 and above who can read and write. As in Column 1, higher slave-to-population ratios in 1860 do not predict lower literacy of blacks in 1870. Though it is not statistically significant, the positive coefficient suggests that black literacy rates were rather higher in proportion to the slave-to-population ratios.<sup>11</sup> From 1880, however, the negative effects of slavery

<sup>11</sup>Though they are not statistically significant, the positive coefficients in 1870 are intriguing. They might suggest that Reconstruction policies were initially more effective in the counties with higher prevalence of slavery. Logan (2020) argues that the influx of black officials following Reconstruction raised tax revenue, black literacy, and land tenancy significantly, but the effects disappeared entirely at Reconstruction's end. If the prevalence of slavery was followed by more influx of black political leaders, then the argument of Logan

arise. Column 3 indicates that a one SD increase in the slave-to-population ratio caused a 0.72 SD decrease in black literacy rates in 1900. The negative effects last in the long-run, but their magnitude decreases following the convergence of black literacy.<sup>12</sup>

In Panel 2, the outcome variables are literacy rates of blacks aged 10 to 19. Collins and Margo (2006) reveal that the increase in black literacy after the Civil War resulted primarily from the replacement of low-literacy older cohorts by high-literacy younger cohorts. If slavery were associated with demographic background that delayed the replacement effects, then the divergence in black literacy may not imply different dynamics of human capital investment. However, even if the sample is restricted to younger cohorts of blacks, a similar relationship between slavery and black literacy is observed over time. This further supports that the legacy of slavery results from different dynamics of human capital investment, rather than differences in initial conditions.<sup>13</sup>

What is the mechanism? The break from 1880 provides a clue. It suggests that the legacy of slavery emerged only after the Reconstruction era, which began after the Civil War and lasted until 1877. Institutional changes during Reconstruction aimed at raising socioeconomic status of emancipated blacks in the South. Education for blacks began to be supplied through various channels,<sup>14</sup> and the political rights of African Americans were extended significantly.<sup>15</sup> But this trend ended following the Compromise of 1877.<sup>16</sup> Including Jim Crow laws and the Black Codes, southern institutional environments were reversed to re-establish the racial hierarchy in the antebellum period. In this context, the regional divergence after the 1870s suggests that the legacy of slavery should be understood

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(2020) could be a reason for the temporary increase in black literacy during Reconstruction.

<sup>12</sup>As shown in Table 1, this does not imply a decrease in the effects of slavery. The IV specification shows that educational attainment of blacks decreases with the slave-to-population ratio in the long-run.

<sup>13</sup>As in Table 1, the relationship between slavery and black human capital has persisted in the long-run. Given that black migration is a prominent feature of US history, the persistence at the local level could be questionable because migration across regions could have equilibrated the southern labor market. In Appendix C, I provide suggestive evidence that migration selectivity was not sufficient to offset the regional divergence in black human capital.

<sup>14</sup>After the Civil War, the Freedmen's Bureau played a crucial role in education for African Americans. Though it did not operate schools directly, the bureau provided both tangible and intangible resources for black education such as textbooks, land for schools, and military protection. In addition to the public sector, support from the northern societies and efforts of blacks to educate themselves were also essential factors (Blassingame, 1965; Anderson, 1988).

<sup>15</sup>The 14th Amendment granted citizenship to native blacks including former slaves, and their voting rights were guaranteed by the 15th Amendment. Despite practical obstacles such as threats from white supremacist groups, the institutional changes promoted political influence of African Americans significantly. By 1877, 22 black men served in Congress, and more than 2000 black men held federal, state, and local public offices (Foner et al., 1993).

<sup>16</sup>The 1876 presidential election was highly contentious because electoral votes from four states were in dispute. To resolve the dispute, an informal deal was made in 1877. Through the deal, the Republican candidate took the disputed votes, and the Republicans withdrew the last federal troops from the South in return. This marked the end of the Reconstruction policies and restored Democratic control in the South.

as an interaction between slavery and institutional changes in the post-Reconstruction era. Section 4 discusses a mechanism in more detail.

### 3.3 Falsification Tests

The evidence in Section 3.1 and 3.2 is based on the IV strategy using the potential share of the slave crops. The IV estimates could be biased if the southern plantation had direct effects on the local economy. For instance, because of their low-skill intensity, relative suitability for the slave crops might have reduced demand for human capital of farm labor. It could also have affected industrial structure. Jung (2020) argues that cotton mechanization in the South caused the expansion of low-skill industries, and this reduced demand for high-skilled workers. Considering that cotton accounts for the largest share of the slave crops, this could be an alternative channel between the IV and human capital formation.<sup>17</sup>

Table 3: Reduced form estimation using the original and falsification IVs

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent variable</i>	Share of blacks w/o college education 2015		log per capita income of blacks 2015		Black literacy 1900	
Potential share of the slave crops 1859	0.102** (0.051)		-0.252** (0.121)		-0.123*** (0.030)	
<i>N</i>	885		885		905	
<i>R</i> <sup>2</sup>	0.10		0.17		0.55	
Potential share of the slave crops 1919		0.022 (0.074)		0.188 (0.164)		-0.019 (0.051)
<i>N</i>		885		885		905
<i>R</i> <sup>2</sup>		0.10		0.17		0.54
Predetermined controls	Y	Y	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y	Y	Y

Notes: Robust standard errors clustered at the 90mi-by-90mi grid squares are shown in the parentheses. The outcome variables in Columns 1 to 4 are obtained from the 2011-2015 ACS estimates. Because the sample excludes counties whose margin of error is larger than its estimate, the sample size of the black population is smaller. The coefficients of the white sample hardly change when its sample counties are matched to the black sample. Black literacy rates are computed from the complete-count census data.

The endogeneity concerns arise from crop-specific suitability. Considering that it is

<sup>17</sup>These hypotheses are rejected by the dynamic patterns of the IV estimates. If low-skill intensity of the southern plantation biased the IV estimates, then we should observe a consistent relationship between slavery and black literacy over time. If cotton mechanization caused endogeneity, then the divergence of black literacy would arise from the 1950s. In contrast, Section 3.2 shows that the relationship between slavery and human capital formation displays a break in the late 19th century. Beyond the timing of evidence, the falsification tests aim at supporting exogeneity of the IV more broadly.

a fixed component over time, the persistence of crop-specific suitability might mediate the direct effects of the southern plantation. To address the issue, this section proposes a falsification test exploiting time-varying conditions of the IV strategy. The potential share of a crop consists of two parts: a vector of crop-specific suitability ( $\Pi$  in Equation 2) and its coefficients estimated in 1859 ( $\beta$  in Equation 2). Because crop-specific suitability is a fixed condition, its temporal relationship comes from the coefficients estimated in the given year. Using this property, we can construct the potential share of the slave crops in different periods separately. If the IV estimates were biased due to direct effects of crop-specific suitability, then the potential share of the slave crops estimated in different periods would still produce similar results. In contrast, if the IV affected outcome variables exclusively through slavery, then the potential share of the slave crops estimated after the abolition of slavery would not lead to comparable estimates.

In this context, I use the potential share of the slave crops in 1919 as a falsification IV.<sup>18</sup> Table 3 shows the reduced form estimation comparing the OLS coefficients of the original and falsification IVs. Three outcome variables are chosen from Table 1 and 2, but identical patterns are observed for the other outcome variables as well. In line with the strong first- and second-stage estimation results, the original IV shows significant negative correlations with the levels of income and human capital of blacks. In contrast, the falsification IV displays much weaker correlations. The coefficients are close to zero, and their statistical significance is low. In short, the potential share of the slave crops after the abolition of slavery does not produce comparable results. This indicates that the IV estimates are not confounded by direct effects of the southern plantation.

## 4 Mechanism: Labor Market Institutions and Return to Human Capital

Section 3 shows that where slavery was more prevalent, African Americans accumulated human capital more slowly in the subsequent period. In particular, the divergence in human capital formation began on the heels of the end of Reconstruction. Considering that human capital structure was the most critical factor in regional development after the Civil War (Mitchener and McLean, 1999; Connolly, 2004), it would be crucial to clarify how slavery caused the differentiation in human capital investment.

This section argues that slavery induced selective application of labor market laws,

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<sup>18</sup>The 1920 Census of Agriculture records acreage of more various crops than in the 1860 Census. To maintain consistency, the acreage share is computed only for the crops included in the 1860 Census. The results hardly change if the composition of crops is extended.

and this reduced the incentives of blacks to invest in human capital. I present two sets of evidence supporting the mechanism. First, the higher the prevalence on slavery in the past, the more selective the labor market laws were applied in the post-Reconstruction period. I show that anti-enticement laws, which were a central element of the Black Codes, were applied more intently to keep blacks in low-skill occupations in counties with greater slave-to-population ratios. This suggests that the legacy of slavery created institutional barriers that hindered effective use of black human capital. Moreover, using the 1940 census data, I find direct evidence that slavery reduced the return to education for blacks. After estimating a modified mincer equation for each county separately, I show that the relative return to education for blacks became lower in regions with higher slave-to-population ratios in the past.

#### 4.1 Selective Application of Labor Market Institutions

Because slaves were the most crucial form of agricultural assets,<sup>19</sup> the destructive effects of the Civil War were larger to slaveowners. Ager et al. (2019) find that white households having more slave assets lost substantially larger after the Civil War than those with otherwise similar pre-War wealth levels. The greater loss of the means of production would have increased the need to isolate the black labor force.<sup>20</sup> Moreover, since the political influence of rural elites worked at the local level, they would have been able to exploit institutional tools to intervene in the local labor markets.<sup>21</sup>

In this context, I argue that slavery induced selective application of labor market institutions in the post-Reconstruction period, and this prevented effective use of black human capital. After the Civil War, southern states enacted a set of laws called the Black Codes that attempted to maintain control over the black population. While Reconstruction legislation derailed them, the Black Codes regained their effectiveness to exploit black workers from the late 1870s.<sup>22</sup> Anti-enticement laws were a fundamental element of

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<sup>19</sup>Ransom and Sutch (2001) estimate that the value of slaves constituted 60% of the total agricultural wealth in the five cotton states. In the words of Wright et al. (1986), slaveowners were not landlords but *laborlords*.

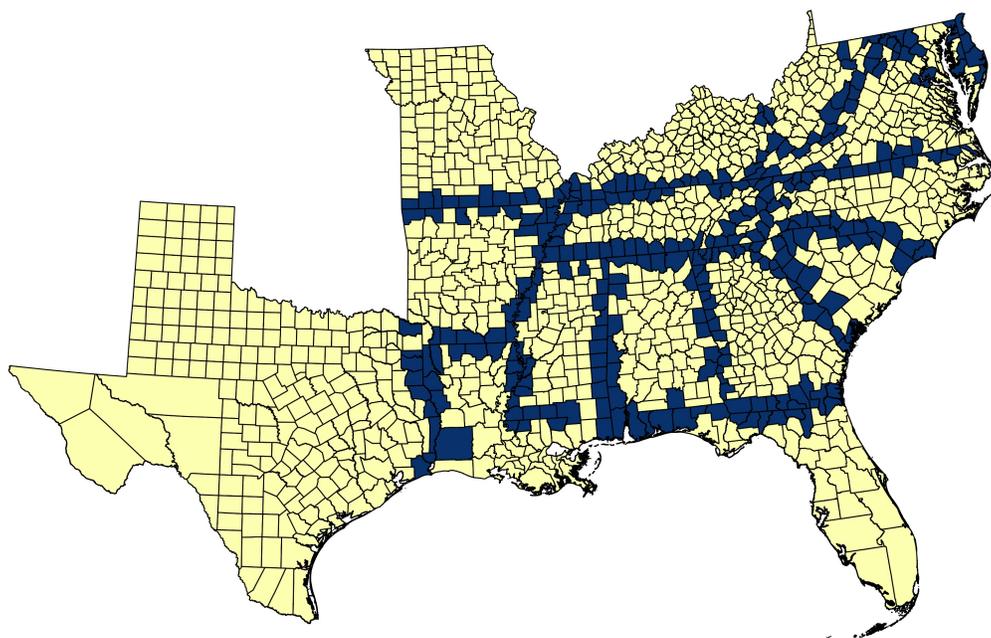
<sup>20</sup>Adopting labor-saving technology could have been an alternative. At least until the end of the Great Depression, however, the Southern economy was behindhand in its adoption of new technologies compared to other regions (Wright et al., 1986). Moreover, the relative abundance of cheap labor could have reinforced labor-using technology dynamically (Habakkuk, 1962; Acemoglu, 2010).

<sup>21</sup>Alston and Ferrie (1989) describe the social control of white elites that “... *those representatives needed to satisfy the interests of their principals. ... they probably looked to the white rural elite.*”. However, while the authors refer to the political power of rural elites as “*remarkable Southern unity*”, this paper suggests that institutional environments varied substantially even within the South depending upon the local prevalence of slavery.

<sup>22</sup>For illustration, under the vagrancy laws, unemployed blacks without permanent residence could have been fined. Because the amount of fine was not affordable to most poor blacks, those who were captured

them. While their ostensible purpose was to prohibit enticement (hiring a worker under another contract) and secure employment contracts, the laws were in effect enforced to restrict labor mobility of blacks (Wilson, 1965; Clarke, 2018).<sup>23</sup> Cohen (1976) argues that anti-enticement laws reproduced in a modified form the proprietary relationship under slavery, and this embodied the essence of the Black Codes. In line with historical observations, Naidu (2010) provides empirical evidence that the anti-enticement laws reduced the upward mobility and wages of black workers in the South.

Figure 4: Sample counties along the state borders



Though anti-enticement laws were enacted at the state-level, I argue that their effects on blacks were heterogeneous along the local history of slavery. The laws were implemented more intently in regions with higher slave-to-population ratios, and blacks in those regions were more likely to be locked in low-skill occupations. To provide its causal evidence, I exploit the state-year level discontinuity in enticement fines which is summarized in Table 4. I restrict the sample to the state-border counties and exploit changes in enticement fines within each state-border segment. It leaves 265 counties along the 30 border segments.

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by the laws were usually sent to jail. In the words of Du Bois (2017), blacks who were “*caught wandering in search of work, and thus unemployed and without a home ... could be whipped and sold into slavery.*” This entails the convict lease system, in which convicts could be leased out to public or private industries having minimal responsibilities for housing and feeding the convicts.

<sup>23</sup>The concept of enticing was defined broadly. For example, aiding an employee who left his or her employer was a crime in Louisiana (Clarke, 2018).

Figure 4 depicts the sample counties.<sup>24</sup>

Table 4: Changes in the maximum enticement fines

	1880	1890	1900	1910	1920
DE	0	0	0	0	0
MO	0	0	0	0	0
VA	0	0	0	0	0
AL	0	500	500	500	500
AR	0	0	200	100	100
FL	0	0	100	100	100
GA	0	0	1000	1000	1000
LA	0	0	200	200	0
MS	0	0	100	100	100
NC	0	100	100	100	100
SC	0	0	100	100	100
TX	0	0	0	0	0
KY	0	0	50	50	50
MD	0	0	0	0	0
TN	0	damages	damages	damages	damages

Notes: The records of enticement fines were compiled by Holmes (2005). Following Naidu (2010), I adopt half-year's wage in manufacturing as a proxy for "damages" in Tennessee for the empirical analysis.

I examine selective application of anti-enticement laws in two dimensions. First, I consider how discontinuous changes in enticement fines affected labor markets between the two states. Second, conditional on the state-level relationship, I explore whether the effects of enticement fines vary with the local prevalence of slavery. The estimation follows the equation below,

$$y_{bsct} = \alpha \text{EnticeFine}_{st} + \beta \text{Slave}_{c,1860} \times \text{EnticeFine}_{st} + \gamma' X_{sct} + \delta_c + \delta_{bt} + u_{bsct} \quad (3)$$

The outcome variable is the proportion of workers employed in low-skill occupations, computed from the decennial census data from 1880 to 1920.<sup>25</sup> Occupational skill-level is

<sup>24</sup>The logic of selective application can be extended to overall regulatory conditions. Appendix B provides relevant evidence using an index of labor market regulations constructed by Fishback et al. (2009).

<sup>25</sup>Because the 1890 census records are largely missing due to a fire in 1921, the equation is estimated for

based upon EDSCOR50 variable, which indicates the proportion of workers with at least one year of college education in each occupation. If the values of EDSCOR50 are lower than the first quartile of the entire South sample, then such occupations are classified as low-skill occupations.<sup>26</sup>  $\text{EnticeFine}_{st}$  is the maximum enticement fine of state  $s$  in year  $t$ .  $b$  denotes the border segment, which is a set of counties along the border of two states. Since I control for the border-segment-year fixed effects,  $\delta_{bt}$ , the coefficients are identified within each segment, conditional on their common shocks other than anti-enticement laws. Lastly, to address potential endogeneity of slavery within the border-segment,  $\text{Slave}_{c,1860} \times \text{EnticeFine}_{st}$  is instrumented by  $\text{IV}_{c,1860} \times \text{EnticeFine}_{st}$  where  $\text{IV}_{c,1860}$  is the potential share of the slave crops constructed in Section 2.2. The robust standard errors are clustered both on the state and border-segment levels.<sup>27</sup>

Table 5 shows that anti-enticement laws induced separation of black workers, but such impact functioned only through the local history of slavery. In the black sample in Columns 1-3, the coefficients of  $\text{Slave}_{c,1860} \times \text{EnticeFine}_{st}$  are strongly positive. This indicates that where the slave-to-population ratio was higher, anti-enticement laws were applied more intensively to keep blacks in low-skill occupations. On the contrary, the coefficients of  $\text{EnticeFine}_{st}$  are significant and negative. Obviously, it should be noted that the estimates are conditional on the selective application resulting from slavery. As shown in Naidu (2010), anti-enticement laws depressed the wage and mobility of black workers. A key implication of this exercise is that the adverse effects of the southern institution resulted principally from their selectivity that traces back to the local history of slavery.<sup>28</sup>

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$t = 1880, 1900, 1910, \text{ and } 1920$ . The results are robust to dropping 1880 and using the periods with an equal interval. The sample consists of adult workers aged 25 and over who are considered to have finished their education.

<sup>26</sup>In both the black- and white samples, the majority of low-skill workers are farm laborers. Other examples of low-skill occupations include miller, peddler, lumberman, and laundresses.

<sup>27</sup>If the standard errors are clustered only at the state-level, residuals become correlated mechanically due to the counties in multiple border segments. For instance, Mississippi county in Arkansas falls in three different border-segments, and this induces mechanical correlations of the residuals across the three states. In this context, I cluster standard errors both on state and border-segment levels. Under the two-way clustering, the cluster-robust variance matrix is computed by  $\hat{V}_{S,BS} = \hat{V}_S + \hat{V}_B - \hat{V}_{S \cap B}$  where  $S$  and  $B$  denote state and border-segment respectively and  $\hat{V}_k$  is the one-way robust matrix clustered on  $k$  (Cameron and Miller, 2015). An application of the two-way clustering in a similar context can be found in Dube et al. (2010), which exploits the discontinuity in the minimum wage at the state borders.

<sup>28</sup>De jure purpose of anti-enticement laws was to clarify the contractual relationship in the labor market. Thus, after filtering out the selective motivation originating from slavery, restrictions on enticement could have enhanced the bargaining power and mobility of black workers.

Table 5: Selective application of anti-enticement laws 1880-1920

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent Variable: share of adult workers in low-skill occupations</i>						
	Black			White		
Slave <sub>c,1860</sub> × EnticeFine <sub>st</sub>	0.106*** (0.033)	0.096*** (0.027)	0.102*** (0.030)	-0.029 (0.023)	-0.035 (0.025)	-0.026 (0.022)
EnticeFine <sub>st</sub>	-0.054*** (0.015)	-0.047*** (0.011)	-0.047*** (0.011)	-0.002 (0.009)	0.000 (0.010)	-0.001 (0.009)
Black literacy	-	-0.210*** (0.072)	-0.211*** (0.071)	-	-0.046** (0.022)	-0.049** (0.022)
White literacy	-	0.063 (0.113)	0.073 (0.107)	-	-0.088* (0.051)	-0.059 (0.052)
Share of blacks	-	-	-0.064 (0.102)	-	-	-0.179*** (0.057)
F-Stat	114.39	126.37	133.66	114.39	126.37	133.66
Number of counties	265	265	265	265	265	265
Number of border segments	30	30	30	30	30	30
Number of observations	1192	1192	1192	1192	1192	1192
County fixed effects	Y	Y	Y	Y	Y	Y
Border segment-year fixed effects	Y	Y	Y	Y	Y	Y

Notes: Robust standard errors clustered at state and border-segment are shown in the parentheses. EnticeFine<sub>st</sub> denotes the maximum enticement fines in state *s* in year *t*, standardized to z-score. County-fixed effects and segment-year fixed effects are controlled. The sample is balanced.

The estimates are robust to additional controls. Column 2 suggests that the selective application of anti-enticement laws was conditional on the racial differences in literacy. As in Column 3, the results also hardly change when the contemporary share of blacks is controlled, which excludes explanations based on the racial threat hypothesis (Giles and Buckner, 1993; Glaser, 1994). Lastly, the smaller and less significant coefficients from the white sample in Columns 4-7 confirm that the selectivity of anti-enticement laws was a unique feature over the black labor force.

Farm tenure could be a potential concern for the interpretation. While Naidu (2010) documents the adverse effects of anti-enticement laws on black workers, its empirical evidence is limited to the agricultural sector. If the results in Table 5 were also driven by mobility within the farm-tenure system, then it may not be carried over to the incentive to invest in human capital. To address the concern, I re-estimate Equation 3 using black and white workers in the non-agricultural sectors only. Table 6 summarizes the results which are analogous to the estimates from the whole sample. This indicates that the selectivity

of anti-enticement laws had a broad influence, not restricted to the agricultural sector.

Table 6: Selective application of anti-enticement laws 1880-1920: non-agricultural workers

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent Variable: share of adult workers in low-skill occupations</i>						
	Black			White		
Slave <sub>c,1860</sub> × EnticeFine <sub>st</sub>	0.201*** (0.048)	0.197*** (0.051)	0.191*** (0.051)	-0.027*** (0.005)	-0.029*** (0.006)	-0.022** (0.011)
EnticeFine <sub>st</sub>	-0.103*** (0.027)	-0.102*** (0.028)	-0.101** (0.029)	-0.001 (0.007)	-0.000 (0.007)	-0.001 (0.008)
Black literacy	-	0.018 (0.094)	0.022 (0.099)	-	-0.012 (0.021)	-0.016 (0.023)
White literacy	-	-0.234 (0.095)	-0.251* (0.141)	-	-0.049 (0.049)	-0.032 (0.052)
Share of blacks	-	-	0.131 (0.238)	-	-	-0.136 (0.093)
F-Stat	49.20	51.38	51.81	50.77	51.38	51.81
Number of counties	219	219	219	219	219	219
Number of border segments	30	30	30	30	30	30
Number of observations	972	972	972	972	972	972
County fixed effects	Y	Y	Y	Y	Y	Y
Border segment-year fixed effects	Y	Y	Y	Y	Y	Y

Notes: Robust standard errors clustered at state and border-segment are shown in the parentheses. *EnticeFine<sub>st</sub>* denotes the maximum enticement fines in state *s* in year *t*, standardized to z-score. County-fixed effects and segment-year fixed effects are controlled. The sample is balanced.

## 4.2 Decline in Return to Human Capital

Section 4.1 shows that the selective application of anti-enticement laws undermined the effectiveness of black human capital. It is then possible to speculate that such institutional barriers would have reduced the return to human capital for blacks. This section provides evidence supporting the conjecture. First, the relative return to education for blacks in 1940 declines with the slave-to-population ratio in the past. Moreover, this relationship is not confounded by the racial gap in educational quality.

### 4.2.1 Slavery and Return to Education for Blacks

The literature highlights that the southern labor market discouraged blacks from accumulating human capital. Ransom and Sutch (2001) write that “*Most blacks ... hoped that*

*literacy and elementary education would make them better farmers ... or open the possibility of becoming independent landowners or artisans. But such individuals were frequently disappointed ... because blacks were never allowed to pursue those occupations.*". In short, blacks saw less justification in accumulating human capital due to their "unequal access to higher-paying jobs of a skilled, supervisory, administrative." (Wright et al., 1986).

However, it was not simply a Southern phenomenon. Section 4.1 shows that the negative environment for human capital accumulation varied with the local history of slavery, and it is expected to have caused regional divergence of the return to human capital for blacks. In this context, I assess the effects of slavery on the relative return to education. The estimation follows two steps. First, using the complete-count census in 1940, I estimate the relative return to education for blacks for each county separately. The estimation follows Equation 4, which is a modified mincer equation.

$$\text{wage}_{cj} = \alpha_c + \beta_c \text{Edu}_{cj} + \gamma_c \text{Black}_{cj} + \lambda_c \text{Edu}_{cj} \times \text{Black}_{cj} + X'_{cj} \delta_c + \epsilon_{cj} \quad (4)$$

The sample consists of black and white adult workers.<sup>29</sup> For each county  $c$ ,  $\text{wage}_{cj}$  and  $\text{Edu}_{cj}$  are log weekly wage and years of schooling of individual  $j$ .  $\text{Black}_{cj}$  is a dummy variable equal to 1 if individual  $j$  is black.  $X_{cj}$  is a vector of other individual-level controls including labor market experience and its square, family size, dummy variables for sex, marital status, migration, and the urban residence. The equation is estimated separately for each county  $c$ .

Second, I test whether the return to education for blacks in 1940 decreases with the slave-to-population ratio in 1860. After estimating Equation 4 for each county separately, I employ the estimated coefficients of the black dummy ( $\text{Black}_{cj}$ ) and the coefficients of the interaction of schooling years and the black dummy ( $\text{Edu}_{cj} \times \text{Black}_{cj}$ ) as outcome variables of the county-level regressions in Equation 1.

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<sup>29</sup>The sample only includes full-time workers to compare individuals who fully intend to utilize their human capital in the labor market. The results are robust to including workers who worked at least 26 hours per week. I exclude counties whose number of relevant individuals is less than 20.

Table 7: Slavery and the return to education for blacks in 1940

	(1)	(2)	(3)	(4)
<i>Dependent variable:</i> Estimated coefficients of	Black dummy ( $\gamma_c$ )		Black×Edu ( $\lambda_c$ )	
Slave to pop ratio	0.159 (0.169)	0.263 (0.178)	-0.407** (0.182)	-0.448** (0.191)
F-stat	24.13	24.13	24.13	24.13
N	843	843	843	843
Individual controls of the Mincer equation	N	Y	N	Y
Predetermined controls	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y

Notes: The table shows standardized coefficients. Robust standard errors clustered at the 90mi-by-90mi grid squares are shown in the parentheses. The outcome variable in Columns 1 and 2 measures the wage loss of blacks due to the race itself. The latter outcome variable is the race-specific return to education.

Table 7 summarizes the results. The outcome variables are the estimated coefficients of  $\text{Black}_{cj}$  ( $\gamma_c$ ) and  $\text{Edu}_{cj} \times \text{Black}_{cj}$  ( $\lambda_c$ ) from Equation 4, and the coefficients are standardized for comparison. The coefficients of the Black dummy measure the wage loss explained by the race itself, and those of Black×Edu represents racial disadvantages through the return to education. Columns 3 and 4 show that counties with higher prevalence of slavery in 1860 display a lower return to education for blacks in 1940. A one SD increase in the slave-to-population ratio predicts a 0.41-0.45 SD deviation decrease in the return to education for blacks relative to whites. In contrast, Columns 1 and 2 indicate that the wage gap through the black dummy does not vary with slavery.

The results suggest that the postbellum economy did not simply re-establish the pre-Civil War racial hierarchy. The local history of slavery produced heterogeneous market conditions against black workers. Furthermore, the effects of slavery on the racial wage disparity were through the regional divergence in the return to education. This implies that the legacy of slavery affected better educated blacks more strongly. According to the estimates in Table 7, the relationship between the slave-to-population ratio and the racial wage gap was not negative nor significant for workers who completed less than 5 years of schooling.<sup>30</sup> On the other hand, the relative wage of more educated blacks declined significantly with the local prevalence of slavery. Such patterns support that

<sup>30</sup>In the 1940 census, 36.2% of black adults completed less than 4 years of schooling. The ratio declines to 8.35% for white adults.

greater prevalence of slavery reduced the incentive of blacks to invest in their human capital.

#### 4.2.2 Robustness to Educational Quality

Since the separate-but-equal doctrine did not hold in the postbellum South, educational quality could be a potential concern for the interpretation. Margo (1990) estimates that differences in black and white school quality explain nearly half of the racial gap in school attendance in the early-20th century. Carruthers and Wanamaker (2017) report similar findings. They argue that equalizing school quality would have reduced the racial wage gap in 1940 by 40 to 51 percent. If the relationship between slavery and the return to education resulted from differences in educational quality, then the mechanism based on labor market conditions in Section 4.1 would not be valid.

Employing a county-by-race index of educational quality from Carruthers and Wanamaker (2017)<sup>31</sup>, this section reveals two facts. First, the local prevalence of slavery actually widened the racial gap in educational quality. Second, however, the variations in educational quality do not explain the relationship between slavery and the return to education.

Table 8: Slavery and educational quality in the 1930s

	(1)	(2)	(3)	(4)
<i>Dependent variable:</i> Index of educational quality				
	Average in the 1930s		Median in the 1930s	
	<i>Black</i>	<i>White</i>	<i>Black</i>	<i>White</i>
Slave to pop ratio	0.093	0.351***	0.115	0.396***
	(0.198)	(0.107)	(0.194)	(0.108)
F-stat	10.74	11.57	10.74	11.57
N	461	492	461	492
Predetermined controls	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y

Notes: Robust standard errors clustered at the 90mi-by-90mi grid squares are shown in the parentheses. The index of educational quality is from Carruthers and Wanamaker (2017). Because the original index is only available for 10 southern states, the number of observations is smaller than in Table 7.

<sup>31</sup>The index is composed of race-specific school resources at the county-level including the following eight metrics: expenditures per enrolled pupil, expenditures per pupil in average daily attendance (ADA), teachers per enrolled pupil, teachers per pupil in ADA, certified teachers per enrolled pupil, certified teachers per pupil in ADA, term length, and average teacher salary. For each metric and year, the authors calculate a Z-score and define the average of the Z-scores as an index of educational quality.

First of all, Table 8 shows the relationship between slavery and educational quality. The outcome variable measures educational quality by race in the 1930s, using the average and median of their annual indices during that decade. The results show that slavery widened the racial gap in educational quality, but the effects were primarily through higher educational quality of whites. In contrast, the educational quality of blacks was not tied to slavery.<sup>32</sup>

Table 9: Slavery, educational quality, and the return to education for blacks

	(1)	(2)	(3)	(4)	(5)
<i>Dependent variable: Estimated coefficient of Edu × Black</i>					
Slave to pop ratio	-0.448** (0.191)	-0.820** (0.328)	-0.814** (0.324)	-1.104*** (0.415)	-0.849** (0.338)
Index of educational quality					
Black	-	-	-0.045 (0.071)	-	-
White	-	-	-	0.824*** (0.300)	-
White-Black	-	-	-	-	0.142 (0.088)
F-stat	24.13	10.68	10.71	9.05	10.44
N	843	443	443	468	443
Predetermined controls	Y	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y	Y

Notes: Robust standard errors clustered at the 90mi-by-90mi grid squares are shown in the parentheses. Since the original index is only available for 10 southern states, the number of observations is smaller in Columns 2 to 5. The sample for the modified mincer equations consists of workers aged 18 to 25 who did not migrate across counties over the last five years.

The increase in the racial gap in educational quality, however, does not explain the relationship between slavery and the return to education. I verify this in two steps. First, I re-estimate Equation 4 using a sample of workers aged 18 to 25 who did not migrate across counties over the previous five years. This restricts the sample to those who were

<sup>32</sup>This pattern is consistent with historical observations that white-dominated school boards diverted resources which were assigned based on the size of black school-age children (Kousser, 1980; Margo, 1982; Collins and Margo, 2006). Given its correlation with the share of the black population in the later period, the local prevalence of slavery could have increased redirection of school funds to whites, leading to their higher educational quality. Moreover, Acharya et al. (2016) argue that slavery reduced the political participation of blacks persistently. If less political participation of blacks reinforced the influence of white-dominated school boards, then it could be another channel increasing white school quality. In a similar context, Reece and O’Connell (2016) argue that the local prevalence of slavery caused disinvestment in public school systems in the long-run. If an imbalance between public and private school systems had heterogeneous effects on blacks and whites, it could also have increased the racial gap in school quality.

aged 13 to 20 in 1935 in the same county of residence. Second, assuming that the workers received their education in the county of residence, I estimate the effects of slavery on the coefficients of  $\text{Edu} \times \text{Black}$ , controlling for the race-specific educational quality.

The results are summarized in Table 9. The outcome variable is the estimated coefficient of  $\text{Edu} \times \text{Black}$  in Equation 4 with individual-level controls. For comparison, Column 1 shows its relationship with slavery without controlling for educational quality. Column 2 restricts the sample to the counties whose index of black school quality is available. Though the sample size decreases due to data availability, the negative relationship does not change and the magnitude of the coefficient rather increases. In Columns 3 and 4, I control for black and white educational quality, but the results are similar to Column 2.<sup>33</sup> In addition, Column 5 shows that the estimate is not sensitive to the racial disparity in educational quality. Similarly, Table 9 suggests that violations of the separate-but-equal doctrine do not confound the relationship between slavery and the return to education for blacks.

## 5 Conclusion

This paper examines the divergence of the local economy after the abolition of slavery. Using an IV strategy based on exogenous crop suitability, I show that African Americans in counties with higher prevalence of slavery accumulated human capital more slowly, and this relationship became evident as of the post-Reconstruction period.

I suggest a mechanism consisting of two components: institutional intervention in the labor market and decline in the return to human capital. Evidence shows that slavery induced selective application of the labor market laws, and this hindered effective use of black human capital. The border-county analyses show that anti-enticement laws, an essential element of the Black Codes in the early 20th century, were more intensively applied to separate blacks in counties with greater slave-to-population ratios. Black workers in those regions were more likely to be locked in low-skill occupations even conditional on their human capital. The institutional barriers reduced the incentive of blacks to invest in human capital. Using the 1940 Census, I find that the return to education for blacks became lower in counties with greater prevalence of slavery. I further show that the relationship between slavery and the return to education is not attributable

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<sup>33</sup>The positive coefficient of white educational quality could be counter-intuitive. Because the index of educational quality is not instrumented, however, it does not imply any causal interpretation. For example, higher school quality for whites might be associated with a greater demand for skilled workers. If the market forces undermined discriminatory wage structure, then the racial disparity in the return to education could decrease (Becker, 1957).

to racial disparity in educational quality.

Beyond the persistence of the peculiar institution, this paper clarifies a dynamic relationship between slavery and human capital formation. In particular, the divergence in the return to human capital proposes a novel perspective. Adding to studies focusing on the supply-side of human capital, this approach emphasizes the importance of individual demand for human capital for studying socioeconomic inequality. To generalize the implications, future research will need to study the causes and consequences of the demand for public goods in diverse contexts.

Also, the legacy of slavery in this paper displays a different pattern from conventional understanding. The negative effects of slavery became evident only after Reconstruction, and the interaction between slavery and post-Reconstruction institutional changes was the core of the mechanism. In a broader context, this suggests that long-run effects of a historical factor can be comprehensively understood only if its dynamic relationship in the subsequent period is considered.

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# Appendices

## A Robustness to Additional Controls

Despite their potential endogeneity, the baseline specification does not control for initial socioeconomic conditions due to the “bad control problem” (Angrist and Pischke, 2008). Though the IV strategy mitigates the concerns by exploiting exogenous crop-specific suitability, some might still question whether the correlations between slavery and initial socioeconomic conditions generate bias. This section presents that the estimates are robust to a battery of initial socioeconomic conditions.

Table A1: Robustness to initial socioeconomic conditions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Dependent variable: Share of black adults w/o college education 2015</i>							
Slave to pop ratio	0.353** (0.160)	0.357** (0.163)	0.364** (0.157)	0.407*** (0.181)	0.352** (0.159)	0.359** (0.160)	0.419** (0.181)
F-stat	24.80	25.01	25.15	21.00	24.80	25.19	21.51
N	885	885	885	885	885	885	885
<i>Dependent variable: Log per capita income of blacks 2015</i>							
Slave to pop ratio	-0.869** (0.400)	-0.901** (0.409)	-0.880** (0.397)	-1.004** (0.460)	-0.868** (0.400)	-0.886** (0.400)	-1.042** (0.460)
F-stat	24.79	25.12	25.18	21.29	24.72	25.20	21.81
N	885	885	885	885	885	885	885
<i>Dependent variable: Estimated coefficients of Black×Edu</i>							
Slave to pop ratio	-0.448** (0.191)	-0.448** (0.194)	-0.462** (0.191)	-0.543** (0.226)	-0.450*** (0.191)	-0.446** (0.192)	-0.552** (0.222)
F-stat	24.13	24.70	24.38	20.01	23.86	24.37	20.30
N	843	843	843	843	843	843	843
Share of free blacks		√					√
Urbanization rate			√				√
White literacy				√			√
Average farm yield					√		√
Land inequality						√	√
Predetermined controls	Y	Y	Y	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y	Y	Y	Y

Notes: Robust standard errors clustered at the 90mi-by-90mi grid squares are shown in the parentheses. The estimates in the first panel are standardized coefficients. Farm productivity and land inequality are measured by the log of farm output values per acre and the Gini index of land concentration, respectively.

Table A1 documents the robustness of the IV estimates for the key outcome variables in Sections 3 to 4. Column 1 shows the original estimates without initial socioeconomic conditions, and Columns 2 to 6 test their robustness to each additional control. In Column 2, I control for the share of free blacks in 1860.<sup>34</sup> If the proportion of slaves were negatively correlated with the share of the free population within blacks, then the initial composition of African Americans might confound the effects of slavery. Including the share of free blacks, however, hardly affects the size and significance of the estimates.

Initial status of local development could also produce bias. If slavery were associated with underdeveloped economic conditions, it might be another channel that reduces the demand for human capital. In this context, Columns 3 and 4 control for the share of urban population and white literacy in 1860, but the estimates do not change significantly. Similarly, the slave concentration might reflect comparative advantage in agriculture that could have hindered structural change in the long-run. To mitigate the concern, Column 5 shows the robustness of the estimates to farm productivity which is measured by the average farm yield per acre. Lastly, since higher slave-to-population ratios could imply greater concentration of land ownership, it should be verified whether the estimates are biased due to initial wealth distribution. In this regard, Column 6 controls for the Gini index of land concentration in 1860, but the coefficients hardly change.<sup>35</sup>

## B Policy Climate of the Labor Market

Section 4.1 addresses that anti-enticement laws were selectively applied to keep blacks in low-skill occupations. The logic of selectivity can also be applied to generic institutional climate. Given state-level laws and regulations in the labor market, counties with a stronger background of slavery would have applied the regulatory conditions more intensively to separate black workers. To assess this logic, I estimate the following equation.

$$y_{sct} = \alpha LR_{st} + \beta \text{Slave}_{c,1860} \times LR_{st} + \gamma' X_{sct} + \delta_c + \delta_t + u_{sct} \quad (5)$$

$LR_{st}$  is an index of labor market regulations constructed by Fishback et al. (2009).<sup>36</sup> The

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<sup>34</sup>More exactly, I compute the share of the free *colored* population among the sum of the free *colored* and slave population.

<sup>35</sup>Because individual farm size is not available, the Gini index is calculated using the median value of each category of farm size in the 1860 Census.

<sup>36</sup>Within each category, the relative importance of the laws and regulations is measured by the share of workers affected. For instance, bakery regulations and electrical regulations are categorized into Workplace Activity Regulation. Since electrical regulations affect a larger share of workers, higher weight is given to them than to bakery regulations. Then, the authors calculate the weighted average of the existence of laws and regulations that workers favored.

index takes values between 0 and 1, and a higher value implies that policy climate is more favorable to employers.<sup>37</sup>  $\delta_c$  and  $\delta_t$  are the county- and year fixed effects.  $X_{sct}$  consists of the time-varying controls as in Equation 3. The equation is estimated in 1900, 1910, and 1920. Lastly, as in Section 4.1,  $\text{Slave}_{c,1860} \times LR_{st}$  is instrumented by  $IV_{c,1860} \times LR_{st}$ .<sup>38</sup>

Table A2: Selective application of labor market regulations 1900-1920

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Dependent variable: share of workers in low-skill occupations</i>						
	Black			White		
$\text{Slave}_{c,1860} \times LR_{st}$	0.124** (0.049)	0.124** (0.050)	0.114** (0.050)	-0.001 (0.019)	0.001 (0.017)	0.003 (0.017)
$LR_{st}$	-0.012 (0.018)	-0.013 (0.017)	-0.009 (0.017)	0.009 (0.008)	0.011 (0.008)	0.010 (0.008)
Black literacy	-	-0.092 (0.058)	-0.084 (0.054)	-	-0.019 (0.018)	-0.021 (0.017)
White literacy	-	-0.117* (0.060)	-0.138** (0.062)	-	-0.195** (0.071)	-0.190** (0.074)
Share of blacks	-	-	0.219** (0.107)	-	-	-0.052 (0.049)
<i>F</i> -Stat	73.91	70.43	53.62	73.91	70.43	53.62
Number of counties	795	795	795	795	795	795
Number of observations	2385	2385	2385	2385	2385	2385

Notes: Robust standard errors clustered at the state-level are shown in the parentheses. Standardized coefficients are shown in the table. County-fixed effects and year fixed effects are controlled. All balanced.

Table A2 summarizes the results. As in Table 5, the outcome variables are the share of workers in low-skill occupations. The coefficients of  $\text{Slave}_{c,1860} \times LR_{st}$  in Columns 1-3 suggest that slavery induced selective application of the labor market laws and regulations to separate black workers. Moreover, the small coefficients of  $LR_{st}$  indicate that direct impact of the institutional environment was not particularly adverse to blacks, so long as the selectivity from slavery is filtered out. This pattern is consistent with the conclusion of Section 4.1 that the effects of anti-enticement laws on black workers stemmed principally

<sup>37</sup>Higher values of the original index imply a regulatory climate more favorable to workers. For a consistent interpretation as in Section 4.1,  $LR_{st}$  is defined as “1–original index value”. In other words, higher  $LR_{st}$  indicates greater bargaining power of employers.

<sup>38</sup>Unlike in Section 4.1, the sample is not restricted to border counties because  $LR_{st}$  varies continuously. This implies that the estimation does not control for endogeneity of  $LR_{st}$ . For instance, changes in  $LR_{st}$  could be correlated with the state-level changes in industrial structure which might affect racial composition of the labor force. However, since the state-level unobservables are by construction orthogonal to the county-level variations in slavery, the coefficients of  $\text{Slave}_{c,1860} \times LR_{st}$  would still be informative in the sense of selectivity.

from the local history of slavery. The small and insignificant coefficients of the white sample in Columns 4-6 strengthens the mechanism of selective application.

## C Selectivity in Migration

Black migration was a prominent feature of the early 20th century US history. As Kim (1998) addresses, gradual migration across regions could have equilibrated the national labor market. Thus, to understand the regional divergence caused by slavery, the relationship between slavery and selective migration of blacks needs to be clarified.

This section suggests that black migration was more limited in counties with higher prevalence of slavery. Using the 1940 Census with the place of residence 5 years ago, I calculate the proportion of black in- and out-migrants to the total black population.<sup>39</sup> Also, to assess their educational background, I compute the average years of schooling of the black in- and out-migrants. The samples are all composed of adults aged 25 and, but including individuals aged less than 25 hardly affects the patterns of migration rates.

Table A3: Slavery and black migration 1940

<i>Dependent variable</i>	(1)	(2)	(3)	(4)
	Migration rates		Educational attainment	
	In-migration	Out-migration	In-migrants	Out-migrants
Slave to Pop ratio	-0.167** (0.081)	-0.192** (0.090)	-0.596 (1.001)	-0.650 (1.013)
<i>F</i> -stat	24.82	24.82	22.03	22.74
Predetermined controls	Y	Y	Y	Y
State fixed effects	Y	Y	Y	Y
<i>N</i>	877	877	790	815

Notes: Robust standard errors clustered at the 90mi-by-90mi grid squares are shown in the parentheses. The in- and out-migrants are identified from the place of residence five years ago. The samples exclude counties whose number of relevant observations is less than 10. Standardized coefficients are shown in the table.

Table A3 shows the relationship between slavery and black migration. According to Columns 1 and 2, migration flows of blacks were smaller in counties with greater slave-

<sup>39</sup>There are a few cases of migration whether individuals moved across counties are not identified, and I do not count such cases when constructing the outcome variables. The proportion of the ambiguous cases is very low. Among the 7,994,454 black migrants aged 25 and over, only 0.58% of them are reported as "Unknown within state".

to-population ratios. This implies that, where slavery was more prevalent, equilibration of the labor markets through migration was less effective. Its mechanism is beyond the scope of this paper, but the findings of this study might be a hint for further research. According to Sections 4.1 and 4.2, slavery hindered effective use of black human capital. Since human capital was a critical factor for the expected benefits of migration (Margo, 1990; Tolnay, 1998; Vigdor, 2002), counties with greater prevalence of slavery could have been less attractive to potential migrants. Similarly, given that slavery implies lower human capital of black residents, they would have had fewer incentives to migrate for another opportunity.<sup>40</sup>

Columns 3 and 4 estimate the effects of slavery on the education level of black migrants. While they are not statistically significant, the coefficients for in- and out-migrants are both negative. In addition to fewer migrations resulting from slavery, this further suggests that migration selectivity was not sufficient to moderate the regional divergence in human capital. If we accept the negative signs despite their low statistical significance, it could rather be interpreted that selective migration supported the effects of slavery, by replacing the outflow of less-educated individuals with the inflow of migrants with similar characteristics.

There are many issues to be clarified between slavery and selective migration of blacks. For instance, the relationship between slavery and the origin-destination flows should be identified. While Columns 1 and 2 indicate that the volume of migration declined with the local prevalence of slavery, it might involve heterogeneous effects across the origin and destination counties. Also, it is an important question whether the patterns of selective migration had changed over time. For example, if slavery had a stronger relationship with black migrants during the first Great Migration, then it could be another channel intensifying the divergence in human capital structure in the early 20th century. To understand the relationship between slavery and black migration comprehensively, further studies using linked censuses would be required.

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<sup>40</sup>The southern tenant system could also have reduced out-migration of blacks. The old plantation under slavery was reorganized into small tenancies by the late 19th century, and southern tenant families relied heavily on non-wage benefits provided by landowners (Alston and Ferrie, 1989, 1993; Ransom and Sutch, 2001). If the paternalistic benefits had increased opportunity costs of migration, then tenant families would have had fewer incentives to leave their farms.