

IZA DP No. 5329

## Slavery, Education, and Inequality

Graziella Bertocchi  
Arcangelo Dimico

November 2010

# Slavery, Education, and Inequality

**Graziella Bertocchi**

*University of Modena,  
CEPR, CHILD and IZA*

**Arcangelo Dimico**

*University of Nottingham*

Discussion Paper No. 5329  
November 2010

IZA

P.O. Box 7240  
53072 Bonn  
Germany

Phone: +49-228-3894-0  
Fax: +49-228-3894-180  
E-mail: [iza@iza.org](mailto:iza@iza.org)

Any opinions expressed here are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but the institute itself takes no institutional policy positions.

The Institute for the Study of Labor (IZA) in Bonn is a local and virtual international research center and a place of communication between science, politics and business. IZA is an independent nonprofit organization supported by Deutsche Post Foundation. The center is associated with the University of Bonn and offers a stimulating research environment through its international network, workshops and conferences, data service, project support, research visits and doctoral program. IZA engages in (i) original and internationally competitive research in all fields of labor economics, (ii) development of policy concepts, and (iii) dissemination of research results and concepts to the interested public.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

## ABSTRACT

### Slavery, Education, and Inequality\*

We investigate the impact of slavery on the current performances of the US economy. Over a cross section of counties, we find that the legacy of slavery does not affect current income per capita, but does affect current income inequality. In other words, those counties that displayed a higher proportion of slaves are currently not poorer, but more unequal. Moreover, we find that the impact of slavery on current income inequality is determined by racial inequality. We test three alternative channels of transmission between slavery and inequality: a land inequality theory, a racial discrimination theory and a human capital theory. We find support for the third theory, i. e., even after controlling for potential endogeneity, current inequality is primarily influenced by slavery through the unequal educational attainment of blacks and whites. To improve our understanding of the dynamics of racial inequality along the educational dimension, we complete our investigation by analyzing a panel dataset covering the 1940-2000 period at the state level. Consistently with our previous findings, we find that the educational racial gap significantly depends on the initial gap, which was indeed larger in the former slave states.

#### NON-TECHNICAL SUMMARY

The legacy of slavery for the US economy and society has been the subject of a huge literature. In this paper, we investigate whether it can explain the racial educational gaps which NCLB targets. Our empirical analysis indeed shows that, across the US counties, the current degree of educational inequality, along the racial dimension, can be traced to the intensity of slavery before the Civil War. In other words, those counties that in the past have been more heavily affected by slave labor show a higher degree of racial educational inequality in the present day. Moreover, the data uncover a persistent effect of slavery on the degree of per capita income inequality. On the contrary, the legacy of slavery has no explanatory power for the current level of income per capita. Finally, we show that the driver of income inequality is racial inequality, which is in turn linked to slavery through its impact on the racial gap in education.

JEL Classification: E02, D02, H52, J15, O11

Keywords: slavery, development, inequality, institutions, education

Corresponding author:

Graziella Bertocchi  
Dipartimento di Economia Politica  
University of Modena  
Viale Berengario 51  
41121 Modena  
Italy  
E-mail: [graziella.bertocchi@unimore.it](mailto:graziella.bertocchi@unimore.it)

---

\* We would like to thank Daron Acemoglu, Costas Azariadis, Roland Benabou, Raquel Fernandez, Chiara Gigliarano, Oded Galor, Nippe Lagerlöf, Nathan Nunn, Elias Papaioannou, Dietrich Vollrath, as well as participants at the NBER Summer Institute Workshop on Income Distribution and Macroeconomics, the IV Workshop of the Social Choice Research Group, the PRIN Workshop on Political Institutions and Demographic Dynamics, the Rimini Conference in Economics and Finance, and seminars at the Universities of Glasgow and Göteborg, for comments and suggestions. Generous financial support from the Italian University Ministry and Fondazione Cassa Risparmio di Modena is gratefully acknowledged.

## 1. Introduction

Recent developments in growth theory have debated the long-run influence of geography and institutions on comparative current economic performances. In this paper we address the same issue within the context of a single country - the United States - where a specific institution - slavery - has historically been associated more heavily with particular areas - primarily the South. To concentrate on a single country facilitates the empirical investigation on several grounds, since it reduces the risk of omitted variable bias that typically plagues across countries investigations. At the same time, because of their size and history, the US still presents sufficient variations along both the geographic and the institutional dimensions to make such investigation worthwhile.

In the broader context of the Americas, Engerman and Sokoloff (1997, 2005a) have influentially argued that factor endowments, in the form of soils, climate, and the size of the native population, have determined the diffusion of agricultural crops best suited for the employment of slave labor. The resulting unequal structure of society has in turn contributed to the evolution of a set of legal, political, and educational institutions meant to preserve the privileges of the elites. Thus, even though factor endowments themselves can be viewed as exogenous, these initial conditions have exerted a magnified effect on current performances because the institutions subsequently developed tended to reinforce their influence. These institutions have then exerted a persistent impact on economic outcomes long after the abolition of slavery, determining paths of development characterized by marked inequality in wealth, human capital, and political power. We test this theory for a cross section of US counties, with special emphasis on the legacy of slavery for the current level of income and inequality.

Slavery was introduced in North America as early as in the 16<sup>th</sup> century and its diffusion escalated throughout the next centuries. Overall, the Middle Passage brought an estimated 645,000 slaves, mostly from Africa, to the territories that today represent the US. Initially most of the slaves were settled in the coastal Southern colonies, where they were employed primarily in agriculture. Later, between the American Revolution and the Civil War, with the Second Middle Passage around a million slaves were relocated toward the inland regions where the plantation economy was developing (Berlin, 2003). By the 1860 Census the US slave population had grown to four million, to represent about 13% of the entire population, distributed within 15 slave states. In the same year, almost 90% of the blacks living in the US were slaves. After the American Civil War led to the abolition of slavery in 1865, massive migration flows brought the former slaves from the rural South to the urban North. By 1940 75% of black men still lived in the South. By 2000, the fraction

had further declined to about 55%. Therefore, the majority of the blacks are still located in the South, while for white men the corresponding fractions are much smaller at about 28% and 16%, respectively. In fact, the cross state correlation between the fraction of slaves in the population in 1860 and the fraction of blacks in 2000 is 0.80. These figures indicate that, throughout American history and even after the end of the institution of slavery, the economic welfare of blacks has been tied closely to the performance of the Southern economy (Smith and Welch, 1989).

The historiography of slavery in America is huge. Economic historians have focused on the profitability and the efficiency of slavery. In their provocative and controversial empirical work on the antebellum South, Fogel and Engerman (1974) suggested that slavery was both productive and economically efficient, a conclusion which was criticized, among others, by David et al. (1976). Lagerlöf (2009) and Acemoglu and Wolitzky (2010) model the economics of labor coercion from a related perspective. A parallel research effort has been devoted to the long-term legacy of slavery, in a number of dimensions. While Nunn (2008a) has focused on the implications of slave trades in Africa, Engerman and Sokoloff (2005a) and Nunn (2008b) have examined the impact of slavery in the receiving countries. In particular, on the basis of historical evidence, the former formulate the hypothesis that factor endowments, through large-plantation slavery and other inequality-perpetuating institutions, may have hampered subsequent economic growth. The latter estimates the influence of slavery on the current performances of the US economy, to find that slave use is negatively correlated with subsequent economic development, but that this relationship is not driven by large-scale plantation slavery, i.e., a more precise measure of factor endowments. He also finds a positive impact of slavery on 1860 land inequality, which is in turn correlated with current income inequality, but no impact of 1860 land inequality on current income, which suggests that inequality may not be the channel of influence running from factor endowments to the current level of development. Mitchener and McLean (2003) find that the legacy of slavery has a strong and persistent effect on productivity levels across US states in the 1880-1980 period. Lagerlöf (2005) explores the link between geography and slavery and also documents a negative relationship between slavery and current income. A common conclusion for this stream of the literature is a negative relationship between past slavery and current income per capita across US states and counties, even though the channels through which this influence materializes are still unclear.

A separate research line has focused on the impact of race on inequality. This work has documented that, since emancipation and especially since 1940, the average income of black Americans has increased greatly, both in absolute and relative terms. The determinants of the relative improvement of the economic status of blacks after WWII, however, have been the subject of debate. Both the

civil rights movement, with its impact on the labor market through affirmative action laws, and long-term changes in human capital have been advanced as possible explanations of the observed trend (Heckman, 1990 and Margo, 1990). The main contributions to the line of research on race and human capital are Smith (1984), Smith and Welch (1989), followed by Margo (1990) and Collins and Margo (2006).<sup>1</sup> The evidence collected by these authors documents the evolution of racial differences both in the quality and the quantity of education, starting from the emancipation of blacks in the post-Civil War era and taking into account the potential legacy of slavery for human capital accumulation. Initially African-Americans had essentially no exposure to formal schooling, as a legacy of the extremely high rates of illiteracy that existed under slavery. The first generations of former slaves were able to complete far fewer years of schooling, on average, than whites. Moreover, they had access to racially segregated public schools, mostly in the South, where they received a qualitatively inferior education, even if compared to that received by Southern whites.<sup>2</sup> In an initial phase, the combination of low educational attainment and inferior educational quality determined the persistence of large wage and income gaps. Subsequently, however, the racial schooling gap declined, as successive generations of black children received more and better schooling, with an eventual impact on earnings. Overall, despite the initial conditions and the persistence of discrimination, the reported evidence on the evolution of educational differences, in a wide number of dimensions (such as literacy rates, years of educational attainment, spending per pupil, and returns to literacy), overwhelmingly points to long-term convergence. A related stream of the literature on racial inequality in education has measured the long-term influence of family background (as captured by ability, or parental education) on the schooling process (see for example Cameron and Heckman, 2001). Within this stream, Sacerdote (2005) has focused on a comparison between the grandchildren of former slaves and free blacks, to find substantial convergence of educational outcomes, since by 1920 the remaining legacy of slavery is such that all blacks are affected equally. While the contribution of human capital to the improvement of the economic status of blacks cannot be disputed, as previously mentioned other factors have also been evaluated. In particular, it has been argued that at the beginning of the 20th century employment segregation in agriculture, especially in the South, was also instrumental in delaying income convergence, while after WWI an increased demand of black labor in the North may have accelerated it. Likewise, further pressure toward convergence occurred in the 1960s with the civil rights movement.

Given these premises, to investigate the long-term impact of slavery on current economic performances, we start by revisiting the available evidence on the impact of slavery on current per

---

<sup>1</sup> See also Goldin and Margo (1992), Goldin (1998), and Goldin and Katz (1999).

<sup>2</sup> Naidu (2010) estimates the effect of the 19th century disenfranchisement laws for blacks in the South and finds that they are associated with a fall in black educational inputs and thus with low-quality Southern schooling.

capita income. We find that, contrary to what previously established in the above cited literature, there is no robust evidence that those US counties that employed slave labor more heavily are poorer today than those that did not. Next we turn to examine how the current level of inequality is shaped by slavery. We find that the distribution of per capita income is more unequal today in former slave counties. These results taken together indicate that the long-term influence of slavery on per capita income is not on its level, but on its distribution within each county. Moreover, we identify the driver of income inequality in racial inequality, which is in turn determined by slavery.

To test the channels through which slavery determines current income inequality, we compare three alternative theories: a land inequality theory, a racial discrimination theory, and a human capital transmission theory. To be noticed is that, at least in principle, the three channels are not mutually exclusive since, as suggested by Sokoloff and Engerman (2000) and Acemoglu et al. (2008), institutional and economic development paths may be interlinked and jointly determined by various factors. For instance, the institution of public schooling, which has been a major vehicle of capital accumulation, as well as the removal of de facto and de jure discrimination, may have been more rapid and more effective in the same counties where factor endowments prevented the diffusion of slavery. The empirical evidence previously reviewed on race and inequality also points to complex connections among all these aspects.

Once again, the land inequality theory derives from the Engerman and Sokoloff hypothesis that links factor endowments to institutions and economic performances. If this theory is verified, the legal institution of slavery would affect current performances through its link with factor endowments. In our context, the latter could be measured by land inequality, which should in turn reflect the diffusion of those crops that were typical of large-scale plantations and thus of the use of slave labor.

Our second test evaluates the potential explanatory power of those racial discrimination theories which have emphasized racial differences in the value of skills. Racial discrimination can manifest itself on the schooling dimension, through a worse quantity and quality of the education publicly provided, or directly on the labor market, by denying blacks access to certain jobs (see Smith, 1984). To measure the impact of these aspects on racial inequality and to verify its connection with the legacy of slavery, we construct a measure of racial discrimination by comparing the returns on education for blacks and whites.

Our third channel of influence is represented by human capital transmission. The hypothesis we test

is that the long-term influence of slavery may run through its negative impact on human capital accumulation. According to this hypothesis, which is closely associated with Smith (1984) and the above-mentioned work on race and human capital, the counties more affected by slavery should be associated with worse educational attainment for the black population.

For a cross section of counties, our empirical investigation supports the third theory, i. e., even after controlling for potential endogeneity, we find that current income inequality is primarily influenced by slavery through the impact exerted by the latter on the unequal educational attainment of blacks and whites. If we compare our results with the Engerman and Sokoloff hypothesis, we can conclude that indeed the presence of an association among factor endowments, institutions and inequality is confirmed, but also that the final link between these variables and economic development is missing in our findings. In particular, the institution of slavery does not affect the current level of development, possibly because the potential variations in this dimension are absorbed by a number of national factors that attenuate it. Moreover, while factor endowments, as measured by land inequality, do exert a direct effect on current inequality, their impact does not run through the specific institution we focus on, i.e., slavery, even though we cannot rule their potential impact on other relevant institutions we do not consider (e.g., political institutions).

To improve our understanding of the dynamics of racial inequality along the educational dimension, we complete our investigation by analyzing a panel dataset covering the 1940-2000 period at the state level. We find that the racial educational gap significantly depends on the initial gap. Since the initial gap was larger in the former slave states, this confirms the influence of slavery on racial educational inequality.

The rest of the paper is organized as follows. In Section 2 we revisit the evidence on the impact of slavery on the current level of development. In Section 3 we examine its impact on the current level of inequality. In Section 4 we explore three alternative channels through which this impact materializes. In Section 5 we review our results in Section 4 to control for endogeneity. In Section 6 we complete our investigation by analyzing the evolution of educational attainment in the 1940-2000 period. In Section 7 we derive our conclusions.

## **2. Slavery and Development: Revisiting the Evidence**

As mentioned in the introduction, it has been argued that slavery in the US has had a negative and significant effect on current per capita income. However, the channels through which slavery should



affect current development have not been clarified. In more detail, Nunn (2008b) employs data at the county level to test the Engerman and Sokoloff hypothesis and finds that slave use is negatively correlated with subsequent economic development, but that this relationship is not driven by large-scale plantation slavery, as suggested by the above hypothesis. He also finds a positive impact of slavery on inequality, for a measure of inequality given by the Gini coefficient of land holdings in 1860, which appears positively correlated with 2000 income inequality. However, he finds no impact of the 1860 land Gini on 2000 income. Lagerlöf (2005) also finds a negative relationship between slavery and current income at the county level, but he limits his investigation to the counties belonging to former slave states. Finally, on the basis of state level data, Mitchener and McLean (2003) argue that slavery has affected productivity as measured by income per worker. Given the state of art, we start by re-investigating the long-run effects of slavery and then we try to shed light on the mechanism at work.

In Figures 1 and 2 we plot income per capita in 2000 on the share of slaves to the total population in 1860.<sup>3</sup> Figure 1, which includes all counties, shows a negative and significant relationship between slavery and income per capita but, when in Figure 2 we confine the plot to counties within former slave states, the relationship becomes not significant. The plots therefore suggest that the results from the literature previously reviewed may not be robust, so that they may not actually capture a causal effect of slavery. The fact that the partial correlation turns to be insignificant (and of opposite sign) once confined to the sub-sample of slave states may indicate that the negative effect of slavery on development only captures simple structural differences between the North and the South of the US, or between slave states and non-slave states.

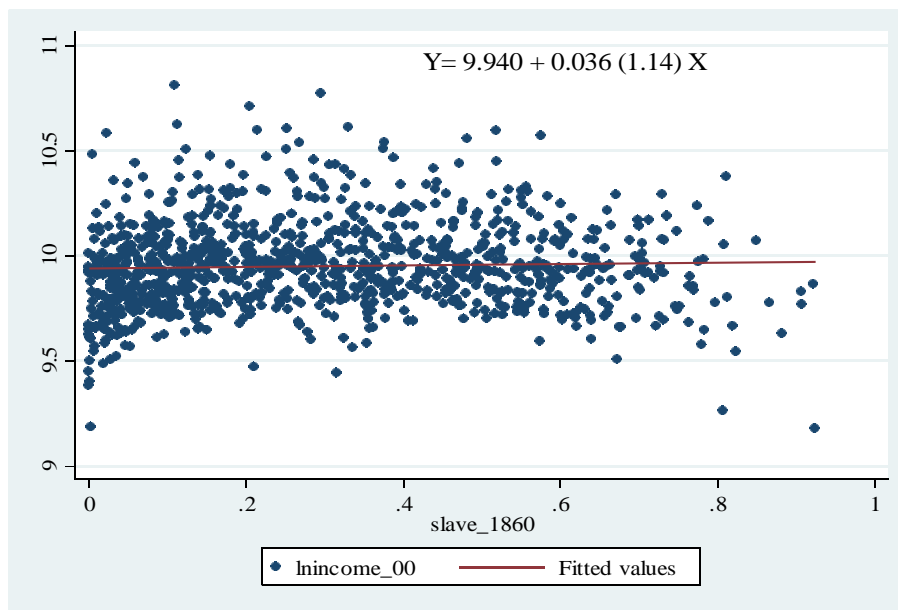
---

<sup>3</sup> See the Data Appendix for data sources.

*Figure 1: Slavery and Income per Capita (All Counties)*



*Figure 2: Slavery and Income per Capita (Only Counties in Slave States)*



In order to investigate this hypothesis, in Table 1 we first re-estimate the same model as in Nunn (2008b) and then we enter geographical controls which should capture structural differences among different regions of the US. More specifically, we control for counties within former slave states and for counties within North Eastern and South Atlantic states. The last two controls are necessary because there is evidence that states in these regions have a higher income per capita (see Rappaport and Sachs, 2003 and Lagerlöf, 2005). Model 1 replicates the basic model in Nunn (2008b), where population density in 1860 is also entered as a proxy for initial prosperity (as in Acemoglu et al., 2002). As expected we find a negative and significant effect of slavery on current income per capita.

In Model 2 we enter the slave states dummy together with our two geographical dummies and the effect of slavery becomes insignificant, while the coefficients of the dummies are significant and with the expected sign. In Model 3 we replace the slave states dummy with a dummy for Southern states,<sup>4</sup> and the slavery variable is again not significant. In Model 4 and 5 we confine the estimates respectively to slave states and Southern states: in these additional models the dummy for Atlantic states is the only variable which retains a significant effect. To sum up, the results from Table 1 show that the negative effect of slavery which was found in related papers captures structural differences among US regions and, in particular, between former slave and non-slave states, or between South and North. Once we control for these structural differences, there is not any significant direct effect of slavery on current income per capita.<sup>5</sup>

**Table 1: Slavery and Economic Development**

<i>Dependent Variable: Per Capita Income 2000</i>					
Estimation Method: OLS	Model 1	Model 2	Model 3	Model 4	Model 5
Slaves/Population 1860	-0.239*** (-10.99)	-0.0249 (-0.79)	-0.0497 (-1.51)	-0.0211 (-0.67)	-0.0287 (-0.85)
Population Density 1860	0.0444*** (7.26)	0.0386*** (9.37)	0.0387*** (9.22)	0.297 (1.59)	0.263 (1.61)
North East Dummy		0.0982*** (5.61)	0.120*** (6.89)		
South Atlantic Dummy		0.107*** (7.57)	0.111*** (7.79)	0.103*** (7.40)	0.107*** (7.55)
Slave States Dummy		-0.174*** (-13.64)			
South Dummy			-0.148*** (-10.53)		
Constant	10.06*** (1652.16)	10.09*** (1464.86)	10.07*** (1515.65)	9.911*** (886.96)	9.911*** (753.30)
Observations	1960	1960	1960	1026	913
R-squared	0.08	0.21	0.18	0.08	0.08
Sample	All Counties	All Counties	All Counties	Slave States	South States

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

After establishing that the effect of slavery on current economic performances (as of the year 2000) is absent, we also test whether this conclusion holds in previous decades. In Table 2, we re-estimate the complete model (Model 2) in Table 1 for income per capita in 1990, 1980 and 1970 and we find that the effect of slavery on income per capita has faded at least since 1980. There is a moderate and

<sup>4</sup> The correlation between the two dummies is high but not perfect, at 0.83.

<sup>5</sup> For the state of São Paulo (Brazil), Summerhill (2010) also finds that the intensity of slavery in 1872 has no discernable negative impact on income in 2000.

significant negative impact on income per capita in 1970, even after controlling for structural differences.<sup>6</sup> The decreasing effect of slavery on income per capita is consistent with the evidence of a catch-up between North and South (see Caselli and Coleman, 2001). The drop in the coefficient on slavery after the 1970s is also consistent with a positive effect of the abolition of the Jim Crow Laws in 1965. This effect may have been delayed<sup>7</sup> because of adjustments in the economy which were mainly related to schooling. For example Margo (1990) finds a negative effect of ‘Separate but Equal’ schools on blacks’ schooling, skills, and employment rate. It is possible therefore that this set of laws may have caused some distortions in the efficient allocation of factors which then had a negative effect on income per capita.<sup>8</sup>

**Table 2: Slavery and Income from 1970 to 1990**

<i>Dependent Variable: Per Capita Income</i>			
Estimation Method: OLS	1970	1980	1990
Slaves/Population 1860	0.134*** (-4.34)	0.0418 (-1.25)	0.0335 (-1.12)
Population Density 1860	0.0277*** (6.07)	0.0237*** (7.31)	0.0345*** (8.67)
North East Dummy	0.0549*** (4.37)	0.0366*** (2.78)	0.112*** (7.14)
South Atlantic Dummy	0.0764*** (5.60)	0.0323** (2.28)	0.127*** (9.69)
Slave States Dummy	-0.252*** (-19.34)	-0.201*** (-15.85)	-0.192*** (-15.54)
Constant	8.181*** (1441.89)	9.080*** (1541.64)	9.681*** (1632.81)
Observations	1959	1959	1960
R-squared	0.39	0.26	0.27
Sample	All Counties	All Counties	All Counties

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

<sup>6</sup> We do not have data on income per capita at the county level for the 1960. However, we have data on median family income in 1960, which has a correlation of 0.82 with income per capita in 1970 (the serial correlation between the levels of income per capita in subsequent decades is between 0.89 and 0.79 and therefore almost the same as for median family income in 1960 and income per capita in 1970). If we use median family income as a dependent variable for 1960 we find that the coefficient for slavery in 1960 is significant and equal to 0.23. A similar coefficient is found if we use as dependent variable the predicted level of income per capita in 1960 coming from the interpolation between median income in 1960 and income per capita in 1970.

<sup>7</sup> Using measures of income correlated with income per capita (see footnote above) we find that for previous decades the coefficient on slavery is almost constant, which suggests a positive effect of the abolishment of the Jim Crow Laws.

<sup>8</sup> Going further back, the historical evidence reported and interpreted by Acemoglu and Robinson (2008) suggests that the abolition of slavery had a small effect on the Southern economy since, after the Civil War, the landed elites managed to maintain economic institutions based on low-skilled, repressed labor through the exercise of de facto political power.

### 3. Slavery and Inequality: New Evidence

According to the Engerman and Sokoloff hypothesis, the initial presence of specific factor endowments explains the development of agricultural production techniques based on slave labor, which in turn resulted in extreme economic inequality and in a set of political (Engerman and Sokoloff, 2005b), redistributive (Sokoloff and Zolt, 2007), and educational (Mariscal and Sokoloff, 2000) institutions that reflected this inequality. The link between factor endowments and inequality is also empirically documented. Galor et al. (2009) find evidence that land inequality adversely affected the emergence of human capital promoting institutions, as measured by educational expenditure across US states in the 1900-1940 period. Vollrath (2010) finds evidence of a negative effect of inequality on property tax revenues in 1890. Ramcharan (2009) tests the relationship between land inequality and redistribution and finds a significant effect of land inequality on redistributive policies in the 1890-1930 period. Over a cross section of slave counties, Lagerlöf (2005) finds that counties which in 1850 had a larger slave population display higher racial inequality today. However, the link between slavery and overall economic and racial inequality today still remains unclear. The channel through which this link may have worked is also poorly understood.

In Table 3 we show the distribution of inequality and poverty across the nine US Census regions. The three Southern regions, where the share of slaves was the largest, are the ones with highest levels of inequality (both in terms of racial and income inequality). The share of the population below the poverty level is also highest in the three Southern regions. However the table only provides some statistical association between variables which of course can depend on structural differences between regions as for the case of income per capita. For example, most of the Southern states (e.g., Texas, Louisiana, Kansas, etc.) are rich in natural resources (mainly oil) which may explain a higher degree of inequality through a resource curse.

In Table 4 we test the relationship between slavery and current economic inequality once we control for structural differences which we proxy with appropriate dummies as in Table 1. In Model 1 we regress income inequality<sup>9</sup> on slavery, controlling for the same set of dummies introduced in Model 2 of Table 1, i.e., the slave states dummy and two geographical dummies. As in Table 1, we also enter population density as a control for initial differences in income across counties. We find that slavery has a positive and significant effect on income inequality, even under our controls. The dummy for slave states is also positive and significant suggesting that, beside slavery, there may be

---

<sup>9</sup> See the Data Appendix for an explanation of the method used to calculate income inequality at the county level.

other reasons that have worsened current economic inequality within these states. The dummy for the North East is also associated with higher inequality, even if the size of the coefficient is small, while South Atlantic states display less inequality. In Model 2 we replace the slave states dummy with the South dummy, to obtain very similar results. In Model 3 we confine the estimates to slave states only. In all specifications, slavery always retains a positive and significant coefficient.

**Table 3: Descriptive Statistics**

Region	Freq.	Slaves	Inc. Wht	Inc. Blk	Racial Ineq	Income Ineq	Share Blk	Share Wht	Poverty
New England	67	0	22873	15280	0.031	0.392	2.013	92.149	0.088
Middle Atlantic	150	0.0004	21668	13508	0.044	0.399	5.354	87.047	0.102
East North C.	437	0	19449	13383	0.027	0.386	3.109	92.396	0.097
West North C.	617	2.83	17546	12472	0.030	0.398	1.186	92.295	0.110
South Atlantic	584	36.70	20321	13078	0.084	0.417	21.06	73.381	0.143
East South C.	364	28.26	17341	11244	0.065	0.436	17.13	80.082	0.169
West South C.	469	29.10	18731	10713	0.110	0.432	10.82	68.905	0.178
Pacific	278	0.0213	19080	13577	0.068	0.405	7.13	79.929	0.139
Mountain	153	0	23317	17408	0.102	0.405	1.758	71.981	0.134
Total	3119	15.62	19219	12748	0.063	0.410	8.693	81.470	0.135

**Table 4: Slavery and Economic Inequality**

<i>Dependent Variable: Income Inequality</i>			
Estimation Method: OLS	Model 1	Model 2	Model 3
Slaves/Population 1860	0.0374*** (7.42)	0.0331*** (6.39)	0.0375*** (7.46)
Population Density 1860	0.00304*** (4.28)	0.00302*** (4.36)	0.0117 (0.86)
North East Dummy	0.0108*** (6.25)	0.00817*** (4.78)	
South Atlantic Dummy	-0.0212*** (-9.58)	-0.0240*** (-10.73)	-0.0214*** (-9.60)
Slave States Dummy	0.0335*** (17.64)		
South Dummy		0.0353*** (17.34)	
Constant	0.387*** (409.51)	0.390*** (421.94)	0.420*** (251.81)
Observations	1984	1984	1050
R-squared	0.31	0.31	0.11
Sample	All Counties	All Counties	Slave States

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

In Table 5 we focus on racial inequality (measured by horizontal income inequality)<sup>10</sup> and the effect of slavery is even more significant.<sup>11</sup> In Model 1 the dummy for slave states is significant but turns to be negative while the dummies for Southern and North Eastern counties are respectively insignificant and marginally significant. In Model 2 we replace the slave states dummy with the South dummy and then in Model 3 we restrict the estimates to former slave states only. Results for both models are similar to those from Model 1. We therefore can conclude that there is a robust relationship between slavery and current income and racial inequality.

**Table 5: Slavery and Racial Inequality**

<i>Dependent Variable: Racial Inequality</i>			
Estimation Method: OLS	Model 1	Model 2	Model 3
Slaves/Population 1860	0.178*** (26.33)	0.162*** (22.15)	0.179*** (26.70)
Population Density 1860	0.0102*** (5.83)	0.0102*** (5.84)	0.0532*** (2.83)
North East Dummy	0.00126 (0.41)	0.00475 (1.57)	
South Atlantic Dummy	-0.00537* (-1.75)	-0.00842*** (-2.63)	-0.00597* (-1.95)
Slave States Dummy	-0.00647** (-2.16)		
South Dummy		0.00590* (1.71)	
Constant	0.0355*** (23.39)	0.0320*** (23.21)	0.0279*** (10.84)
Observations	1984	1984	1050
R-squared	0.40	0.40	0.40
Sample	All Counties	All Counties	Slave States

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

Next in Table 6 we estimate the effect of slavery on the share of the population below the poverty level. As in previous tables in Model 1 we control for former slave states. In Model 2 we replace the slave states dummy with the South dummy. Finally in Model 3 we restrict the estimates to counties in former slave states only. The effect of slavery on the share of the population below poverty is significant and positive under all specifications. It is therefore obvious to infer that slavery affects the poverty rate (which is likely to be more prevalent among blacks) which in turn contributes to the level of racial and income inequality within the country.

<sup>10</sup> See Data Appendix.

<sup>11</sup> Consistently, in Lagerlöf (2005) slavery increases white income and decreases black income.

**Table 6: Slavery and Poverty**

<i>Dependent Variable: Population Below Poverty Level</i>			
Estimation Method: OLS	Model 1	Model 2	Model 3
Slaves/Population 1860	0.0575*** (6.40)	0.0520*** (5.54)	0.0575*** (6.42)
Population Density 1860	0.00377*** (4.93)	0.00374*** (5.04)	0.00768 (0.22)
North East Dummy	-0.00109 (-0.45)	-0.00534** (-2.19)	
South Atlantic Dummy	-0.0357*** (-10.42)	-0.0397*** (-11.29)	-0.0357*** (-10.42)
Slave States Dummy	0.0523*** (15.43)		
South Dummy		0.0540*** (14.07)	
Constant	0.0972*** (74.68)	0.101*** (77.46)	0.149*** (46.65)
Observations	1984	1984	1050
R-squared	0.32	0.32	0.11
Sample	All Counties	All Counties	Slave States

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

Finally in Table 7 we test whether slavery affects racial inequality through income disparities, or vice versa. In order to test these alternative hypotheses we first enter income inequality as an additional regressor in the model in which we regress racial inequality on slavery (Model 1). In the second model (Model 2) we enter racial inequality as a regressor for economic inequality. In both cases, we also control for population density and for the set of dummies that appear in the first specifications of Tables 4-6- In Model 1, income inequality hardly diminishes the effect of slavery on racial inequality. There is a positive effect of income inequality on racial inequality, but it is hard to establish a causality given that the two variables are for the same year. In Model 2, once we control for racial inequality, slavery is no longer significant in a regression for economic inequality. Therefore, our results suggest that the impact of slavery on economic inequality runs through its impact on racial inequality. In the next two models (Models 3 and 4) we replicate the same test for the share of population below the poverty level. Consistently we again find that the effect of slavery on poverty runs through racial inequality.



**Table 7: The Effect of Slavery Through Racial Inequality**

	Model 1	Model 2	Model 3	Model 4
Estimation Method: OLS	<i>Racial Inequality</i>	<i>Income Inequality</i>	<i>Racial Inequality</i>	<i>Poverty</i>
Slaves/Population 1860	0.156*** (25.03)	-0.00730 (-1.38)	0.155** (23.94)	-0.0149 (-1.55)
Population Density 1860	0.00842*** (6.25)	0.000465 (1.45)	0.00872*** (5.88)	-0.000393 (-1.00)
North East Dummy	-0.00517* (-1.70)	0.0104*** (6.19)	0.0017 (0.54)	-0.00160 (-0.61)
South Atlantic Dummy	0.00733*** (2.61)	-0.0199*** (-9.99)	0.00885** (3.18)	-0.0335*** (-10.98)
Slave States Dummy	-0.0265*** (-8.49)	0.0352*** (19.19)	-0.0273*** (-9.03)	0.0549*** (17.19)
Income Inequality	0.597*** (16.36)			
Racial Inequality		0.251*** (17.28)		0.407*** (15.17)
Population Below Poverty Level			0.399*** (14.29)	
Constant	-0.196*** (-14.20)	0.378*** (378.62)	-0.00325 (-1.18)	0.0828*** (59.43)
Observations	1984	1984	1984	1984
R-squared	0.49	0.41	0.49	0.43
Sample	All Counties	All Counties	All Counties	All Counties

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

#### 4. The Impact of Slavery on Current Income Inequality: Three Alternative Theories

So far we have shown that the relationship between slavery and long-run development is not robust, but that there is a robust relationship between slavery and inequality, which appears to work through racial inequality. In this Section we try to understand which is the channel through which racial inequality, as caused by slavery, affects inequality. We test three alternative theories. The first theory relates to the Engerman and Sokoloff hypothesis on the link between factor endowments and economic inequality. The second theory focuses on racial discrimination. The human capital transmission is the third theory we test.

According to the first theory, slavery emerged where factor endowments justified large-scale plantations. In other words, the impact of slavery on current inequality should come from its association with land inequality.<sup>12</sup> To test this hypothesis, we construct an index of land inequality

<sup>12</sup> The direct link between endowments and slavery, where the former are measured by temperature, elevation, and precipitation, has been examined for the US by Lagerlöf (2005).

similar to the one employed by Nunn (2008b).<sup>13</sup> It is reasonable to expect that, within counties with a prevalence of large-scale plantations and therefore large land inequality, income per capita for whites in mid 19<sup>th</sup> century was higher. This in turn implied, in those days, a larger degree of inequality between blacks and whites. This initial racial inequality may have persisted until present day and contributed to the higher overall economic inequality, as suggested by our results in Table 4. Therefore, according to this first hypothesis, the effect of slavery only captures differences in the diffusion of large-scale plantations which used to employ a larger number of slaves, driving the correlation between slavery, racial inequality and economic inequality.

According to the racial discrimination theory, slavery was responsible for inducing racial discrimination, which in turn implied a racial wage gap. To test this hypothesis we proceed as follows. We start by creating a measure of racial discrimination. To this end, we compute returns on education for blacks and whites through a model akin to a macro-Mincerian equation, which we estimate in the Table Appendix as Table A1. Beside educational attainment, we also control for experience, as proxied by the employment rate and median age for each group, for the proportion of whites and blacks in the labor force, to capture clusters or network effects, and for fixed geographical effects.<sup>14</sup> In Table 8 we summarize the descriptive statistics resulting from our estimates. As expected income per capita tends to increase with the level of education. On average, for educated whites income per capita is 71.3 percent higher than for whites without any formal education (i.e., high-school dropouts), while for educated blacks income per capita is only 36.5 percent higher. We use predicted returns to construct a measure of discrimination between blacks and whites which is equal to the ratio of average returns for blacks to returns for whites. A ratio below one denotes the existence of a possible racial discrimination.

**Table 8: Predicted Returns on Education (Blacks and Whites)**

Variable	Obs	Mean	Std. Dev.	Min	Max
Estimated Returns Whites	3074	0.713	0.139	0.341	1.499
Estimated Returns Blacks	2799	0.365	0.170	0.016	1.415

According to the human capital transmission theory, the legacy of slavery runs through educational inequality. This happens since blacks, the vast majority of whom descend from slaves with no education (Smith, 1989 and Margo, 1990) have accumulated a gap in terms of education which

<sup>13</sup> See Data Appendix.

<sup>14</sup> In order to estimate returns for whites and blacks at the county level we confine the estimates to the two groups separately. For a discussion on macro-Mincerian equations see Krueger and Lindhal (2001) and references therein.

results in economic inequality between blacks and whites, and in turn in overall inequality. To test this hypothesis, we construct a measure of racial inequality for education,<sup>15</sup> based on information on the attainment of blacks and whites.

Table 9 presents descriptive statistics for the proxies we have constructed in order to test the three hypotheses presented above, i.e., for land inequality in 1860, for racial discrimination in 2000, and for educational inequality in 2000. We present these statistics for the entire sample of counties and also for the sub-sample of counties belonging to former slave states. At the mean, the ratio of the expected returns on education we estimated for blacks and whites is 0.51, across all counties.<sup>16</sup> When confined to former slave states only, the blacks to whites ratio of returns on education is even smaller, suggesting the presence of more discrimination down in the South. The distribution of education between races<sup>17</sup> and the distribution of land across farms<sup>18</sup> are also more unequal within slave states.

**Table 9: Comparison Among Theories: Descriptive Statistics**

<i>All Counties</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
Land Inequality in 1860	1878	0.463	0.076	0.1011	0803
Returns Blacks/Returns Whites	2799	0.511	0.224	0.0284	2.531
Racial Educational Inequality	3140	0.023	0.026	0.00007	0.203
<i>Slave States Only</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
Land Inequality in 1860	1037	0.480	0.076	0.119	0.803
Returns Blacks/Returns Whites	1358	0.452	0.163	0.071	2.015
Racial Educational Inequality	1405	0.033	0.027	0.0005	0.203

In Table 10 we compare our three hypotheses as follows. In Model 1 we test the land inequality theory. We enter the index of land inequality in 1860 as a regressor for income inequality, to find that its coefficient is highly significant and with the expected positive sign, but that the impact of slavery is hardly diminished.<sup>19</sup> This effect suggests that land inequality does contribute to income inequality, but it is not the channel through which slavery manifests its impact on current

<sup>15</sup> See Data Appendix.

<sup>16</sup> We omit as outliers those few counties (67) for which the ratio is zero. In these counties the number of blacks is small (26 on average) and all of them dropped out of school before gaining a diploma.

<sup>17</sup> Racial educational inequality is zero in those counties (only three counties) where only a single race is present. We also omit these counties as outliers.

<sup>18</sup> The index of land inequality is zero for six counties in which farm size falls within the same range.

<sup>19</sup> Acemoglu et al. (2008) document a negative cross-state relationship between land inequality in 1860 and school enrollment both in 1870 and 1950.

inequality.<sup>20</sup> In Model 2 we enter the returns ratio to the same basic specification to test the racial discrimination theory. As expected the ratio displays a significant and negative coefficient, but again does not affect the coefficient of slavery, which implies a contribution of racial discrimination to inequality but does not identifies in this factor the influence of slavery on the dependent variable. Finally, in Model 3, to test the human capital transmission theory, we enter the control for racial educational inequality and we find not only that this measure is significant, but also that it fully explains the impact of slavery, which loses significance. Table 11 replicates the same set of regressions of Table 10 by entering the poverty rate as dependent variable. Once again we find that slavery loses its significance only when we control for racial educational inequality.

**Table 10: Slavery and Inequality: Comparison Among Theories**

Estimation Method: OLS	<i>Dependent Variable: Income Inequality</i>		
	Model 1	Model 2	Model 3
Slaves/Population 1860	0.0381*** (7.33)	0.0366*** (7.34)	0.000556 (0.10)
Population Density 1860	0.00284*** (4.51)	0.00295 (0.39)	0.000808** (2.15)
North East Dummy	0.0108*** (6.16)	0.0104*** (5.29)	0.0102*** (6.00)
South Atlantic Dummy	-0.0194*** (-8.71)	-0.0214*** (-9.24)	-0.0231*** (-11.37)
Slave States Dummy	0.0310*** (15.25)	0.0325*** (16.43)	0.0349*** (19.27)
Land Inequality 1860	0.0456*** (4.64)		
Returns Blacks/Returns Whites		-0.0117*** (-3.48)	
Racial Educational Inequality			0.569*** (17.16)
Constant	0.366*** (84.18)	0.393*** (185.71)	0.380*** (400.24)
Observations	1878	1895	1984
R-squared	0.32	0.31	0.41

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses except for Model 2 in which we bootstrap standard errors because of the predicted variable.

<sup>20</sup> In Table A2 of the Table Appendix we perform a couple of robustness checks to gauge the impact of land distribution. In Model 1, as an alternative measure of land inequality other than the Gini index, we enter the mean log deviation (namely, a General Entropy Index with  $\alpha = 0$ , also known as a GE(0)). In Model 2, to control for measurement errors, we instrument the land Gini with latitude. In both cases our previous conclusions hold.

**Table 11: Slavery and Poverty: Comparison Among Theories**

<i>Dependent Variable: Population Below Poverty Rate</i>			
Estimation Method: OLS	Model 1	Model 2	Model 3
Slaves/Population 1860	0.0594*** (6.58)	0.0576*** (6.18)	-0.00635 (-0.63)
Population Density 1860	0.00347*** (5.26)	0.00364 (0.45)	0.0001 (-0.24)
North East Dummy	-0.000508 (-0.21)	-0.000981 (-0.37)	-0.00212 (-0.85)
South Atlantic Dummy	-0.0320*** (-9.17)	-0.0354*** (-10.47)	-0.0389*** (-12.31)
Slave States Dummy	0.0476*** (13.95)	0.0503*** (14.85)	0.0545*** (18.10)
Land Inequality 1860	0.0744*** (4.11)		
Returns Blacks/Returns Whites		-0.0179*** (-3.94)	
Racial Educational Inequality			0.985*** (15.40)
Constant	0.0633*** (8.01)	0.106*** (37.21)	0.0858*** (66.29)
Observations	1878	1926	1984
R-squared	0.34	0.33	0.44

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses except for Model 2 in which we bootstrap standard errors because of the predicted variable.

To conclude, our results show that even though land inequality and racial discrimination matter for current inequality, it is through human capital transmission that slavery determines the cross-country distribution of inequality in the US today.<sup>21</sup>

## 5. Controlling for the Endogeneity of Racial Educational Inequality

It is reasonable to conclude that current income inequality is primarily influenced by slavery through the impact exerted by the latter on the unequal educational attainment between races. However, a possible objection to this conclusion is of course the potential endogeneity of racial educational inequality, even though data for educational attainment are stock data for the population of 25 years of age and above, which means that decisions about schooling are taken well before 2000. This implies that our regressions should not present problems of causality. Still, they can present a problem related to a possible correlation between educational attainment and the error term (due to unobserved heterogeneity, measurement errors, etc.), which can affect the magnitude of

<sup>21</sup> Bobonis and Morrow (2010) examine the consequences of labor market coercion for individuals' decisions to accumulate human capital in the context of nineteenth century Puerto Rico.

the coefficient if the relationship is estimated using an OLS estimator. However, if we can assume that effect of slavery is only through educational inequality, we can use the former as an excluded instrument for the latter in a two stage least estimation (2SLS) which should provide consistent estimates.

We can write the 2SLS system as:

$$Y_i = \alpha_i + \beta_1 E_i + \beta_2 X_i + \varepsilon_i \quad (1)$$

$$E_i = \lambda_i + \gamma_1 S_i + \gamma_2 X_i + \eta_i \quad (2)$$

where  $Y_i$  represents economic inequality,  $E_i$  represents racial educational inequality,  $S_i$  is the share of slaves in 1860 and  $X_i$  denotes other exogenous controls. In (1) income inequality depends on educational inequality and other exogenous factors. In (2) racial educational inequality depends on slavery which, according to Table 7, should not have any direct effect on inequality and other exogenous factors. Therefore, slavery does satisfy the necessary requirement for an excluded instrument.

Table 12 presents results for the 2SLS estimation in a regression where land inequality and the returns ratio are entered together with the instrumented racial inequality. As expected, in the first stage regression (Panel B) slavery explains a large proportion of the racial educational inequality. The endogeneity test does not reject the hypothesis that racial educational inequality is orthogonal to income inequality and the weak identification test (i.e., a comparison between the Cragg-Donald statistics and the Stock and Yogo critical values) confirms that the instrument we employ is appropriately correlated with the instrumented variable. The coefficient for racial educational inequality in the second stage regression (Panel A, Model 1) is significant at 1 percent and its magnitude is even larger than the one obtained using an OLS estimator. In general a 1 percent increase of racial educational inequality increases economic inequality by 0.59 percent. Land inequality has still a significant effect on income inequality, while the returns ratio is not significant. Model replicates the second stage regression with the poverty rate as dependent variable and similar results hold.

To sum up, we can conclude that our hypothesis, according to which the effect of slavery runs through human capital transmission, is confirmed even after controlling for endogeneity.

**Table 12: 2SLS Estimates**

<i>Second Stage Regressions</i>		
	Model 1	Model 2
Estimation Method: 2SLS	<i>Income Inequality</i>	<i>Poverty</i>
Racial Educational Inequality	0.590*** (7.42)	0.957*** (6.94)
Population Density 1860	0.000608 (1.47)	-0.000132 (-0.23)
North East Dummy	0.0101*** (5.75)	-0.00141 (-0.55)
South Atlantic Dummy	-0.0220*** (-10.10)	-0.0356*** (-10.18)
Slave States Dummy	0.0331*** (18.70)	0.0501*** (18.54)
Land Inequality 1860	0.0299*** (3.41)	0.0475*** (3.13)
Returns Blacks/Returns Whites	0.00146 (0.42)	0.00386 (0.69)
Constant	0.366*** (94.49)	0.0622*** (9.80)
Cragg Donald Statistics	532.982	532.982
Stok and Yogo Critical Values	(16.23)	(16.38)
Endogeneity (p-values)	0.8101	0.6856
Hansen J-Statistics (p-values)	0.0000	0.0000
Anderson LR Statistic	469.604	469.604
Instruments	<i>Slaves/Population 1860</i>	<i>Slaves/Population 1860</i>

<i>First Stage Regressions</i>	
Dependent Variable	<i>Racial Educational Inequality</i>
Slaves/Population 1860	0.0627*** (19.54)
Population Density 1860	0.00363*** (6.34)
North East Dummy	0.0011 (0.95)
South Atlantic Dummy	0.00428*** (3.35)
Slave States Dummy	-0.00469*** (-3.03)
Land Inequality 1860	0.0289*** (3.04)
Returns Blacks/Returns Whites	-0.0216*** (-10.23)
Constant	0.00973** (2.21)
Observations	1831
R-squared	0.43

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Significance levels in parentheses.

## 6. Convergence and Divergence in Educational Attainment

To improve our understanding of the dynamics of racial inequality along the educational dimension, we complete our investigation by analyzing a panel dataset of educational attainment across races for the US states for the 1940-2000 period. Smith (1984), Smith and Welch (1989), Margo (1990) and Collins and Margo (2006) provide a description and an interpretation of the underlying evolution of these variables. Here we build on this literature.

Even though information on educational attainment data is only available after 1940, the data show a very high correlation between the racial gap in education in 1940 and the fraction slaves/population in 1860. At the high-school level the correlation is 0.90, while it is 0.78 at the bachelor-degree level. Therefore, we can treat the initial gap as of 1940 as a proxy for the effect of slavery.

Table 13 shows the shares of whites and blacks with at least either a high-school education or a bachelor degree. Over the 1940-2000 period whites are on average more educated than blacks. The share of the white population with at least a high-school level of education is above 60% against a 47% of the black population. The gap between whites and blacks is even larger (in relative terms) when we consider the share of the population with a bachelor degree (15.4% against 8.8%). In this case the share of the black population holding a bachelor degree is in mean 40% smaller than the one for the white. In addition, the population in the North of the US seems to have a higher level of education both within the black and the white population.

Figure 3 shows the educational gap between whites and blacks calculated as the ratio of the share of whites to the share of blacks with at least a high-school diploma (on the LHS) or a bachelor degree (on the RHS). The figure shows a sort of convergence in the share of the population (belonging to the two groups) with a high-school education. The gap between the shares of whites and blacks holding a bachelor degree also decreases over time, but this seems to occur at a slower rate. The two figures at the bottom show that those states which have started with a larger gap are nowadays the ones which still have larger racial inequality in terms of education.

In Table 14 we regress the educational gap on the shares of educated whites and blacks in 1940, in a parsimonious specification where we only control for population and time and regional fixed effects, in order to use the maximal number of observations. Model 1 shows that the gap in high-school education depends significantly on the initial gap. At the mean, the educational gap at the high-school level of education is 0.30 percent higher for a 1 percent increase in the initial gap.



Model 2 shows results for the gap between shares of the population holding a bachelor degree. Decreasing the initial gap for the population holding a bachelor degree by a 1 percent decreases the gap by almost 0.28 percent. In Models 3 and 4 the fraction of slaves in the population in 1860 has a significantly positive effect on the racial gaps both at the high-school and bachelor levels. However, when in Models 4 and 5 we enter this variable together with the initial gaps, it loses significance, as expected given the pattern of correlation previously mentioned.<sup>22</sup> This once again confirms that the impact of slavery on the evolution of the educational gap runs through its impact on the initial gaps. To sum up, the results in Table 14 confirm the trend reported in Figure 3, according to which states which have initiated with a larger racial gap in terms of education still have nowadays a larger racial educational inequality, if compared to states in which blacks and whites had similar levels of education.

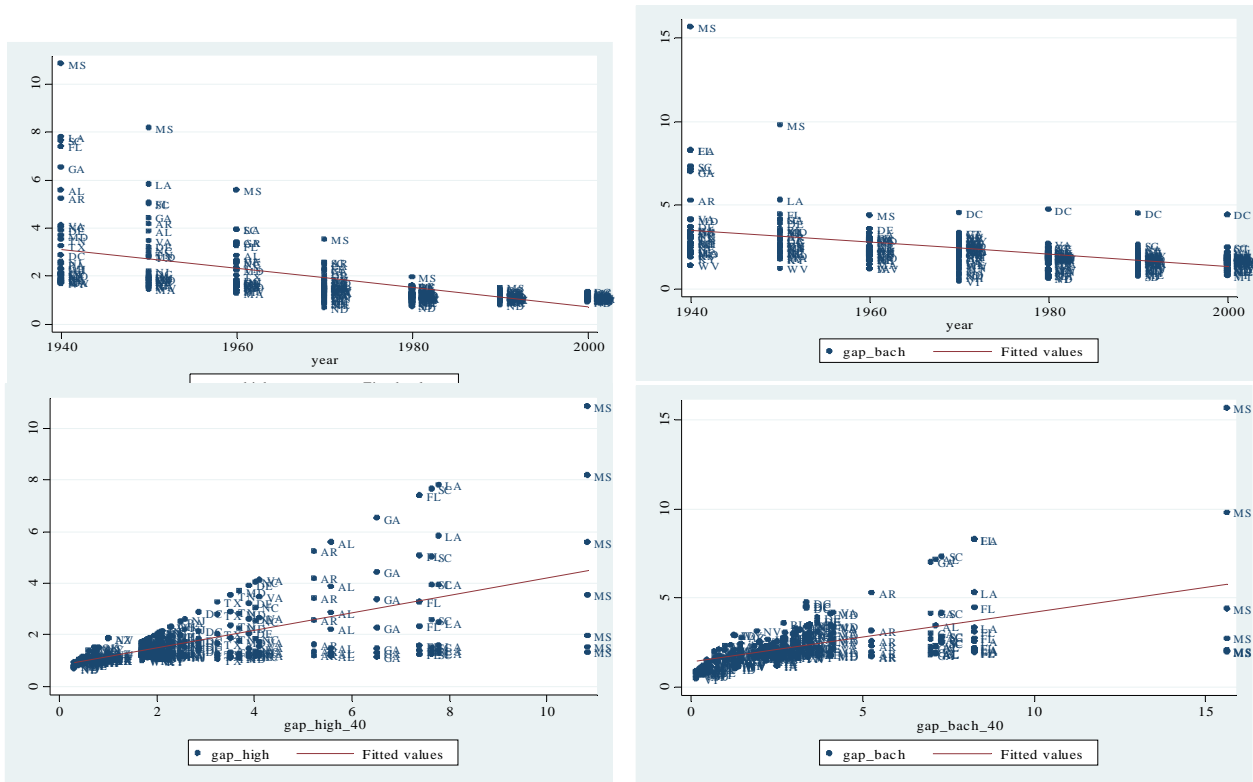
**Table 13: Educational Attainment, by Race (1940-2000):**

***Descriptive Statistics***

<i>All Counties</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
High-School Diploma (Whites)	297	60.2291	21.34998	16.37847	94.43
Bachelor Degree (Whites)	297	15.42412	9.624878	2.813198	77.3
High-School Diploma (Blacks)	297	47.18088	26.79546	2.594816	95.9
Bachelor Degree (Blacks)	297	8.758676	6.594131	.3484704	34.82
<i>North of the US Only</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
High-School Diploma (Whites)	199	64.82332	20.23654	20.85144	94.43
Bachelor Degree (Whites)	199	16.91558	10.25016	3.544309	77.3
High-School Diploma (Blacks)	199	54.32846	25.12736	5.924223	95.9
Bachelor Degree (Blacks)	199	10.1778	7.026015	1.125535	34.82
<i>South of the US Only</i>					
Variable	Obs	Mean	Std. Dev.	Min	Max
High-School Diploma (Whites)	98	50.90004	20.58661	16.37847	86.31
Bachelor Degree (Whites)	98	12.39555	7.375334	2.813198	34.73
High-School Diploma (Blacks)	98	32.66692	24.17767	2.594816	78.95
Bachelor Degree (Blacks)	98	5.876993	4.404805	.3484704	20.29

<sup>22</sup> In Models 3-6 the number of observations is lower since a few states (e.g., Hawaii, Idaho, Montana) do not appear in the 1860 Census.

**Figure 3: The Educational Gap between Whites and Blacks (1940 – 2000)**



**Table 14: The Determinants of the Racial Educational Gap**

Estimation Method: Pooled OLS	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	<i>Gap H.S.</i>	<i>Gap Bach.</i>	<i>Gap H.S.</i>	<i>Gap Bach.</i>	<i>Gap H.S.</i>	<i>Gap Bach.</i>
Educational Gap in 1940 (High-S.)	0.300*** (5.37)				0.238*** (2.98)	
Educational Gap in 1940 (Bachelor)		0.279*** (3.60)				0.279*** (2.65)
Slaves/Population 1860			4.404*** (5.36)	4.105*** (3.56)	1.197 (1.54)	-0.466 (-0.49)
Population	-0.136*** (-4.05)	-0.0729 (-1.38)	-0.147*** (-3.86)	-0.0716 (-1.07)	-0.133*** (-3.77)	-0.0765 (-1.29)
Slave States Dummy	-0.0641 (-0.51)	-0.280 (-1.61)	-0.427** (-2.08)	-0.592** (-2.01)	-0.198 (-1.35)	-0.0744 (-0.50)
Constant	4.545*** (8.02)	4.154*** (4.95)	5.287*** (7.89)	4.832*** (4.28)	4.636*** (7.81)	4.255*** (4.65)
Time Dummies	Yes	Yes	Yes	Yes		
Observations	297	297	258	258	258	258
R-squared	0.68	0.53	0.65	0.43	0.68	0.53

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

In Table 15 we add some additional controls to Models 1 and 2 of Table 14. The use of additional controls reduces the sample size, but it permits to evaluate additional factors which may have affected the dynamics. In the first two models we control for the share of blacks, whose dynamics

should capture the massive migration flows occurring across states during this period, and for the ratio of numbers of farms and manufacturing establishments to the total population, to proxy for structural changes in the economy.<sup>23</sup> The share of blacks marginally explains (being significant at 10 percent) the gap in high-school education, but it is significant in explaining differences between blacks and whites holding a bachelor degree, denoting that much of the difference in education in former slave states (the ones with the larger number of blacks) remains at the higher-education level. The two variables that we use to proxy for structural changes (i.e., the proportion of farms and manufacturing establishments) are only significant in Model 1. Increasing the proportion of farms increases the gap in the high-school level of education by 1 percent, while the elasticity associated with the proportion of manufacturing establishments tends to decrease the gap by almost 2 percent. The latter effect may occur because returns to education in the manufacturing sector are higher and therefore individuals are more willing to acquire education in the presence of many manufacturing establishments. Instead in rural areas (with a higher number of farms) returns to educations are likely to be lower, which associated with land inequality explains the higher educational gap. The non significance of the same two regressors for the bachelor level, in Model 2, can be explained by the fact that the latter is less correlated with these two sectors.

Finally in Models 3 and 4 we control for median family income and for the ratio of general direct expenditure on education to general direct expenditure.<sup>24</sup> Richer states tend to have a smaller gap at the high-school level of education (Model 3), however this is reversed for the bachelor level, presumably because once gained a high-school diploma whites are more likely to go for further education when income per capita increases (Model 4). The education share of the general direct expenditure is only significant in the model for higher education (Model 4). Increasing expenditures on education by a 1 percent decreases the gap by almost 0.95 percent. The educational gap is significant in all specifications except Model 4.

To conclude, our results confirm that, over the period under consideration, after controlling for a large variety of factors, the present level of the racial educational gap is largely explained by the initial gap, which was in turn determined by slavery through the channels documented in Margo (1990).

---

<sup>23</sup> The data are collected from the City and County Data-Book and normally refer to three years before the Census (1937, 1947, etc.).

<sup>24</sup> These data are also collected from the City and County Data-Book.

**Table 15: The Determinants of the Racial Educational Gap: Extended Models**

Estimation Method: Pooled OLS	Model 1	Model 2	Model 3	Model 4
	<i>Gap High-Schl.</i>	<i>Gap Bach. Dgr.</i>	<i>Gap High-Schl.</i>	<i>Gap Bach. Dgr.</i>
Educational Gap in 1940 (High-School)	0.221*** (2.68)		0.143*** (4.49)	
Educational Gap in 1940 (Bachelor Degree)		0.180** (2.00)		0.0356 (1.51)
Population	-0.0947** (-2.52)	-0.00761 (-0.15)	-0.00604 (-0.30)	0.00821 (0.24)
Slave States Dummy	-0.253 (-1.57)	-0.597** (-2.56)	-0.173* (-1.90)	-0.104 (-1.11)
Black Population Share	0.0336* (1.85)	0.0481*** (4.39)	0.00705** (2.48)	0.0376*** (10.27)
Number of Farms	0.0104*** (2.84)	0.00514 (0.82)		
Number of Manufacturing Establish.	-0.0209*** (-2.61)	0.000575 (0.04)		
Median Family Income			-0.640** (-2.41)	1.153*** (4.47)
Educational Expenditure/Direct General Exp.			-0.00178 (-0.53)	-0.00946** (-2.19)
Constant	3.280*** (5.04)	2.753*** (3.09)	7.334*** (2.98)	-7.726*** (-3.48)
Time Dummies	Yes	Yes	Yes	Yes
Observations	238	238	183	183
R-squared	0.76	0.62	0.76	0.68

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

## 7. Conclusion

In this paper we have shown that the institution of slavery still plays a major role in the US economy and society. The main legacy of slavery is not on the level of development, but on the degree of inequality. In other words, those US counties that in the past have been more heavily affected by slave labor turn out to be not poorer, but more unequal, in the present day. We also show that the current level of income inequality is explained by racial inequality, which is in turn determined by slavery through its impact on the racial gap in human capital accumulation. While other factors that have been linked to slavery, such as initial endowments and racial discrimination, are also shown to affect current inequality, our results suggest that human capital transmission is the main channel through which slavery manifests its legacy.

In March 2010 President Obama presented Congress with a plan to reform No Child Left Behind (NCLB), America's main federal education programme, enacted in 2002 under President Bush with the full bipartisan support of Congress. Given the apparent failure of the education policies

introduced under NCLB, it is likely that the next few months will witness a heated debate about the state of America's education system and its weaknesses, among which profound racial and ethnic educational gaps play a prominent role (Hursh, 2007). Our work shows, on the one hand, that educational inequality is a central driver of income inequality and, on the other, how deeply rooted educational inequality is in the history of the country.

## REFERENCES

Acemoglu, D., Bautista, M. A., Querubín, P. and Robinson, J. A., 2008, Economic and Political Inequality in Development: The Case of Cundinamarca, Colombia, in Helpman, E. (ed.), *Institutions and Economic Performance*, Harvard University Press, Cambridge, 181–245.

Acemoglu, D., Johnson, S. and Robinson, J. A., 2002, Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution, *Quarterly Journal of Economics* 117, 1231-1294.

Acemoglu, D., Johnson, S., Robinson, J. A. and Yared, P., 2008, Income and Democracy, *American Economic Review* 98, 808-842.

Acemoglu, D. and Robinson, J. A., 2008, Persistence of Power, Elites, and Institutions, *American Economic Review* 98, 267-293.

Acemoglu, D. and Wolitzky, A., 2010, The Economics of Labor Coercion, *Econometrica*, forthcoming.

Berlin, I., 2003, *Generations of Captivity: A History of African American Slaves*, Harvard University Press, Cambridge.

Bobonis, G. J. and Morrow, P. M., 2010, Export Commodity Booms, Labor Coercion, and the Historical Containment of Education, mimeo, University of Toronto.

Cameron, S. V. and Heckman, J. J., 2001, The Dynamics of Educational Attainment for Blacks, Hispanics, and Whites, *Journal of Political Economy* 109, 455-499.

Caselli, F. and Coleman, W. J., 2001, The U.S. Structural Transformation and Regional Convergence: A Reinterpretation, *Journal of Political Economy* 109, 584-616.

Collins, W. J. and Margo, R. A., 2006, Historical Perspectives on Racial Differences in Schooling in the United States, in Hanushek, E. and Welch, F. (eds.), *Handbook of the Economics of Education*, Elsevier, New York, 107-154.

David, P. A. and Stampp, K. M. (eds.), 1976, *Reckoning With Slavery: Critical Essays in the Quantitative History of American Negro Slavery*, Oxford University Press, New York.

Engerman, S. L. and Sokoloff, K. L., 2005a, Institutional and Non-institutional Explanations of Economic Differences, in Menard, C. and Shirley, M. M. (eds.), *Handbook of New Institutional Economics*, Springer, Dordrecht, 639-665.

Engerman, S. L. and Sokoloff, K. L., 2005b, The Evolution of Suffrage Institutions in the Americas, *Journal of Economic History* 65, 891-921.

Engerman, S. L. and Sokoloff, K. L., 1997, Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States, in Harber, S. (ed.), *How Latin America Fell Behind*, Stanford University Press, Stanford, 260-304.

Fogel, R. W. and Engerman, S. L., 1974, *Time on the Cross: The Economics of American Negro Slavery*, Little Brown, Boston.

Galor, O., Moav, O. and Vollrath, D., 2009, Inequality in Landownership, the Emergence of Human-Capital Promoting Institutions, and the Great Divergence, *Review of Economic Studies* 76, 143-179.

Goldin, C. and Margo, R. A., 1992, The Great Compression: The US Wage Structure at Mid-Century, *Quarterly Journal of Economics* 107, 1-34.

Goldin, C., 1998, America's Graduation from High School: The Evolution and Spread of Secondary Schooling in the Twentieth Century, *Journal of Economic History* 58, 345-374.

Goldin, C. and Katz, L. F., 1999, The Shaping of Higher Education: The Formative Years in the United States, 1890 to 1940, *Journal of Economic Perspectives* 13, 37-62.

Heckman, J. J., 1990, The Central Role of the South in Accounting for Economic Progress of Black Americans, *American Economic Review* 80, 242-246.

Hursh, D. 2007, Exacerbating Inequality: The Failed Promise of the No Child Left Behind Act, *Race Ethnicity and Education* 10, 295-308.

Krueger, A. B. and Lindahl, M., 2001, Education for Growth: Why and For Whom?, *Journal of Economic Literature* 39, 1101-1136.

Lagerlöf, N., 2009, Slavery and Other Property Rights, *Review of Economic Studies* 76, 319-342.

Lagerlöf, N., 2005, Geography, Institutions, and Growth: The United States as a Microcosm, mimeo, York University.

Lokshin, M. and Sajaia, Z., 2006, EGEN\_INEQUAL: Stata Module Providing Extensions to Generate Inequality and Poverty Measures, *Statistical Software Components S456711*, Boston College.

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

Mariscal, E. and Sokoloff, K. L., 2000, Schooling, Suffrage, and the Persistence of Inequality in the Americas, 1800–1945, in Haber, S. (ed.), *Political Institutions and Economic Growth in Latin America: Essays in Policy, History, and Political Economy*, Hoover Institution Press, Stanford, 159-218.

Mitchener, K. J. and McLean, I. W., 2003, The Productivity of U.S. States Since 1880, *Journal of Economic Growth* 8, 73-114.

Naidu, S., 2010, Suffrage, Schooling, and Sorting in the Post-Bellum U.S. South, mimeo, Harvard University.

Nunn, N., 2008a, The Long-Term Effects of Africa's Slave Trades, *The Quarterly Journal of Economics* 123, 139-176.

Nunn, N., 2008b, Slavery, Inequality, and Economic Development in the Americas: An Examination of the Engerman-Sokoloff Hypothesis, in Helpman, E. (ed.), *Institutions and Economic Performance*, Harvard University Press, Cambridge, 48-180.

Ramcharan, R., 2009, Inequality and Redistribution: Evidence from U.S. Counties and States, 1890-1930, *Review of Economics and Statistics*, forthcoming.

Rappaport, J. and Sachs, J. D. , 2003, The United States as a Coastal Nation, *Journal of Economic Growth* 8, 5-46.

Sacerdote, B., 2005, Slavery and the Intergenerational Transmission of Human Capital, *Review of Economics and Statistics* 87, 217-234.

Smith, J. P., 1984, Race and Human Capital, *American Economic Review* 74, 685-98.

Smith, J. P. and Welch, F. R., 1989, Black Economic Progress After Myrdal, *Journal of Economic Literature* 27, 519-564.

Sokoloff, K. L. and Engerman, S. L., 2000, Institutions, Factor Endowments, and Paths of Development in the New World, *Journal of Economic Perspectives* 14, 217-232.

Sokoloff, K. L. and Zolt, E. M., 2007, Inequality and the Evolution of Institutions of Taxation: Evidence from the Economic History of the Americas, in Edwards, S., Esquivel, G. and Marquez, G. (eds.), *The Decline of Latin American Economies: Growth, Institutions, and Crises*, University of Chicago Press, Chicago, 83-136.

Summerhill, W. , 2010, Colonial Institutions, Slavery, Inequality, and Development: Evidence from São Paulo, Brazil, MPRA Paper No. 22162.

Vollrath, D., 2010, Inequality and School Funding in the United States, 1890, mimeo, University of Houston.



## Table Appendix

*Table A1: Returns on Education (Blacks and Whites)*

	Model 1	Model 2
Dependent Variable:	<i>Income (2000) Whites Only</i>	<i>Income (2000) Blacks Only</i>
Estimation Method: OLS		
High-School Diploma	0.683*** (4.84)	0.260*** (2.82)
Some Years of College (no Bachelor)	0.596*** (2.95)	0.532*** (3.63)
Bachelor Degree	1.646*** (11.47)	0.789*** (6.24)
Post-Graduate Education (Master or PhD)	1.890*** (8.54)	1.409*** (7.54)
Employment Rate	1.601*** (5.62)	0.368*** (2.68)
Whites in Labour Force	0.0330*** (6.31)	0.0778*** (6.78)
Blacks in Labour Force	0.0134*** (4.42)	0.0110 (1.49)
Median Age	0.0109*** (6.13)	0.0267*** (11.03)
North East Dummy	-0.0165 (-0.52)	0.0235 (0.47)
South Atlantic Dummy	0.0410 (1.55)	0.0276 (0.59)
South Central Dummy	0.0388 (1.36)	-0.0720** (-2.62)
Constant	6.680*** (24.26)	7.000*** (51.20)
Sample	All Counties	All Counties
Observations	3030	2714
R-squared	0.77	0.27

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Robust t statistics in parentheses.

**Table A2: Robustness Checks for Land Inequality**

<i>Dependent Variable: Income Inequality</i>		
	Model 1	Model 2
Estimation Method:	OLS	IV
Slaves/Population 1860	0.0339*** (6.32)	0.0407*** (5.86)
Population Density 1860	0.00286*** (4.57)	0.00154*** (5.50)
North East Dummy	0.0107*** (6.12)	0.00708*** (3.19)
South Atlantic Dummy	-0.0198*** (-8.83)	-0.0103*** (-3.56)
Slave States Dummy	0.0319*** (16.20)	0.0138*** (4.35)
Land Inequality 1860 (Gini Index)		0.335*** (7.03)
Land Inequality 1860 (GE(0))	0.0222*** (4.04)	
Constant	0.377*** (158.59)	0.241*** (11.46)
Cragg Donald F-statistic		169.839
Stock and Yogo Critical Values (10% maximal Size)		19.93
Hansen J-Statistic (p-values)		0.0000
Anderson LR-Statistic		163.174
Observations	1878	1878
R-squared	0.31	0.09

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Robust t statistics in parentheses.

Instrument for Model 2: Latitude

## Data Appendix

The following datasets have been used:

a) The Historical, Demographic, Economic, and Social Data: The United States, 1790-2000, downloaded from the Inter-University Consortium for Political and Social Studies (<http://www.icpsr.umich.edu/>), is used for the following variables: Total slaves number in 1860, Total population in 1860, and Size of farms in 1860.

b) The United States Decennial Census 2000, downloaded through the American Fact Finder (<http://factfinder.census.gov/home/saff/main.html?lang=en>), is used for the 2000 levels of: Households income, Median family income, Shares of population for each race, Total Population, Median age, Employment rate, and Civilian labor force participation.

c) As in Nunn (2008b) data on income per capita are downloaded from the Bureau of Economic Analysis, Table CA1-3, located at [www.bea.gov/regional/reis/](http://www.bea.gov/regional/reis/).

d) The US Census Bureau, Selected Historical Decennial Census Population and Housing Counts ([www.census.gov/population/www/censusdata/hiscendata.html](http://www.census.gov/population/www/censusdata/hiscendata.html)) is used for data on Education, Population, and Share of blacks at the state level for the 1940-2000 period.

e) The US City and County Data-Book, which is included in the Historical, Demographic, Economic, and Social Data, is used for data on Number of farms, Number of manufacturing establishments, General direct expenditure, and Ratio of education expenditure to general direct expenditure at the state level for the period 1940-2000.

f) Geographical Dummy Variables are constructed using the US Census regional classification.

g) Inequality measures have been computed as follows, using the STATA package EGEN\_INEQUAL provided by Lokshin and Sajaia (2006):

- 1) **Land Inequality** – The Gini index of land inequality is calculated using information about the size of each farm from the 1860 Census. Sizes of farms fall in the following ranges: (1) 9 acres or less, (2) 10 to 19 acres, (3) 20 to 49 acres, (4) 50 to 99 acres, (5) 100 to 499 acres, (6) 500 to 999 acres, and (7) 1,000 acres or more. Since for each category we do not know the mean farm size, we assume that farms are uniformly distributed within each category and then we take the mean size for the category. As in Nunn (2008b) and Lagerlöf (2005), for the category 1,000 acres or more we use 1,000 acres.
- 2) **Income Inequality** – The Gini index of income inequality is calculated using data from the 2000 CENSUS (downloaded through the US Fact Finder). We adopt the CENSUS categories and we assume that households within each category are uniformly distributed, so that in order to find the Gini index we take the mean value. For the category \$200,000 or more we take \$200,000.
- 3) **Racial Income Inequality** - This is the Gini index for income per capita in 2000 (CENSUS 2000) for each race in the Census. Using information on classes of income for each race we obtain a horizontal Gini index to calculate the distribution of income across races.

4) ***Racial Educational Inequality*** – Data on educational attainment are downloaded from the National Center for Education Statistics. For each race we have data on the share of the population with: 1) no high-school diploma (0-9 grade but no diploma); 2) with a high-school diploma; 3) with some years of college (but no degree); 4) with an undergraduate degree; 5) with a master’s degree; 5) with a PhD. We code this information as follows: 1, if the individual did not gain a high-school diploma; 2, if he has a high-school diploma; 3, if he has some years of colleges; 4, if he has an undergraduate degree; and so on. We use this coding rule to calculate the Gini index across races.