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Bitter Sugar: Slavery and the Black Family *

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Abstract

We empirically assess the effect of historical slavery on the African American family structure. Our hypothesis is that female single headship among blacks is more likely to emerge in association not with slavery per se, but with slavery in sugar plantations, since the extreme demographic and social conditions prevailing in the latter have persistently affected family formation patterns. By exploiting the exogenous variation in sugar suitability, we establish the following. In 1850, sugar suitability is indeed associated with extreme demographic outcomes within the slave population. Over the period 1880-1940, higher sugar suitability determines a higher likelihood of single female headship. The effect is driven by blacks and starts fading in 1920 in connection with the Great Migration. OLS estimates are complemented with a matching estimator and a fuzzy RDD. Over a linked sample between 1880 and 1930, we identify an even stronger intergenerational legacy of sugar planting for migrants. By 1990, the effect of sugar is replaced by that of slavery and the black share, consistent with the spread of its influence through migration and intermarriage, and black incarceration emerges as a powerful mediator. By matching slaves' ethnic origins with ethnographic data we rule out any influence of African cultural traditions.

JEL Codes: J12, J47, N30, O13, Z10.

Keywords: Black family, slavery, sugar, migration, culture.

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1 Introduction

Since its publication in 1965, shortly after the enactment of the Civil Rights and the Voting Rights Acts, the Moynihan Report on the *"Negro family"* has been fraught with controversy. Moynihan, a sociologist who was then serving as Assistant Secretary of Labor in the Johnson Administration, through a wealth of tables and charts uncovered indisputable facts revealing that single-mother families were alarmingly widespread among blacks. He also attributed to the breakdown of the black family the responsibility for the more general *"tangle of pathology"* affecting the American ghettos, and including crime, unemployment, and racial gaps in education. More speculatively and even more controversially, he traced this evidence back to the legacy of slavery and its persistent influence on family formation for the descendants of freed slaves (*"It was by destroying the Negro family under slavery that white America broke the will of the Negro people."*) Within the popular press and the policy arena, these hypotheses were challenged with accusations of racism and suspicions of a patronizing attitudes toward African Americans.

In the slave society of the U.S. South, the living and working conditions in the plantations and in the whites' premises, together with the domestic slave trade, may indeed have severely impeded the formation of stable families adhering to the nuclear model. Even though a connection between the legacy of slavery and the dysfunctions of the black family had been made earlier on (DuBois et al., 1899, 1908; Frazier, 1932, 1939), Moynihan's stress on family structure as the heart of racial inequalities raised heated critiques also on the part of social scientists. In particular, the conjecture that slavery may have negatively influenced family formation and sexual mores among blacks was decisively rejected by historians and economic historians such as Genovese (1965), Fogel and Engerman (1974), and Gutman (1975).

Half a century later, the problems exposed by Moynihan have persisted and in fact worsened: not only the presence of single-mother families has increased among blacks, but the gap with white families has grown even larger (Acs et al., 2013). Can the legacy of slavery represent a plausible explanation not only for the structure of the black family back in the 1960s but also for its subsequent further deterioration?

To this day, Moynihan's conjecture has not been formally tested.[1] In the present paper, we address it from a novel perspective, building on historical evidence about the unique characteristics of the demographics of slavery in sugar plantations. Among North American slaves, births greatly exceeded deaths, so that the slave population rapidly increased. By contrast, the Caribbean and Latin America – where sugar planting was

[1] A notable exception is Miller (2018), who finds that in 1880, in the Cherokee Nation of Oklahoma, slave children in smaller slaveholdings were more likely to belong to single female-headed families.

widespread – persistently experienced a dramatic natural decrease, with low fertility and high mortality. These differences have been attributed the extreme living and working conditions associated with the production of sugar (Tadman, 2000; Coclanis, 2010). In fact, unlike other slave owners, sugar planters did not consider slave children as potential assets over which claim property rights. They thought instead that they could maximize profits by continually skewing their labor force toward males. Together with the disease environment associated with sugar planting, this attitude caused profound demographic and social consequences – including matrifocality, forced celibacy for men, and father absence for children – that may have persistently shaped family formation (Smith, 1982).

The same characteristics that were associated with sugar production in the Caribbean and Latin America were also observed within the U.S., even though sugar planting was quite limited in scope, and almost entirely confined to a small group of parishes located in Louisiana and neighboring states. In order to identify the long-run impact of slavery on the black family, our investigation will therefore be able to exploit differences between counties exposed to the alternative modes of production associated with sugar and the other crops that were typical of the southern slave economy, such as cotton, tobacco, and rice. Our hypothesis is that the unique demographic and social conditions associated with slavery in sugar plantations – rather than with slavery per se – may indeed have been conducive to the development of the black family.

We start our analysis by presenting data on slave demographics and relating them to sugar suitability. We document that in 1850, among the slave population, suitability to sugar is associated with an unbalanced sex ratio skewed toward men, a lower birth rate, and a lower share of infants.

To investigate the effect of sugar planting on the family structure of African Americans, we use individual data on household heads from the 1 percent sample of the U.S. Census over the period 1880-1940. We show that sugar suitability is strongly associated with the probability of the occurrence of single female headship and that its effect is driven by blacks. The relationship between sugar and single female headship is stronger at the beginning of the period under consideration but then starts fading. The emerging patterns can be reconciled with the relocation of freed slaves and their descendants due to the Great Migration, that by 1930 had already involved a large fraction of the blacks formerly living in the U.S. South, and especially in the sugar counties. As a result, the same kind of social arrangements were likely exported to other areas in the U.S., making the relationship between sugar and the black family less stable. Furthermore, for migrants, intermarriage among blacks from source counties with different exposure to sugar planting may have further weakened the legacy of the latter.

For our empirical investigation on the period 1880-1940 we rely on a variety of identifi-

cation strategies. Using OLS estimates, we exploit the exogenous variation in suitability to crops across U.S. counties to test the relationship between potential sugar yields and the probability of single female headship. We complement OLS estimates with a matching estimator, by forming groups that include individuals sharing the same characteristics, in order to avoid the possibility that individuals in treated and untreated counties may display different unobservable characteristics that are correlated with the treatment.

To sharpen the OLS results, we also apply a quasi-experimental approach based on a Regression Discontinuity Design (RDD), by exploiting the fact that sugar suitability is confined to a relatively small and precisely spatially clustered number of counties. Since we may face an issue of partial compliance, we rely on a fuzzy version of the design. In the same setting, we also perform a falsification test using rice suitability.

The magnitude of the effects we uncover is large. With reference to our preferred specification, over stacked cross sections with matching, in 1880 the increase in the likelihood of single female headship, relative to its sample mean and for a one standard deviation of sugar suitability, is 41 percent, and remains as high as 9 percent 60 years later in 1940. Furthermore, the effect is clearly driven by blacks, who display much larger than average coefficients, while the coefficients for whites are hardly different from zero.

To deepen our understanding of the persistent influence of sugar planting, across generations and throughout the country, we construct a dataset of household heads linked between 1880 and 1930. We collect information about unique surnames by state of birth and match individuals on the basis of surnames, race, and state of birth, so that we are able to identify a sub-sample of migrants, that is, of household heads who by 1930 no longer live in their ancestors' state. Over this sub-sample, the indirect influence of sugar planting through the current environment should be filtered away, allowing us to identify its portable legacy as embodied in cultural beliefs and norms. Indeed, even after controlling for destination-county fixed effects that allow us to strengthen the identification of the effect, we establish that the impact of sugar suitability on the descendants of household heads who had likely experienced slavery in sugar plantations is even stronger, if compared with the one we detected in the cross section.

When we move on to contemporary (county-level) data, we discover instead that the legacy of sugar planting has faded, being replaced by that of slavery, consistent with the experiences of migration and intermarriage. However, the effect of the slave share in 1860 is driven out when we control for its contemporary proxy, that is, the share of blacks in the population, with the black sub-sample again driving the result. Furthermore, we find that the share of blacks in the jailed population, a frequently invoked determinant of the instability of today's African American families, emerges as a powerful mediator of the black share. This suggests that the demographic and social dysfunctions inherited

from sugar plantations, and spread all over the country after Abolition, are channeled by black incarceration, that in turn reflects a withdrawal of black males from the marriage market. Another mediating channel could rely instead on a withdrawal on the part of black women, since the experience of slavery may have made them more likely to work and consequently more capable of acting as independent main providers. This hypothesis, however, finds no support from our data.

An alternative explanation for the diffusion of the black family, other than slavery, rests on the legacy of African cultural traditions. By combining the Louisiana Slave Database with the Ethnographic Atlas, we assess this conjecture but find no evidence that the family structure that we found to be associated with slavery in sugar plantations can instead be traced back to the prevailing customs among the African ethnicities that were represented among slaves in Louisiana.

This paper is close in spirit to Engerman and Sokoloff (1997) and Nunn (2008a), who have looked at the impact of slavery on long-term development by focusing on the factor endowments that have promoted the reliance on this specific form of labor coercion.[2] It is also connected with Alesina et al. (2013), who find that the suitability of a location for cultivating crops that require the use of the plough predicts the role of women in society. Relatedly, Nunn and Qian (2011) and Galor and Ozak (2016) look at the long-term influence of crops on population growth and time preferences, respectively. On the specific link between slavery and gender roles, Goldin (1977) suggests that slavery has increased black female labor force participation and, through an intergenerational transmission channel, shaped African Americans' cultural norms about women's work and their role within the family. Boustan and Collins (2014) document racial gender gaps in participation until at least 1980. Baiardi (2018) exploits the cross-county variation in the production of cotton and tobacco and finds that the lower degree of division of labor in the former promotes labor market participation among African American women.

The paper is organized as follows. Section 2 summarizes background information on slavery, sugarcane planting, and their joint influence on family formation. Section 3 illustrates preliminary evidence on slave demographics in U.S. sugar plantations. Section 4 presents results for the 1880-1940 sample. Section 5 focuses on the sample of migrants

[2]The long-term consequences of slavery in the U.S. have also been investigated with regard to productivity (Mitchener and McLean, 2003), inequality (Soares et al., 2012; Bertocchi and Dimico, 2014), education (Sacerdote, 2005; Bertocchi and Dimico, 2012), and politics (Naidu, 2012; Acharya et al., 2016; Bertocchi and Dimico, 2017), while the determinants of the diffusion of slavery have been explored by Lagerlof (2005) and Esposito (2019), with reference to geography and malaria, respectively. The persistent effect of slavery and other forms of labor coercion in the receiving countries, other than the U.S., has been studied by Dell (2010) for Peru, Summerhill (2010), Naritomi et al. (2012), and Fujiwara et al. (2019) for Brazil, Acemoglu et al. (2012) for Colombia, and Bobonis and Morrow (2014) for Puerto Rico. For the legacy of the slave trades in Africa we refer to Nunn (2008b) and the survey in Bertocchi (2016).

linked between 1880 and 1930. Section 6 turns to contemporary evidence. Section 7 explores African culture as an alternative explanation for the diffusion of the black family. Section 8 concludes. An online Appendix contains additional figures and tables.

2 Historical background

2.1 Slavery in the Americas

Between the sixteenth and the nineteenth century, through the transatlantic slave trade, over 12 million blacks were embarked from Africa and transported to the Americas, in order to supply labor for the expanding plantation economies (Eltis et al., 1999; Curtin, 1969). The main destinations of the Middle Passage were Brazil and the the Caribbean, that absorbed 45 and 22 percent of the slaves, respectively, while only 4 percent (about 650,000 people) arrived in North America, where they were initially employed along the southern Atlantic coast for the cultivation of rice and tobacco. Slave import expanded rapidly during the seventeenth century. The local reproduction rate was much higher than in the rest of the Americas, so that the slave population grew, and the natural increase eventually outpaced import. During the first half of the nineteenth century, a Second Middle Passage witnessed the forced migration of a million slaves from the coastal regions to the interior areas, following the boom in the cultivation of cotton. Between 1800 and 1860 the slave population increased from one to four million, to reach 13 percent of the total population, albeit concentrated in the 15 southern slave states. The American Civil War led to the abolition of slavery in 1865, followed by the enactment of the Black Codes in the southern states. The regional distribution of the black population remained substantially stable until 1914 (Higgs, 1997). Starting with 1916, the Great Migration caused the voluntary relocation of six million descendants of slaves from the rural South to the northern cities (Berlin, 2010).

2.2 Sugar planting and slave demographics

In the seventeenth-century Caribbean, the so-called sugar revolution determined a rapid shift from diversified agriculture to sugar monoculture and, in association to that, from free to slave labor, causing in turn a huge boost to the transatlantic slave trade (Higman, 2000). By the eighteenth century, the Atlantic economy was dominated by sugar, and sugar was in turn dominated by slavery, because the hardships of life in sugar plantations would have never made cultivation profitable under a free labor regime (Wright, 2006).

The demographics of the "sugar islands" were peculiar ones, with slave fertility rates

lower and slave mortality rates higher than in non sugar-producing regions. These patterns were due to a variety of interrelated reasons: the extremely harsh working conditions, the lethal disease environment, and the age and sex ratios preferred by slave owners for slave imports.[3] As a direct consequence, the natural increase among slave populations in sugar regions tended to be negative, in contrast with non-sugar ones. Thus, in sugar regions the growth of the slave populations was only sustained by the importation of slaves, as it was cheaper for sugar planters to buy new slaves rather than maintain the labor force by improving fertility and reducing infant mortality. Inevitably, when the transatlantic slave trade was abolished in the nineteenth century, these regions experienced a decline in their slave populations (Coclanis, 2000).

While sugar planting spread swiftly through the Caribbean and Latin America, due to the prevailing geo-climatic conditions in North America it remained concentrated in a relatively small area in the South East, involving a handful of southern Louisiana counties and a few other counties in Florida and Texas. Sugar production intensified in Louisiana with the 1803 Purchase, bringing in large slave imports. By the time Louisiana entered the Union in 1812, sugar had become the main plantation crop along the Lower Mississippi River. Sugar planting was followed by the harvesting season and then by the actual production stage, involving grinding and boiling of the canes (Follett, 1997; Rodrigue, 2001). Handling the highly perishable sugarcane combined both agricultural and industrial processes, a characteristic that kept the slaved labor force under extreme pressure around the clock all year round and that justified the reputation of Louisiana among enslaved people as a *"place of slaughter"* (Stroyer, 1879).[4]

In the aggregate, the demographics of the North American slave population differed sharply from those of the Caribbean and Latin America, displaying a sustained natural increase. However, the sugar areas of the U.S. stood as an exception, unique to North America, that confirms the crucial influence of plantation crop in determining patterns of natural increase and decrease (Tadman, 2010).[5]

For the Louisiana sugar parishes, the U.S. Census provides accurate information that

[3]The appalling living standards in the sugar plantations are described, among others, by Burnard et al. (2019). Demographers list plantation slaves in Trinidad among the documented populations with lowest life expectancies (20 years or less), comparable to those recorded within short-lasting, acute episodes of high mortality due to famines (Ukraine in 1933, Sweden in 1772, and Ireland in 1845), or epidemics (nineteenth-century Iceland) (Zarulli et al., 2018). Ortiz (1947) attributes to sugar planting, if compared to tobacco, the development of a more authoritarian culture in Cuba.

[4]In 1860 Louisiana counted over 333.000 slaves, i.e., 47 percent of the state population, and 8 percent of the slave population in the 15 southern states. In the southern states the slave share was on average 32 percent, and Louisiana came third after South Carolina and Mississippi.

[5]Conrad and Meyer (1958), in their early analysis of slaves' reproduction rates in the ante bellum South, do acknowledge the particularly low rates in the Louisiana area, but they do not link them to sugar planting.

have allowed to document the demographic cost of sugar, by allowing to track both crude population growth rates and ratios of children to women. Related studies on slave imports show that the demands of the sugar planters shaped the gender selective nature of the slave trade in the area, with the extreme labor demands of the sugar plantations determining a preference toward male slaves (Follett, 1997). The consequent shortage of women induced very low fertility rates. Taken together, these factors produced a persistent natural decrease, caused by a combination of skewed sex ratios, excess adult mortality, and shortage of children.[6]

2.3 The "black family"

The demographics of slave regimes in the sugar islands carried important implications for all social institutions including family and kinship. Male-dominated African importation made it difficult for male slaves to find spouses (as a mirror image of the reversed gender imbalance determined by slave exports in Western Africa). According to von Humboldt (2011), a large share of the slave population of Cuba was condemned to a celibate life. Moreover, intensive importation implied for the slaves the permanent trauma of separation from relatives and friends. In Jamaica, the slaves were reportedly so demoralized that they were uninterested in forming a family and taking care of children (Patterson, 1969). Furthermore, high death rates implied pervasive widowhood at an early age, especially for women, who then had to face the prospect of having to raise young children on their own. High child mortality was another factor that discouraged family formation. The disease environment further depressed fertility rates. These factors combined prevented the diffusion of a family structure based on the nuclear model. Matrifocality, i.e., a system of familial relations focused upon women in their role as mothers, with an associated lack of emphasis upon the conjugal relationship, was instead promoted (Smith, 1982). Male-absent families coexisted with large fractions of single males (Higman, 1975). The absence of stable male providers in the post-emancipation Caribbean societies and the widespread perception of Caribbean men as unreliable in their roles as husbands and fathers can be linked to these historical legacies, that were reinforced by the economic insecurity of men. Their consequent forced migration to the cities and abroad further contributed to family dissolution (Marino, 1970).

With reference to the U.S., an early stream of the literature (DuBois et al., 1899, 1908; Frazier, 1932, 1939) had stressed the instability of the "black family"and attributed it to

[6]Prior to joining the U.S., Louisiana was governed first by France and then by Spain. Thus, it operated under a civil code, including norms on the regulation of slaves. Another legacy of the early colonizers was the influence of the Catholic Church. However, scholars have concluded that the institution of slavery in Louisiana was not less harsh than that of the other slave states (Schafer, 1994).

the legacy of slavery, through the same channels that were operating in the Caribbean sugar islands even though, within the U.S., they reached their extreme forms only in sugar plantations. Therefore, the characteristics of the black family that had been highlighted for the Caribbean have resonated in local accounts and remain highly relevant from a U.S. perspective. In particular, the link between the condition of slavery and that of forced celibacy, with men being unable to find partners in overwhelmingly male populations, has been explicitly re-proposed in the U.S. context (Kaye, 2007). The impact of sugar slavery was enhanced by other characteristics of slavery that were common to all types of crops. The intense domestic slave trade, with the frequent division of family members, has represented a further factor in impeding the formation of stable families adhering to the nuclear model. The tendency to matrifocality was strengthened by laws mandating that the children of a slave woman would also be slaves and prohibiting free men to intermarry with slave women (Stampp, 1956). Depriving black males of both authority and responsibility also led to a marginal role for black husbands and fathers within the household, resulting in the reinforcement of the single-mother family model.

The view of the black family as dysfunctional and unstable, once embraced and brought to public attention by Moynihan (1965), provoked a revisionist response asserting that black families, under slavery and just after Abolition, overwhelmingly displayed a two-parent structure (Genovese, 1965; Fogel and Engerman, 1974; Gutman, 1975). Accordingly, the distinctive African American family structure is reported as being of relatively recent origin and caused by contemporary racial inequalities and extreme poverty, rather than causing them. In the words of Gutman (1975): *"Much that flaws the study of slaves and ex-slaves flows from this belief: the alleged inadequacy of the slave father and husband, the absence of male 'models' for young slave children to emulate, the prevalence of the 'Sambo' personality, the insistence that slave marriage usually meant little more than successive polygyny, and the belief that the 'matrifocal' household (a 'natural' adaptation by most blacks to the 'realities' of slavery) prevailed among the mass of illiterate plantation field hands and laborers."*[7] In short, Fogel and Engerman (1974) conclude: *"The belief that slave-breeding, sexual exploitation and promiscuity destroyed the slave family is a myth."*

In turn, a further and more recent stream of studies has reconsidered the revisionist view and documented the continuity of the black family structure starting at least since

[7]Even though, through a meticulous historical analysis, Gutman (1975) lends support to the view that the two-parent family structure was predominant in slave communities, in comparing the Stirling sugar plantation in Louisiana with the Good Hope cotton plantation in South Carolina he does acknowledge, in Stirling, a significantly larger share of women heading single-parent units and women with several children by unnamed men. He also notices that the latter phenomenon was highly unlikely to be related to earlier West African domestic arrangements, since it had actually been absent among first and second generations Stirling slaves.

the nineteenth century. Using Census data from 1880 through 1980, Ruggles (1994) shows that black children are indeed persistently more likely to reside with a single parent than are white children, even though the racial differential has grown over time and especially after 1960.[8] The share of black (aged 0 to 14) children living with a single mother has increased from 13 percent in 1880 to 37 percent in 1980, against 6 and 12 percent respectively for whites. In 1880, parental mortality was the main reason for the absence of parents among whites, while it explained less than half of the cases for blacks.[9] Moreover, female headship among blacks tends to involve primarily single, never-married (rather than widowed or divorced) women. The larger prevalence of extended families among blacks can also be traced back to the fragility of the nuclear family model. Whether these racial differences can be explained by distinct social norms, either engrained in African culture or else developed during slavery, had so far remained an open question. Which characteristics of the latter may have been decisive channels was also, so far, still lacking an answer.[10]

3 Preliminary evidence: The demographics of sugar

In order to describe the demographic and social conditions associated with slavery and, in particular, with slavery in the U.S. sugar plantations, we start with county-level data from the 1850 Census.[11] Data on sugar suitability are from the FAO GAEZ database.[12] Crop suitability is measured using information on agro-climatic factors, soil resources, and terrain-slope conditions, and is classified on a scale from 1 to 8, with 1 denoting maximal suitability and 8 denoting no suitability.[13] For ease of interpretation of the sign of the coefficients, measures of crop suitability will be multiplied by -1, so that the highest value of the index (-1) corresponds to highest suitability.[14] Variable definitions

[8]For a further discussion of post-1960 trends see, e.g., Ellwood and Crane (1990) and Darity and Myers (1995).

[9]Sacerdote (2005) reports that children and grandchildren of slaves were more likely to live in female-headed households than children and grandchildren of free blacks.

[10]On the influence of African culture, see McDaniel (1990); for the history of slave marriage, see Goring (2006) and Logan and Pritchett (2018).

[11]The source is Historical, Demographic, Economic, and Social Data: The United States, 1790-2002 (ICPSR 2896). See https://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/02896 and Haines and Inter-university Consortium for Political and Social Research (2010).

[12]See http://www.fao.org/nr/gaez/en/. Nunn and Qian (2011) provide an in-depth description of the database.

[13]We exclude from the analysis category 9, that corresponds to water. In order to capture as closely as possible exogenously-determined factor endowments, we refer to the indices corresponding to low input levels (i.e., traditional management techniques) and rain-fed production (i.e., absence of irrigation).

[14]The suitability measures will be standardized (i.e., re-scaled with average equal to 0 and standard deviation equal to 1), in order to allow for the interpretation of the coefficients in terms of a one standard deviation change of the regressor.

Table 1: The Demographics of Sugar, 1850

	(1) Slave Share	(2) Sex Ratio	(3) Birth Rate	(4) Infant Share	(5) Death Rate
Sugar Suitability	0.055	0.014	-0.002	-0.002	-0.001
	(0.011)***	(0.006)**	(0.001)***	(0.001)***	(0.001)
	[0.019]**	[0.038]**	[0.001]***	[0.004]***	[0.181]
State FE	Yes	Yes	Yes	Yes	Yes
R-squared	0.664	0.193	0.166	0.166	0.241
Observations	1612	972	929	929	874
States	35	18	16	16	17
Sample Mean	0.110	0.965	0.031	0.031	0.017

Note: Slave Share is number of slaves over population, Sex Ratio is the share of male over female slaves, Birth Rate is slave births over slave population, Infant Share is the share of slave infants (below one year of age) over slave population, and Death Rate is slave deaths over slave population. Controls for total and urban population are also included. Robust standard errors clustered at a state level in parentheses and wild bootstrap p-values in square brackets: *** p<0.01, ** p<0.05, * p<0.1.

are in Table A1 and summary statistics in Table A2 in the online Appendix.

Table 1 shows the relationship between sugar suitability and a number of demographic variables concerning the slave population and potentially associated with the black family structure. Each regression also controls for total and urban population, to account for the potential influence of sugar suitability on population and urbanization (Nunn and Qian, 2011). In Model 1 we find a significant and positive association between sugar suitability and slavery, measured with the share of slaves over population. Model 2 shows that higher sugar suitability is also associated, within the slave population, with a higher sex ratio (measured by the number of male slaves over female slaves), that is, with a gender distribution of the slave population skewed toward men. The next two models uncover a negative effect of sugar suitability on the birth rate (slave births over slave population) and the share of slave infants (i.e., slave children below age 1 over slave population). The fact that the coefficient on the death rate (slave deaths over slave population)[15] is not statistically significant is not surprising, given that underreporting of slave deaths on the part of planters was widespread, and presumably more so when deaths were more frequent (Steckel, 1979).[16]

In Figure 1, we plot the coefficients on the interactions for a regression of the share of blacks on year dummies and their interactions with dummy measures of suitability for

[15]We trim observations for which, probably because of erroneous and/or irregular recording, the death rate is strictly greater than 1.

[16]Since the number of states in 1850 is smaller than 50, Table 1 also reports, in square brackets, the p-values obtained from a wild bootstrap, in order to deal with the potential over-rejection of the null when the number of clusters is small (Cameron and Miller, 2015).

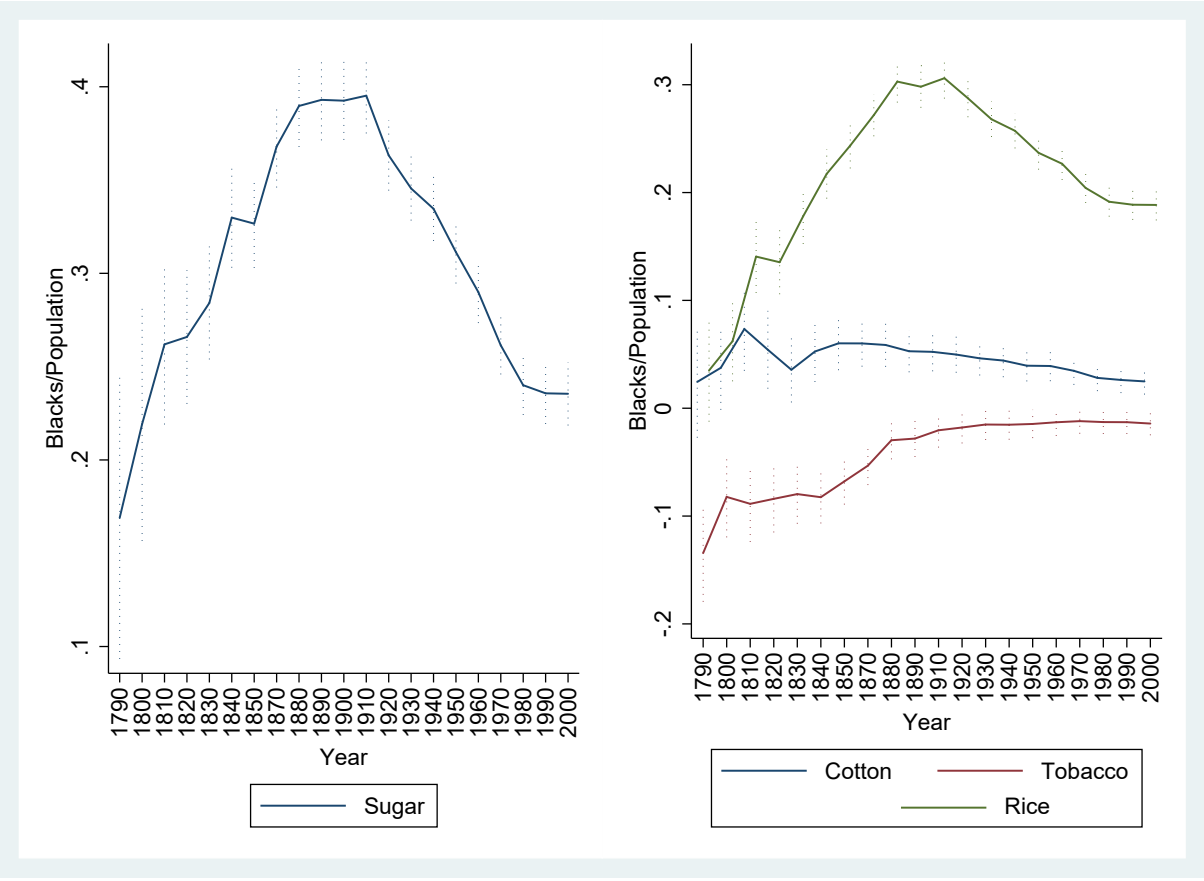

Figure 1: The Black Share by Crop Suitability

Note: The dependent variable is slaves/population from 1790 to 1860 and blacks/population from 1870 tol 2000. The plots represent the regression coefficients on the interactions between year dummies and dummy measures of suitability for sugar (on the left panel) and cotton, rice, and tobacco (on the right panel). Year dummies are also entered in the regressions. The reference year is 1860. Dotted lines indicate 95 percent confidence intervals.

sugar, cotton, tobacco, and rice (each dummy takes value 1 if the level of suitability is within the first quartile, and 0 otherwise). The sample starts from 1790, the first year of the U.S. Census, and ends in 2000, with 1860 – the year of the last Census before Abolition – as the reference year.[17] The plotted coefficients show the differential for each crop with respect to the average black share for each year. Sugar suitability is represented on the left panel, while the right panel represents cotton (in navy), rice (green), and tobacco suitability (red). While the black share in counties with high suitability to cotton and tobacco stays relatively constant after 1860, in counties with high suitability to sugar we observe an increase until 1910, followed by a sharp decline. This pattern is explained by the Great Migration, which was especially intense out of the counties where sugar suitability was higher. The evolution of the black share for the case of rice is similar to that of sugar (even though its inverted-U shape is less pronounced), a point that we shall

[17]We use county-level Census data on the colored share from 1790 until 1860 and on the black share from 1870 until 2000 taken from IPUMS National Historical Geographic Information System (NHGIS). See https://www.nhgis.org/ and Manson et al. (2019).

address in detail in Sub-section 4.3.

Taken together, this preliminary evidence highlights the crucial role of sugar suitability as an explanation for demographic outcomes that are deeply differentiated from those prevailing in areas that were also marked by the exploitation of slave labor, but were characterized by suitability to other crops.

4 Sugar and single female headship until 1940

To derive our main results on the influence of slavery in sugar plantations on family structure, we use individual data from the 1 percent sample of the U.S. Census, for each Census year from 1880 to 1940 (excluding 1890 for which official data have been lost).[18] The choice of the time period is constrained, on the one hand, by the fact that racially-disaggregated data are not available for 1860. Moreover, we choose not to use data for 1870 since the year is too close to the end of the Civil War, with unavoidable consequences of the associated casualties for household composition.[19] On the other hand, after 1940 information which could identify individuals (and consequently a county) is not reported, or sparsely reported, due to U.S. regulation protecting anonymity (i.e., the 72 year rule). In fact, starting from 1950, geographical identifiers are only available for places with population above 100,000.

We restrict the above sample to the states that had already joined the U.S. in 1860, the year for which Census data on the proportion of the population in slavery are available for the largest number of states. From the resulting source, in order to exploit variation across household heads, we focus on a sample consisting exclusively of household heads aged 15-89 and, using information on the sex of the household head and the presence of a spouse within the household, we construct a binary variable that takes value 1 if the household head is a female without a co-living spouse, and 0 otherwise.[20] In keeps with the literature, we interpret this variable, that we define for short as single female headship, as our main proxy for family structure.

For each decade for which we have Census data, we overlay county boundaries with the FAO GAEZ agro-ecological suitability maps for sugarcane, cotton, tobacco, and wetland

[18]The source is IPUMS USA. See https://usa.ipums.org/usa/ and Ruggles et al. (2019).

[19]Furthermore, Higgs (1997) reports serious under-enumerations of blacks in the 1870 Census.

[20]In more detail, the variable takes value 1 for the following marital status categories: married with spouse absent, divorced, widowed, and never married/single. We also consider an alternative definition based on information on household types and construct a binary variable that takes value 1 if the household head is either a female with no husband, or a female living alone, or a female living with others (and 0 if male or female with a partner). However, data on household type are only available from 1900, and missing in 1920. For the available Census years, the correlation between the two alternative variables is 1.

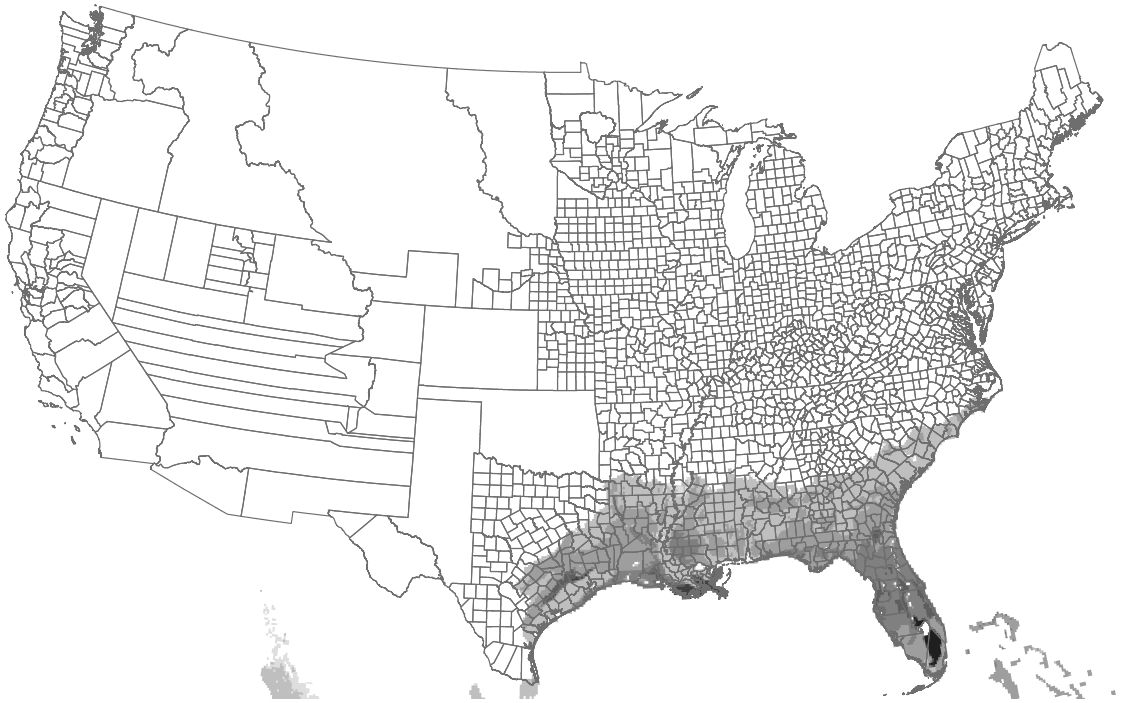

Figure 2: U.S. Counties by Sugar Suitability Class at 1860 County Boundaries

Note: The sugar suitable area comprises regions with suitability between very high (class −1) and very marginal (class −7). Sugar suitable regions are shaded. A darker shade indicates higher sugar suitability. Counties are represented at 1860 boundaries.

rice, in order to obtain a measure of suitability for each crop, county, and decade.[21] Figure 2 shows the result from overlaying sugar suitability classes on the map of U.S. counties at 1860 boundaries. Figure A1 in the online Appendix describes the spatial distribution of the actual production of sugar as of 1880, displaying a shape comparable to that in Figure 2.

We augment the dataset with individual controls taken from the Census and other county-level geographical and historical controls taken from various sources. Table A1 provide definitions and sources. Tables A3 and A4 report descriptive statistics for each year in the sample, overall and for blacks respectively. Figure A2 illustrates the evolution of the share of single female heads during the period 1880-1940, overall and disaggregated between black and white household heads. Overall, households with a single female head represent 11.9 percent of the sample in 1880 and reach 14.6 percent in 1940, with a larger share for blacks – from 17.8 to 22 percent. Figure A3 looks at the age distribution of single female headship and shows that its incidence tends to increase with age, but with important qualifications. First of all, it is actually higher for teenagers than for those aged 25-35, a trend that is driven by whites. Moreover, up until age 74 single female headship is higher for blacks, while above 75 it is higher for whites, presumably as a result of

[21]By using for each Census year the corresponding boundary file in order to map counties onto crop suitability areas, we can exclude issues related to boundary changes.

widowhood. Figure A4, which excludes widowed and divorced, indeed confirms that, for blacks, single headship is not linked to aging as a result of widowhood. Finally, Figure A5 shows that single headship is by no means confined to the former slave states and that in fact, by 1900, it is especially widespread among blacks located in the former free states. The remaining summary statistics show that, steadily through the period, average age increases and the number of children per household declines, while urbanization increases and cane sugar production declines.

4.1 OLS estimates

As shown in Figure 1, high values of sugar suitability are strongly geographically concentrated in small regions within Louisiana and Florida and a few areas within neighboring states. This allows us to exploit a geographical discontinuity together with the exogenous variation in sugar production. Thus, we estimate models in which the exogenous variation in sugar suitability affects an outcome variable using variants of the following Equation 1:

$$Y_{i,c,s} = \sigma_s + \beta_1 SugarSuitability_{c,s} + \beta_2 Z_{c,s} + \beta_3 X_{i,c,s} + \epsilon_{i,c,s} \quad (1)$$

where $Y_{i,c,s}$ is an outcome variable – primarily, single female headship – for individual i in county c and state s; σ_s represents state fixed effects;[22] $SugarSuitability_{c,s}$ is the county-level average measure of sugar suitability; $Z_{c,s}$ includes other county-level geographical and historical controls;[23] and $X_{i,c,s}$ includes individual controls.[24] The error $\epsilon_{i,c,s}$ will be clustered at a county level (i.e., the unit at which the treatment varies).[25]

Figure 3 plots the coefficient on sugar suitability obtained by estimating Equation 1 with OLS using individual data on household heads for each Census year in our sample (i.e., from 1880 to 1940 with the exclusion of 1890). The dependent variable is a binary that takes value 1 if the household head is a female without a co-living spouse (and 0

[22]Even though the institution of slavery in Louisiana – formerly a French and Spanish colony – did not differ from that of the former British colonies (Schafer, 1994), any such difference would be absorbed by the inclusion of state fixed effects.

[23]We include cotton, tobacco, and rice suitability, the population slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density.

[24]We include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. The Duncan socioeconomic index is a measure of occupational status based upon the income level and educational attainment associated with each occupation in 1950, derived using median income and education levels in 1950. The occupational earnings score indicates the median earned income of persons in each occupation, based on the education levels of the employed labor force in 1950.

[25]We shall also test for state-level clustering, the wild cluster bootstrap, and spatial autocorrelation.

Figure 3: Single Female Headship and Sugar Suitability, 1880-1940 - OLS

Note: The dependent variable is single female headship. The dots represent the coefficients on sugar suitability obtained from OLS estimates for each Census year. The value of each coefficient is also reported. In Panel A controls include only the slave share in 1860 and state fixed effects. In Panel B controls also include geographical (cotton, rice, and tobacco suitability, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density) and individual controls (age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area). Robust standard errors are clustered at a county level. Dotted vertical lines represent 95 percent confidence intervals.

otherwise).[26] Thus, only the variation between heads of household – female vs males and single females vs married females – is exploited.[27] Panel A shows estimates controlling only for the (standardized) share of slaves in the population in 1860 and state fixed effects. Cotton, tobacco, and rice suitability, as well as the other geographical and individual controls, are added in Panel B. The corresponding estimates are reported in Table A5.[28]

Although the geographical and individual controls help increasing the R-squared significantly and therefore reduce the standard error, the estimated effects of sugar suitability

[26]Since the dependent variable is a dummy, the coefficients can be interpreted as percentage changes.

[27]The reason why we only include household heads is that including all individuals that belong to a household would artificially increase the number of degrees of freedom, since the same observation would be repeated for each of them.

[28]Using the alternative dependent variable based on household type, which is only available in 1900, 1910, 1930, and 1940, yields nearly identical results that we do not report for brevity.

do not vary much across the two specifications and retain very similar levels of statistical significance. From 1880 through 1930, sugar suitability exerts a positive influence on the dependent variable, thus increasing the probability of the occurrence of single female headship. The size of the coefficients tends to decline from 1920, in connection with the first wave of the Great Migration, an exodus that hit the sugar-suitable counties/states harder than the rest of the U.S. By 1940 the effect of sugar suitability is no longer significant.[29]

In terms of magnitudes, with reference to the fully-controlled specification, in 1880 a one standard deviation increase in sugar suitability raises the probability of single female headship by 0.55 percentage points, or by 19 percent relative to the mean of the dependent variable (0.029 in the estimated sample in non sugar suitable counties, i.e., in counties with mean sugar suitability in class -8), with a gradual decline in subsequent years, down to a 5 percent increase in 1930. The suitability measure for cotton is associated with much smaller and statistically insignificant coefficients, while rice tends to exert an opposite effect if compared to sugar, albeit the coefficients are smaller in size and insignificant in 1910 and 1920. As for tobacco, the effect is largely insignificant except for 1900. Overall, the proxies for the cultivation of the other crops that were typical of the southern slave economy do not exert a robust effect on the probability of a single female headship. The same applies to the measure of slavery, whose influence actually turns negative once the full set of controls is included.[30] It is also instructive to report how the dependent variable is affected by other covariates. For instance, its likelihood increases with the size of a county's population density and an individual's location in a metropolitan area, while it decreases with his/her occupational earnings score, and increases at a decreasing pace with age.

The rest of this sub-section is devoted to a number of robustness checks. Even though our preferred measure of suitability refers to the low input definition, as provided by FAO-GAEZ, it can be argued that the historical conditions reflecting the relatively advanced level of technological innovation in agriculture, even during the ante bellum period, are better captured by an alternative definition based on intermediate inputs.[31] In Table

[29]To account for the possibility of spatial correlation across counties within states, in Table A6 we report a version of Table A5 with clustering at the state level. Since the number of states is smaller than 50, we also report the p-values obtained from a wild bootstrap. Moreover, to adjust for spatial autocorrelation, the same table also reports Conley (1999) spatial HAC standard errors for a windows of 100 km. Overall, the results are confirmed.

[30]Running a horse race between sugar and slavery, with either variable entered without the other one, both in a specification with only state fixed effects and in a fully-controlled one, yields similar results which we show in Table A7. Namely, the effect of sugar always remains positive. By contrast, the effect of slavery is smaller and scarcely significant without the controls and turns from positive to negative as we add them, as we should expect given that its diffusion proxies for the factor endowments that justified its adoption.

[31]Follett (1997) reports that sugar production required heavy investment in machinery, as well as in

A8, we replicate the regressions in Table A5 under such alternative definition, with very similar results for sugar suitability, as well as for cotton, tobacco, and the slave share, while we detect coefficient instability for rice.

The influence of sugar planting, as captured by the suitability proxy, can be confounded by variation in the size of slaveholdings. The latter tend to be larger both for sugar and cotton plantations, if compared to tobacco and rice (Menn, 1998). Therefore, the fact that the impact of sugar might reflect scale economies in production is a legitimate concern. To verify that this is not the case, in Table A9 we add a set of controls for the shares of farms belonging to seven dimensional classes in the county of an individual's residence.[32] Thus, we use information on farm dimension as a proxy for slaveholdings. Omitting the largest class, the coefficients on the farm size shares tend to be negative, consistent with a lower probability of the occurrence of single female headship in counties with a larger share of small farms. This finding goes against the conjecture that small farms, by encouraging "abroad" marriages with husbands and wives living on different farms, may instead have favored the diffusion of male-absent households (Crawford, 1980). However, the coefficients lack statistical significance in most years, while the impact of sugar suitability on the dependent variable is unaffected by their inclusion.[33]

Family formation after the abolition of slavery was also affected by the diffusion of sharecropping, because share contracts often involved entire families of freed people and in some cases having a family was even required for tenants. Since the terms of share contracts varied enormously and information regarding sharecropping is collected inconsistently across Census years, it is not possible to gauge the potential influence of this factor. However, in the sugar parishes – unlike for instance in the cotton ones – the diffusion of sharecropping with emancipation was hindered by the difficulty of dividing the product between planters-millowners and cane cultivators, making this factor likely uninfluential (Sitterson, 1953).

One drawback of the OLS estimator is that it cannot fully capture heterogeneities across individuals. Indeed, a potential issue with Equation 1 is that individuals in treated and untreated counties may have different unobservable characteristics that are in some way correlated with the treatment and thus may confound its effect. If this were the case, then simple OLS estimates of the model – where outcomes are allowed to vary at the individual level – would be biased. For this reason, we complement the approach

slaves.

[32]Census classes are defined for farms of 3-9, 10-19, 20-49, 50-99, 100-499, 500-999, and over 1000 acres.

[33]Our results contrast somewhat with those reported by Miller (2018). However, not only those results are limited to the Cherokee Nation and the year 1880, over a sample of only 683 freed individuals, but they also apply to a state, Oklahoma, where sugar planting was absent, so that any variation in slaveholdings is to be attributed to differences between other crops.

illustrated in Equation 1 with a matching estimator, for which we exactly match individuals based on their characteristics.[34] For each group, some individuals – the treated ones – will be located in an county which is relatively suitable to sugar (i.e., in a county in the shaded area in Figure 2) while the other – untreated – individuals will be in a county which is not suitable to sugar.[35] In the resulting estimates, we shall also control for matched group fixed effects, in order to exploit the variation within each group.[36]

Similarly to Figure 3 for the OLS, Figure 4 plots the coefficient on sugar suitability obtained using our exact matching strategy, in fully-controlled specifications. Panel A shows estimates that exploit the variation across all household heads within the same matched group. If compared to Figure 3, now the effect of sugar suitability persists until 1940. In Panels B and C, we restrict the sample to blacks and whites, respectively. We find for blacks much larger and highly significant coefficients, that triple on average across the years, while whites display coefficients that are hardly different from zero. The corresponding estimates are reported in Table A10 while, for the sake of comparison, Table A11 (Panels A and B) presents analogous OLS estimates by race. From an identification point of view, the coefficients are relatively stable across the two alternative estimation strategies. Still, as expected, the differences we detect suggest the presence of a bias due to omitted individual characteristics which are correlated with sugar suitability, which validates our matching strategy.

The magnitudes of the effects under matching, if compared to the OLS, are larger. For the full sample, in 1880 the percentage change in the dependent variable is now 41 percent, against only 19 in the OLS. This confirms that the OLS estimates are downward biased because of confounding differences in individual characteristics. For blacks, again in 1880, we observe a 16 percent increase, which is naturally lower than that in the full sample due to the higher sample mean among blacks. In other words, the difference in magnitude between the full and the black sample can be explained by the fact that, among whites, single female headship is relatively rare, with an impact on the mean.

In order to better capture cultural and behavioral attitudes that more closely fit the single female family structure, in Figure A6 and Table A12 (Panels A-C) we also con-

[34]Namely, we form groups by matching individuals who share exactly the same characteristics in terms of age, number of children, number of children below age five, number of families within the household, labor force participation, socioeconomic status as measured by the Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. To avoid incurring in the dimensionality curse, for the estimates with matching the Duncan socioeconomic index and the occupational earnings score are grouped in categories of 10 (therefore, we reduce the variables to 10 categories instead of 100).

[35]We disregard individuals who belong to groups including individuals who are all treated/untreated, because they do not satisfy the overlapping condition (i.e., they are not on the common support).

[36]Formally, we estimate the following variant of Equation 1: $Y_{i,g,c,s} = \gamma_g + \sigma_s + \beta_1 SugarSuitability_{c,s} + \beta_2 Z_{c,s} + \epsilon_{i,g,c,s}$, where $Y_{i,g,c,s}$ is the outcome variable for individual i in group g, county c, and state s, γ_g denotes matched group fixed effects, and σ_s represents state fixed effects.

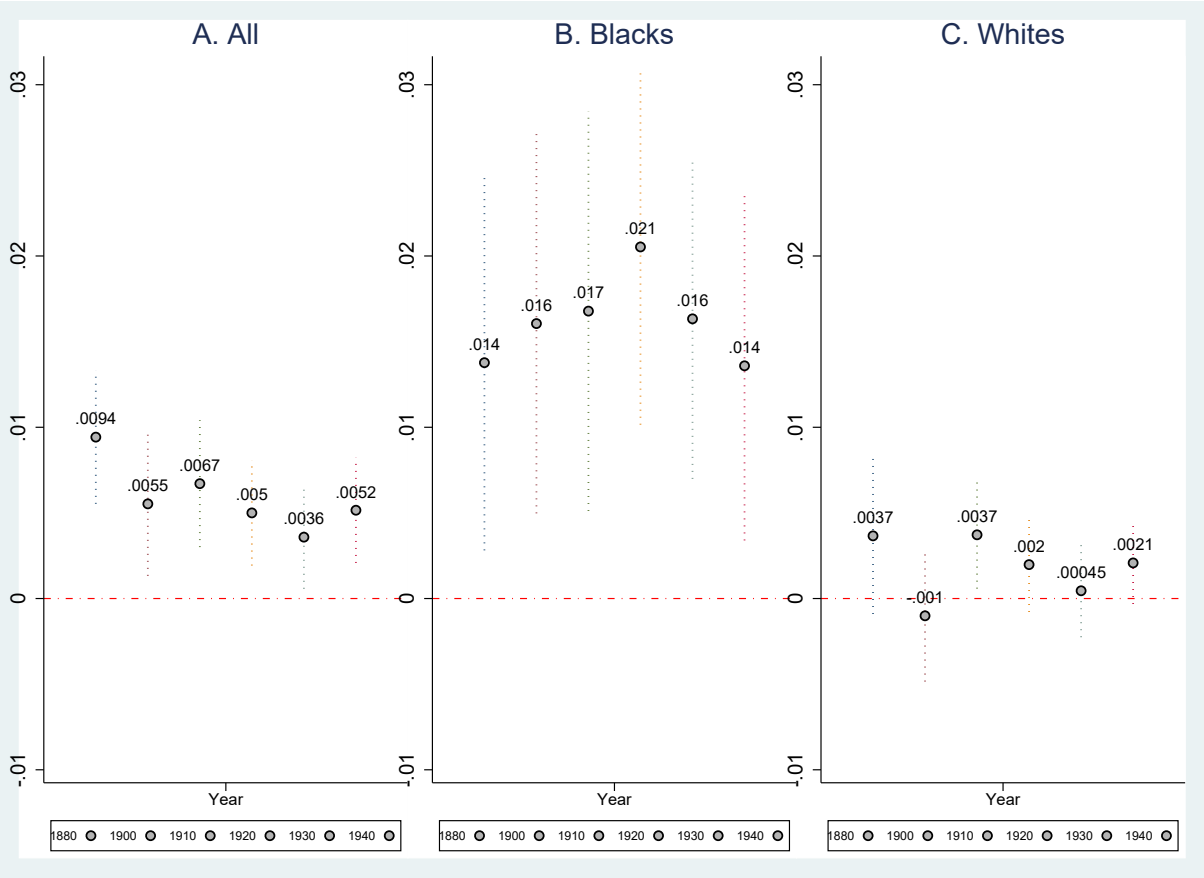

Figure 4: Single Female Headship and Sugar Suitability, 1880-1940 - Matching

Note: The dependent variable is single female headship. The dots represent the coefficients on sugar suitability obtained from OLS estimates with matching for each Census year. The values of each coefficient is also reported. Panel A includes all household heads. Panel B only includes blacks. Panel C only includes whites. Geographical controls (cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density) and matched group and state fixed effects are included. Robust standard errors are clustered at a county level. Dotted vertical lines represent 95 percent confidence intervals.

sider a sample excluding widowed and divorced household heads. The hypothesis is that the status of widowed and divorced is determined by events occurring after and independently of the formation of a given family structure. The restricted estimates exhibit some decrease in significance due to the loss of efficiency of the estimator, to be expected given the sharp reduction of degrees of freedom. However, for the full sample, once we omit widowed and divorced the percentage change goes up to 71 in 1880, which suggests a potential endogeneity bias in splitting the sample along this dimension, due to the relationship between mortality and the decision not to marry. Similarly for blacks, omitting widowed and divorced we observe in 1880 an increase of the effect to 23 percent. Nevertheless, since any arbitrary sample restriction may raise issues, especially when the choice of the restriction may be endogenous to sugar suitability – as indeed the status of widowhood might be – we prefer to refer to the full sample as a way to convey our main

results.[37]

The position of children living with single mothers has been central in the discussion on the causes and consequences of the black family (Ruggles, 1994). To address this issue, we restrict the sample to households that do include children. Even though the cultural and behavioral attitudes that lead households to have children may imply selection into a given family model, with a consequent bias in the corresponding estimates, in Figure A7 and Table 12 (Panels D-F) we present estimates for the resulting sample, altogether and by race. Keeping the above warning in mind, we find that previous results substantially hold also for these samples.[38]

The Census data we employed so far are stacked cross sections. Thus, as a further robustness check, following Deaton (1985) we construct a pseudo-panel, where household heads sharing the same year of birth are grouped into cohorts.[39] The resulting cohorts can be tracked over time along the 60 years under consideration. The advantage of a pseudo-panel approach rests on its ability to control for year and cohort fixed effects that may be correlated with sugar production.[40] Figure A8 plots the coefficients on the interactions between sugar suitability and the year dummies. The dependent variable is single female headship. The figure presents the full, black and white samples, that we stagger in order to ease the reading of the 95 percent confidence intervals. The medium-dashed line represents the sample of all household heads, that displays significant coefficients over the entire period under consideration. The short-dashed line represents blacks, for whom the estimated coefficients are much larger, while the long-dashed line for whites displays insignificant coefficients with values close to zero.[41]

To sum up, our results so far confirm a substantial and significant effect of sugar

[37]Table A11 (Panels C-E) presents analogous variants of OLS estimates excluding widowed and divorced, altogether and by race.

[38]Table A11 (Panels F-H) replicates the same for OLS. Despite a severe loss in efficiency, regressions restricted to samples excluding widowed and divorced, as well as childless household heads, produce broadly consistent results.

[39]The year of birth is computed by subtracting an individual's age from the year of the Census. Summary statistics for the pseudo-panel are provided in Table A13. To combine matching with a pseudo-panel approach is prevented by the fact that the cohorts in the latter can only include time-invariant characteristics.

[40]Formally, we estimate the following model: $Y_{i,k,c,s,y} = \kappa_k + \iota_y + \sigma_s + \beta_1 SugarSuitability_{c,s,y} \cdot Year + \beta_2 Z_{c,s,y} + \beta_3 X_{i,k,c,s,y} + \epsilon_{i,k,c,s,y}$, where $Y_{i,k,c,s,y}$ is the outcome variable for individual i in cohort k, county c, state s, and year y; κ_k, ι_y, and σ_s represent cohort, year, and state fixed effects, respectively; and $SugarSuitability_{c,s,y}$ is entered in interaction with a set of year dummies. To be noticed is that sugar suitability and the other geographical controls are time invariant, but since we keep track of the varying county boundaries over time, they are also indexed by year.

[41]The corresponding estimates, for each sample, are provided in Models 2 of Table A14, while Models 1 report the average effect over the entire period 1880-1940. Since not all cohorts are represented throughout the six Censuses, in order to mitigate the potential attrition bias we also run estimates limited to those cohorts that remain for at least three Censuses, with similar results that we do not report for brevity.

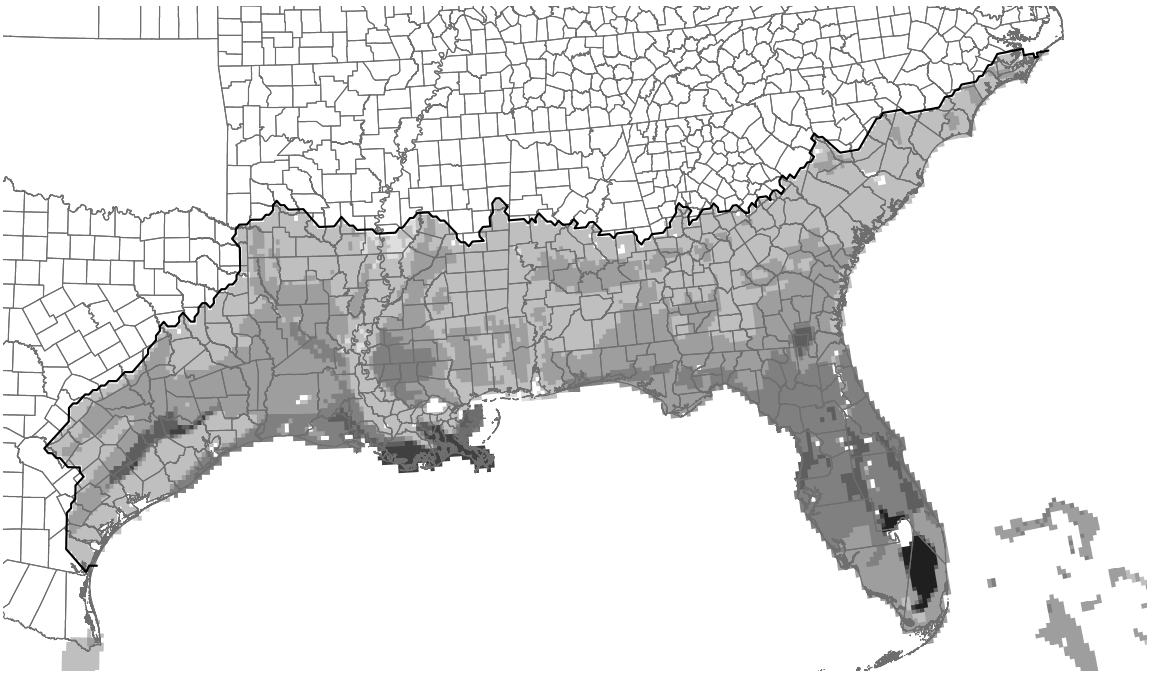

Figure 5: Border of the Sugar Suitable Area

Note: The black line represents the border of the sugar suitable area. The area comprises regions with sugar suitability between very high (class −1) and very marginal (class −7), i.e., with a strictly positive suitability index. Higher sugar suitability regions are represented in a darker shade. Counties are represented at 1860 boundaries.

suitability on the probability that a household is headed by a single female. The effect is driven by blacks and tends to decline with the relocation determined by the Great Migration.

4.2 A fuzzy regression discontinuity design

To sharpen our OLS results, in this sub-section we explore an alternative empirical strategy that takes advantage of the highly concentrated spatial distribution of sugar suitability. Figure 5 highlights the border of the sugar suitable area on the map of U.S. counties. Thus, we can exploit a county's distance from the border of the sugar suitable area in a quasi-experimental approach, according to which whether a county is treated or untreated will depend on the distance from the border (normalized to zero).

Using a sharp RDD requires the hypothesis of perfect compliance, which in our case is unlikely to be satisfied, as suggested by a visual comparison between the sugar suitable area and the map of actual sugar production in 1880, as depicted in Figure A1. Indeed, since the distance from the border of the sugar suitable area only denotes potential production, it may not be indicative of whether the county has actually produced sugar during slavery, that is, of whether a county has truly been treated. Therefore, we turn to a fuzzy RDD that combines county-level data on distance from the border with Census

data on actual average sugar production in 1850-1860, i.e., before the Civil War and Abolition.[42] A few warnings are in order. First, estimates may be affected by potential shocks in the ante bellum production of sugar that may alter the compliance ratio and therefore the relevance of the instrument.[43] Second, spatial spillovers in family patterns to neighbouring counties, possibly due to migration, could reduce the variation in the dependent variable at the border, so that a local estimator may exacerbate potential downward biases related to spillover effects.[44]

With the above warnings in mind, we estimate variants of the fuzzy RDD given below:

$$Y_{i,c,s} = \sigma_s + \beta_1 log(SugarProduction_{c,s}) + \beta_2 Distance_{c,s} + \epsilon_{i,c,s} \quad (2)$$

$$log(SugarProduction_{c,s}) = \theta_s + \delta_1 \mathbb{1}(Distance_{c,s} > 0) + \delta_2 Distance_{c,s} + \mu_{i,c,s} \quad (3)$$

where, in the second stage (Equation 2), $Y_{i,c,s}$ is the main outcome of interest, i.e., the probability of single female headship for individual i in county c and state s; σ_s denotes state fixed effects; $SugarProduction_{c,s}$, i.e., average sugar production in 1850-1860 entered as $log(0.01 + SugarProduction)$, represents the continuous treatment; and $Distance_{c,s}$, i.e., distance from the sugar suitability border, is the running variable. In the first stage (Equation 3), θ_s denotes state fixed effects and $\mathbb{1}(Distance_{c,s} > 0)$ is a dummy variable that takes value 1 if a county is in an area which is suitable to sugar, and 0 otherwise. The latter indicates whether the cutoff has been crossed and represents the rule that predicts treatment. In other words, in Equation 3 sugar production is shown to depend on whether the cutoff has been crossed, while in Equation 2 the treatment (i.e., actual historical sugar production) determines the probability of the occurrence of female headship.[45]

Identification in a RDD relies on the continuity of the density function of the running variable at the cutoff (i.e., absence of selective sorting around the discontinuity) and covariate balance (i.e., absence of an effect of the treatment on potential factors that should not be affected by the discontinuity). Figure A9 illustrates the result of the

[42] After a rapid expansion until the mid 1850s, sugar production was hit by massive damage because of ecological events such as a 1855 drought and a 1856 hurricane (Follett, 1997). Averaging over 1850 and 1860 can therefore alleviate yearly fluctuations in production. For counties that were formed between 1850 and 1860 we assign a production of zero in 1850 to avoid losing further variation.

[43] Price fluctuations pushed relatively small sugar plantations out of the market, so that production as of 1850-1860 may underestimate production during the previous decades, also due to a change in the distribution of sugar plantations (Carrington, 2002).

[44] In our context, a further limitation of a geographic RDD approach comes from the fact that we can rely only on county-level average measures of suitability, so that we are left with limited variation when we look at the sub-sample of counties close to the border.

[45] The counties crossed by the sugar suitability border are dropped, following the "donut" approach, in order to avoid splitting a county that is crossed by the border because of potential geo-referencing errors. This approach also assures that the results are not driven by potential issues related to sorting.

Table 2: Single Female Headship, 1880-1940 - RDD

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
			Second Stage			
Log Sugar Production	0.0245**	0.0245***	0.0336***	0.0262**	0.0217**	0.0146
	(0.0125)	(0.0090)	(0.0130)	(0.0114)	(0.0098)	(0.0102)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	-0.010	-0.008	-0.011	-0.011	-0.009	-0.006
Observations	43484	85893	111228	79907	93461	56062
Counties	1149	1428	1537	1244	1262	785
Sample Mean	0.127	0.128	0.119	0.110	0.121	0.134
Left Bandwidth	0.0058	0.0066	0.0069	0.0054	0.0054	0.0033
Right Bandwidth	0.0006	0.0007	0.0006	0.0006	0.0008	0.0007
			First Stage			
$\mathbb{1}(\text{Distance}_{c,s} > 0)$	1.182***	1.559***	1.333***	1.217***	1.421***	1.423***
	(0.458)	(0.419)	(0.397)	(0.388)	(0.389)	(0.414)
Kleibergen-Paap F Stat.	6.66	13.83	11.30	9.83	13.33	11.79
Cragg-Donald F Stat.	1212.22	4305.76	4697.39	2864.46	4256.36	2359.68
Stock-Yogo Crit. Val.	16.38	16.38	16.38	16.38	16.38	16.38

Note: The dependent variable is single female headship. Border distance is also included among regressors. Two different MSE-optimal bandwidth selectors (below and above the cutoff) are used. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

McCrary (2008) test of continuity of the density function, which confirms the absence of sorting. Tables A15 and A16 report tests of covariate balance for geographical and individual variables, respectively.[46] Reassuringly, among the former, the slave share in 1860 is the only variable that appears not to be balanced between treated and untreated counties, as one should have expected. All the other variables, including the suitability measures for cotton, rice, and tobacco, do not significantly change at the cutoff.[47] Turning to individual variables, over the six samples running from 1880 to 1940, the share of blacks is the only one that appears to be systematically and significantly larger in treated counties, consistently with the tests for the geographical variables and with the fact that slavery and racial characteristics are likely to be endogenous. Beside the share of blacks, we detect some other minor differences between the treated and untreated sample (e.g., for age and number of children, two highly correlated variables). However, since many of these characteristics are potentially endogenous, such small differences are to be expected.

Table 2 reports the results using the fuzzy RDD strategy.[48] In the first stage regres-

[46]The tables show the differences between treated and untreated counties obtained by running for each covariate a sharp RDD on the treatment $\mathbb{1}(Distance_{c,s} > 0)$ and the running variable. Estimates are confined to the optimal bandwidth.

[47]Geographical variables are collapsed at a county level because they vary at such a level and are time invariant.

[48]The bandwidth is measured in degrees with, say, 0.001 corresponding to one degree, i.e., approxi-

sions, the potential treatment has a strong and positive effect on the probability to be treated, providing an adequate value for the Kleibergen-Paap F-statistics of weak identification. With the only exception of the last year in the sample, the second stage shows a significant and sizeable effect of the treatment. Thus, reassuringly, previous results are corroborated by this alternative strategy.[49]

To gauge the robustness of the RDD approach, in order to capture differential trends of the running variable at the two sides of the cutoff, in Table A17 we present results obtained by adding to Equations 2 and 3 a non-linear term, namely, the interaction between the rule which determines the treatment and the running variable. The resulting second-stage coefficients tend to be larger in size than in the baseline linear specification, even though they lack significance because of the loss of efficiency of the estimator (as revealed by the larger standard error). This is due to the collinearity induced by the presence of the interaction, that provokes a decrease in the explanatory power of the treatment rule and causes weak identification issues, so that the standard error suffers from asymptotic size distortions (Stock and Yogo, 2005; Feir et al., 2016).

Because the running variable is measured at a county level, a potential unbalancedness in individual characteristics may confound the effect of the treatment. In principle, in a RDD setting, controlling for exogenous covariates may attenuate this concern and help to isolate the effect of interest (Frolich and Huber, 2019), even though it is not always recommended. Indeed, in the present context, many of the available individual controls are likely endogenous. For this reason, as in the previous sub-section, in order to control for unobservable characteristics which could be unbalanced between the treated and untreated sample we generate groups of individuals with similar characteristics and we complement the fuzzy RDD with the same matching strategy previously applied to OLS.[50] The results of the fuzzy RDD with matching, presented in Table A18, are in line with the previous ones, thus confirming the absence of relevant issues in terms of imbalance between treated and untreated individuals, at least within bordering counties.[51]

mately 111 kilometers.

[49]The same regressions cannot be run over the sample of blacks because, due to the low number of observations, there is not enough variation to achieve identification of the effect. The results for whites are in line with those previously obtained so that we do not report them for brevity.

[50]Consistently, we compute the optimal bandwidth using only individuals on the common support and include among regressors matched group fixed effects, forcing the estimator to exploit the variance among individuals with balanced covariates.

[51]Since a RDD strategy is doomed to deliver only local results, in Table A19 we run (fully-controlled) 2SLS regressions where sugar suitability is used as an instrument for sugar production in 1850-1860. Once again, our main results are confirmed.

4.3 A falsification test

Unlike cotton and tobacco, that are associated with highly dispersed suitability maps, rice shares with sugar a relatively well-defined border.[52] If we draw the border of the rice suitable area by comprising regions with rice suitability between very high (class -1) and marginal (class -6), we obtain a compact area that, if compared to sugar, stretches further North, while at the same time loses some regions at the far West (see Figure A10).[53] Having identified an alternative, well-defined border, other than that of the sugar suitable area, we can perform a falsification test.

Table A20 shows that, when we replicate the fuzzy RDD using the rice suitability border, indeed the treatment no longer exerts any effect on the probability of female headship, with coefficients of a small and even negative sign. These results point to a unique role for sugar suitability and slave life in sugar plantations in shaping American family structure.

5 Out-of-state migration and persistence

In order to deepen our understanding of the effect of sugar planting and to assess the persistence of its legacy through generations and across states, we construct a dataset of household heads whom we link between the 1880 and the 1930 Census. The period under investigation therefore covers the 50 years running from the aftermath of the abolition of slavery to the completion of the first wave of the Great Migration.

The linked sample is constructed as follows. First, we restrict the 10 percent sample of the 1880 Census to individuals with unique surnames by state of birth. We drop individuals born in a foreign country in order to exclude those who may have not been exposed to U.S. slavery.[54] Using only unique surnames alleviates concerns about the possibility of false positive matching. Second, we match these individuals to individuals

[52]The similarity between the shape of the sugar and rice suitable areas justifies the similar evolution of the black population share illustrated in Figure 1.

[53]To be noticed is that the border definition for the case of rice excludes the regions with very marginal rice suitability (class -7) that are represented in a lighter shade outside the border depicted in Figure 5. In the case of sugar, excluding the regions with very marginal suitability would not affect the border substantially, since they reduce to a few spots within the boundary depicted in Figure A10. If we redraw the border of the sugar suitable area to exclude very marginally suitable regions, the results remain similar to those in Table 2, unsurprisingly given that they are negligible in size and that the alternative border would only affect the first stage.

[54]By excluding foreign-born we can also separate out the influence of alternative family arrangements among migrants. In the early twentieth century, European immigrants tended to leave families behind, so that men largely outnumbered women. West Indian blacks incoming from the Caribbean followed the same pattern. By contrast, black Americans moving from the South to the North brought their families along (Gutman, 1976). Thus, the inclusion of foreign-born would dilute the share of female-headed households.

in the 5 percent sample of the 1930 Census by surname,[55] race, and state of birth, using for individuals in 1930 their mothers' state of birth (and again dropping those with a foreign-born mother). The reason why we use the mothers' state of birth rather than the individuals' is that we shall rely on the potential difference between the two in order to define the condition of migrant. We define as migrants those individuals who by 1930 are no longer located in their mothers' state of birth, even though it may have been their mothers who migrated, before or after their birth.[56] For our analysis, other individual characteristics other than surname, race, and state of birth are not essential to the matching, since we aim at capturing a link between any individual residing in 1880 in a sugar suitable county and any individual of the same race and bearing the same name as of 1930, that is, a likely descendant.[57] The match rate between the individuals bearing unique names in 1880 and those in the 1930 sample is 13.5 percent.[58] Third, we restrict the resulting matched and linked sample of individuals to household heads aged 15-89. We obtain a sample of 26,043 household heads in 1930. Lastly, we create a sub-sample of 18,945 migrants, defined as household heads who are no longer located in their mothers' state of birth, according to our definition of migrant. Our procedure allows us to trace the origin of each individual in the dataset to the state where his/her ancestors presumably came from.

Table A21 contains summary statistics, both for the full sample and the sub-sample of out-of-state migrants. If compared with the 1 percent cross-sectional sample of the 1930 Census (see Table A3), the full linked sample is very similar in most dimensions (such as single female headship, age, urbanization, number of children, labor force participation, etc.), which assures us that selection into it is not biased. Within the linked sample, the summaries statistics for the the full and the migrants sub-samples are also reassuringly comparable. Table A21 reports analogous statistics for blacks, who represent 6 percent of the full sample, to be compared with 9 percent in the 1930 Census. This gap is likely due to a smaller variability across black surnames, that results in a larger loss of observations since we only keep unique surnames by state.[59] By 1930, nearly 73 percent

[55]The 1930 Census is the last to provides surnames. However, it does not provide a 10 percent sample.

[56]We refer to the mothers' – rather than fathers' – state of birth in order to include illegitimate children of single mothers and also to account for the fact that cultural transmission is stronger through the maternal side (see, e.g., Fernandez et al., 2004).

[57]We apply standard cleaning procedures, including NYSIIS name standardization, in order to remove non-alphabetic characters and account for common misspellings and nicknames. See Abramitzky et al. (2012) for a description of the methodology.

[58]Our match rate is comparable to the 16 percent rate achieved by Abramitzky et al. (2012), who employ a less restrictive individual-based perfect matching strategy over a shorter (1900-1920) time span.

[59]Ager et al. (2019) warn that unique matches are more likely for uncommon names and/or more accurately reported names, which in turn tend to be associated with higher economic status. The fact that some slaves used to adopt their owners' surnames and may have kept them even after emancipation (Gutman, 1976) may induce a further loss of observations for blacks.

Table 3: Single Female Headship, 1880-1930 Linked Sample - Migrants

	(1)	(2)	(3)
Sugar Suitability	0.0081**	0.0136***	0.0122*
	(0.0037)	(0.0046)	(0.0065)
1930 State FE	Yes	Yes	No
1880 State FE	No	Yes	Yes
1930 County FE	No	No	Yes
Individual Controls	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes
Adj.R-squared	0.376	0.375	0.363
Observations	8226	8226	8226
Counties	2088	2088	2088
Sample Mean	0.059	0.059	0.059

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density, all at 1880 boundaries, and the slave share in 1860. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area, both in 1880 and 1930. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

of the household heads in the linked sample had relocated out of the state their ancestors lived in 1880.[60] Among migrants, about 12 percent of the household heads are single females, while for black migrants they represent 20 percent.

By tracking migration patterns, our empirical strategy allows us to identify the portable legacy of slavery in sugar plantation, as embodied in cultural beliefs and norms, through generations and across states. In other words, for migrants, the indirect influence of sugar planting through the environment should be filtered away, so that their outcomes can indeed be attributed to the experience of slavery in sugar plantations only through their own cultural beliefs and norms.[61] Table 3 presents results for the linked sample of migrants. Sugar suitability is the county-level average measure at 1880 boundaries. In Model 1 we include state-of-destination (i.e., 1930) fixed effects, individual controls – measured both in 1880 and 1930 – that should mitigate concerns regarding potential selection into migration, as well as the slave share in 1860 and geographical controls referring to the county of origin at 1880 boundaries. In Model 2 we add state-of-origin (i.e., 1880) fixed effects, and in Model 3 we tighten our identification strategy by replacing state-

[60]The smaller fraction of out-of-state migrants we obtain for blacks (65 percent) is explained by the fact that whites are generally richer and thus more mobile across states. However, if we focus on migrants out of the former slave states, their fraction is 4 percent on average and much higher, at 12 percent, for blacks, consistently with the evidence on the First Great Migration.

[61]See Fernandez and Fogli (2009) and Giuliano (2007) for epidemiological analyses of the behavior of migrants, in terms of fertility and female labor force participation for the former and living arrangements for the latter.

of-destination fixed effects with county-of-destination fixed effects.[62] The latter should eliminate all potential current local confounders, capable of influencing the dependent variable. All models produce a sizeable and statistically significant coefficient on sugar suitability. In our preferred specification in Model 3, the magnitude of the effect implies a 21 percent increase in the likelihood of a single female head, to be compared with the 7 percent increase resulting from our matching estimator for the year 1930 (see Panel A in Figure 4 and Model 5 of Panel A in Table A10). Thus, the impact of sugar suitability on the migrants descending from households that had likely experienced slavery in sugar plantations is stronger, if compared to the one we detected in Section 4.

Table A23 replicates Table 3 for the full linked sample, uncovering a similar magnitude for the effect of sugar in Model 3. This follows from the fact that the inclusion of county-of-destination fixed effects implies that the only variation which can be exploited is the one coming from migrants, since for non migrants county characteristics are absorbed by the fixed effects. Table A24 presents racially-disaggregated results for migrants. The models including county-of-destination fixed effects cannot be estimated over these sub-samples because of a loss in degrees of freedom, which is especially severe for blacks.[63] Nevertheless, despite the loss of significance due to the small sample size, the size of the coefficients for blacks is larger than in Table 3, both for Model 1 and 2, while the opposite is true for whites.

Taken together, the evidence identifies a non dissipating influence of sugar and points to an intergenerational persistence of its legacy for households whose ancestors experienced slavery in sugar plantations, even after accounting for geographic mobility and the consequent geographic spread of the black family model.

6 Contemporary evidence

We now turn to evaluate the persistency of the influence of sugar planting on black family structure up to the present day, using 1990 data provided at the county level by the Census.[64] As previously mentioned, after 1940 individual data from the 1 percent sample of the Census are only available for places with population above 100,000, thus excluding a large portion of the population. For this reason, we use data at the county level.

[62] We can do so since within a destination county there will be individuals exposed to different levels of sugar suitability (or not exposed at all).

[63] As the table show, we have 356 counties for 649 observations, which implies that variation at a county level is close to zero.

[64] The source is IPUMS NHGIS. See https://www.nhgis.org/ and Manson et al. (2019).

The reason why we focus on 1990, rather than on a more recent Census year, is the following. For each decade, the Census defines two types of households: family and nonfamily.[65] For our purposes, we aim at considering female heads of family households, who consist mostly of single women with children, together with female heads of nonfamily households, who consist of childless single women. The 1990 Census provides racially disaggregated information only for family households. By contrast, the 2000 and 2010 Censuses provide racially disaggregated information only for nonfamilies. However, single mothers – as opposed to childless single women – do represent the prevailing type of single female head among blacks, that is, the main object of our investigation. The reverse is true among whites. This is why we prefer to use 1990 data despite the fact that we miss information on childless female heads.[66]

Summary statistics in Table A25 show that the share of single female heads, defined as the number of family households headed by a woman, is 13.1 percent. It is as high as 30.1 percent among blacks, while limited to 10.7 percent for whites.[67] Figure A11 shows the differential distribution of single female headship by former state type. The share of single mothers is much higher for blacks across all types.[68]

In Table 4, where the dependent variable is the county-level proxy for single female headship, we control for state fixed effects and a set of geographical characteristics that mimics, as closely as possible, the set we employed when using the historical individual data. The estimates in Panel A, for all household heads, reveal in Model 1 the absence of any residual association between sugar suitability and single female headship, while the slave share in 1860 is now significantly and positively associated with it.[69] The same influence of the slave share is confirmed in Panel B for blacks, but not in Panel C for whites. For the latter, the slave share is actually negatively related to the likelihood of

[65] A family household has at least two members related by birth or marriage and can be maintained by either a married couple or, in the case of so-called other families, by a man or woman living with relatives (possibly including children). A nonfamily household is maintained either by a man or a woman with no cohabiting relatives.

[66] On the basis of the 2011 American Community Survey conducted by the Census Bureau, Vespa et al. (2013) document the presence, among 13.9 million black households, of 4.1 million (29.4 percent) female-headed family households against 2.8 million (20.1 percent) female-headed nonfamily households. By contrast, for whites, out of 89.7 million households the corresponding shares are 10.3 and 18.5 percent, a pattern that can be explained by a delay of marriage for younger white women, who are more likely to work than the previous generations (see, e.g., Fernandez et al., 2004).

[67] A direct comparison with the 1940 figures reported in Tables A3 and A4, where households with a single female head represent 14.6 percent of the sample and 22 percent of the black sample, is prevented by the fact that for 1990 we cannot count childless female heads.

[68] However, contrary to the pre-war period when single female headship was most likely among blacks in the former free states, the share is now at its peak among blacks in former slave states, a phenomenon that can in part be explained by the reverse migration of blacks to the South since 1970.

[69] Berger (2018) also documents a relationship between slavery and contemporary family structure, as captured by the fraction of single mothers.

Table 4: Single Female Headship, 1990 - County Data

	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: All			
Sugar Suitability	0.0021	-0.0006	0.0004	-0.0005	0.0019	-0.0005
	(0.0034)	(0.0018)	(0.0029)	(0.0018)	(0.0033)	(0.0018)
Slave Share 1860	0.0245***	-0.0105***	0.0114***	-0.0103***	0.0241***	-0.0104***
	(0.0037)	(0.0021)	(0.0036)	(0.0021)	(0.0037)	(0.0021)
Black Share		0.0468***		0.0462***		0.0465***
		(0.0018)		(0.0022)		(0.0018)
Black Incarceration			0.0248***	0.0011		
			(0.0021)	(0.0014)		
Black Female Empl.					-0.0042***	-0.0019***
					(0.0012)	(0.0005)
Adj.R-squared	0.562	0.838	0.648	0.838	0.510	0.830
Observations	1944	1944	1842	1842	1635	1635
States	40	40	36	36	40	40
Sample Mean	0.138	0.138	0.138	0.138	0.145	0.145
			Panel B: Blacks			
Sugar Suitability	-0.0020	-0.0042	-0.0079	-0.0081	-0.0024	-0.0043
	(0.0079)	(0.0082)	(0.0067)	(0.0069)	(0.0067)	(0.0071)
Slave Share 1860	0.0185***	-0.0102	-0.0102	-0.0153*	0.0125**	-0.0167**
	(0.0059)	(0.0084)	(0.0073)	(0.0081)	(0.0050)	(0.0069)
Black Share		0.0385***		0.0108*		0.0394***
		(0.0061)		(0.0059)		(0.0059)
Black Incarceration			0.0567***	0.0512***		
			(0.0087)	(0.0099)		
Black Female Empl.					0.0002	0.0023
					(0.0043)	(0.0040)
Adj.R-squared	0.280	0.296	0.316	0.316	0.306	0.336
Observations	1835	1835	1749	1749	1622	1622
States	40	40	36	36	40	40
Sample Mean	0.317	0.317	0.319	0.319	0.338	0.338
			Panel C: Whites			
Sugar Suitability	-0.0001	-0.0004	-0.0004	-0.0005	-0.0000	-0.0003
	(0.0013)	(0.0012)	(0.0014)	(0.0013)	(0.0013)	(0.0012)
Slave Share 1860	-0.0045***	-0.0084***	-0.0056***	-0.0082***	-0.0048***	-0.0084***
	(0.0009)	(0.0013)	(0.0010)	(0.0013)	(0.0009)	(0.0013)
Black Share		0.0052***		0.0055***		0.0049***
		(0.0012)		(0.0014)		(0.0012)
Black Incarceration			0.0024***	-0.0005		
			(0.0008)	(0.0008)		
Black Female Empl.					-0.0014**	-0.0011**
					(0.0006)	(0.0005)
Adj.R-squared	0.486	0.501	0.473	0.485	0.440	0.457
Observations	1944	1944	1842	1842	1635	1635
States	40	40	36	36	40	40
Sample Mean	0.111	0.111	0.112	0.112	0.114	0.114
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is the share of single female headship. Geographical controls include cotton, rice, and tobacco suitability, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population. Robust standard errors clustered at a state level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

single female headship. When in Model 2 we add the contemporary black share (whose correlation with the slave share is as high as 0.81), for the full sample its coefficient is large and highly significant, while it drives to negative the coefficient on the slave share. The positive coefficient on the black share is confirmed for the black sample, while for the white sample its size is much smaller (namely, the resulting increase in the share of single female headship is 12 percent for blacks and 5 percent for whites). Thus, the attitudes toward family formation inherited from sugar plantations, and spread all over the country through migration and intermarriage, appear to be channeled – and even amplified – by the share of blacks in the population. This finding can be explained by the joint influence of migration and intermarriage. Indeed the relocation of the descendants of black slaves following the Great Migration induced intermarriage among blacks from source counties with different exposure to sugar planting. This process ultimately weakened the direct relationship between sugar and the black family structure, but created a novel one which is best captured today by the share of blacks in the population. The amplified impact of the latter explains why the incidence of single female among blacks is higher in 1990 than in 1880, in the aftermath of Abolition.

During the past few decades, the dissolution of the black family has forcefully been attributed to the economic insecurity of black men. According to Wilson (1987), the growing diffusion of factors such as poverty, unemployment, and incarceration, disproportionately so for African American urban poor males, has disabled them from forming stable unions, making them de facto withdraw from the marriage market.[70] The belief that the instability of today's black family is the result of contemporary poverty, and not of past slavery, clearly resonates with those of the early critics of Moynihan. Can these relatively recent developments represent alternative explanations for the existing trends, other than the history of slavery and sugar planting? In order to dig deeper into what can explain contemporary family structure, we employ county-level data on incarceration by race provided by the Vera Institute of Justice.[71] Data by race and gender combined are not available, but since incarceration is disproportionately more prevalent among males, particularly for blacks, we use black incarceration as a proxy for black male incarceration and we focus on the share of blacks in the jailed population.[72]

[70]The Wilson hypothesis has been tested, among others, by Charles and Luoh (2010), who find that higher male imprisonment has lowered the likelihood that women marry, and Caucutt et al. (2018), that model differences in incarceration dynamics between black and white men and show that they can explain the racial marriage gap.

[71]See https://www.vera.org. To maximize the sample size, we consider jail, rather than prison data, but the two are highly correlated. Jail population is defined by Vera as the average daily number of people held in jail through December 31 of a given year. Race-disaggregated data is available yearly starting from 1985. We average out the five years from 1986 to 1990.

[72]To be noticed is that the share of blacks in the jailed population differs from the common definition of black jailed incarceration rate, i.e., black jailed population over black population, since our purpose is

In Models 3 of Table 4, after controlling for sugar suitability and the slave share as well as for the other geographical controls and state fixed effects, while at the same time excluding the black share, indeed black incarceration is shown to exert a positive effect on female headship, for all samples, with an especially large coefficient for blacks. However, when in Model 4 we reinsert the black share, black incarceration loses significance over the full and white samples, while it retains it for the black sample to the expense of the black share – whose coefficient becomes smaller and significant only at the 10 percent level. In other words, for blacks only, black incarceration emerges as a powerful mediator of the black share. Thus, the main driver of the black family structure is confirmed to be represented by the black share, which proxies for past slavery and the spread of the legacy of slavery in sugar plantations. Moreover, the effect of the black share is mediated by black incarceration, in turn a proxy for the withdrawal of black males from the marriage market. The emerging mechanism linking slavery in sugar plantations and the contemporary black family suggests that today's attitudes of black men can be traced back to the prominence of matrifocality, the diffusion of male-absent families, and the condition of forced celibacy which were especially acute among slaves in sugar plantations.

An alternative mediating channel might run through a legacy of past slavery for the current position of black single women as household heads and, as a consequence, main providers. This legacy can be captured by the contemporary employment rate of black women.[73] Accordingly, the persistent prevalence of single female headship among blacks could be attributed to a withdrawal of women, rather than men, from the marriage market, as the former can secure their economic independence. We explore this alternative explanation in Models 5 and 6 of Table 4. For the full sample in Panel A, black female employment actually exerts a negative influence on single female headship, contrary to the intuition that would support its role as a potential mediator. For blacks in Panel B, it exerts no effect. Thus, the labor market performance of black women does not emerge as a relevant driver of the contemporary black family structure.[74]

7 An African legacy?

An alternative explanation for the diffusion of the black family, other than slavery – and in particular slavery in sugar plantations – rests on the legacy of African cultural traditions,

to compare the share of blacks in the jailed population with the analogously defined share of blacks in the total population, which should be similar in the absence of discrimination. In fact, they are respectively equal to 8 and 21.7 percent.

[73]Data are from the U.S. Census. See, e.g., Goldin (1977) on the influence of slavery on African Americans' cultural norms about women's work.

[74]Given the small number of state-level clusters, for all models in Table 4 we also compute standard errors using a wild bootstrap, with similar results that we do not report for brevity.

that may have transmitted specific patterns of family and kinship ties and practices related to childbearing and sexuality. For example, matrifocality has been traced to the polygynous West African societies where the responsibility for raising children rested primarily on the mother (Herskovits, 1941). In the context of the West Indies, low fertility in sugar plantations has been attributed to African traditions concerning breastfeeding, with long periods of lactation (above two years) allegedly explaining wide birth-spacing (Fogel and Engerman, 1979).[75] The emphasis on extended families in African culture has been linked to the reliance on kinship networks rather than the nuclear family model (McDaniel, 1990). The higher likelihood of pregnancy for black female teenagers and the absence of co-residence for black males have been associated with the presumed promiscuity in the mating habits of slaves and their tribal origins, with reference also to polygyny (Bush-Slimani, 1993).

In order to asses the explanatory power of African legacies, we assemble a dataset that documents the ethnic origins of slaves, by combining the Louisiana Slave Database with the Ethnographic Atlas. The former includes information about 104,729 individuals who were enslaved in Lower Louisiana between 1719 and 1820.[76] The database is based on a variety of documents, including sales of slaves and inventories of the estates of slaveholders, and has a focus on the African origin of slaves. Indeed, according to Hall (2004), the legacy of African culture was especially strong in Lower Louisiana. For African-born slaves, the ethnicity (as captured by the place of birth) is reported for 8,994 individuals. The Ethnographic Atlas by Murdock (1967) contains data for 863 primitive, historical, and contemporary societies, organized along 51 categories that pertain a variety of economic and social features, including family and kinship structures. For Africa, data are available at the level of ethnicity and are meant to describe them at a stage that precedes European colonization.

We match the slaves in the Louisiana Slave Database for whom ethnicity is reported with the ethnicities in the Ethnographic Atlas and obtain a dataset of 5,588 slaves belonging to 73 ethnicities.[77] The most represented ones are the Ewe, Wolof, Konkomba, and Yoruba.[78] We then match each parish (i.e., county) in the Louisiana Slave Database with the sugar suitability data from FAO GAEZ. Therefore, for each slave in the dataset,

[75] In African societies, late weaning was in turn related to post-partum sex taboos precluding intercourse, with the purpose to limit conception and assure child survival (Morgan, 2006).

[76] See http://www.ibiblio.org/laslave.

[77] We derive information about the ethnicity from the place of birth recorded in the Louisiana Slave Database. Sometimes two different birth places correspond to a single ethnic group in the Ethnographic Atlas. For example, Timbo and Fulbe in the former can both be traced to the Futajalon in the latter. In these cases, we keep both observations because there may be variation in the exposure to sugar suitability, as slaves may reside in different parishes.

[78] The distribution by ethnicity in our sample is consistent with the historical records, according to which many of the Louisiana African-born slave were taken from Senegambia (Curtin, 1975).

Table 5: African Ethnic Legacies and Sugar Suitability

	Coeff.	S.E.	Sample Mean	Obs.
Extended Family	0.126	0.083	0.616	73
Nuclear Family	-0.017	0.017	0.014	73
Patrilocality	-0.051	0.078	0.795	73
Post-Partum Sex Taboos	0.002	0.725	4.571	14
Matrilineal Descent	0.025	0.067	0.110	73
Norms of Premarital Sexual Behavior	0.253	0.412	3.344	32
Dependence on Agriculture	-0.078	0.164	6.137	73
Intensity of Agriculture	-0.090	0.107	3.282	71
Root and Tubers	0.011	0.011	0.014	71
Animals and Plow Cultivation	-0.034	0.034	1.028	71
Sex Differences in Agriculture	-0.289	0.224	3.440	50

Note: Each dependent variable is regressed on sugar suitability. Heteroskedastic robust standard errors: *** p<0.01, ** p<0.05, * p<0.1.

we collect information about ethnic characteristics, as provided by Murdock (1967), and average suitability to sugar in the parish where the slave is located. Because ethnic characteristics are constant across groups, we collapse the dataset at an ethnicity level (i.e., the birth place recorded in the Louisiana Slave Database). Next, we focus on a set of ethnographic variables, reflecting social and economic organization, that carry potential implications for family structure.[79]

Some of the variables we employ have already been used in other contexts. For instance, Alesina et al. (2013) show that the descendants of societies that traditionally practiced plough agriculture have less equal gender norms in the present day. Becker (2018) uses animal husbandry to construct a measure of dependence on pastoralism that predicts constraints on women's sexuality. Bertocchi and Dimico (2019) find that within Africa sexual norms for girls are not correlated with the slave trade, which corroborates their hypothesis that the impact of the slave trade on HIV infection is channeled instead through polygyny. Enke (2019) combines information on domestic organization and descent to measure kinship tightness and its effect on trust.

Table 5 shows the results from regressing the mean values of the ethnographic variables on average sugar suitability. The coefficients reveal the absence of any correlation, which implies that the fact that a slave belongs to a sugar plantation carries no implication for, say, his/her attitude toward marital residence, or post-partum sex taboos. Even though we must take the above findings as merely suggestive due to the low number of slaves

[79]The variables are: Extended Family, Nuclear Family, Patrilocality, Post-Partum Sex Taboos, Matrilinear Descent, Norms of Premarital Sexual Behavior for Girls, Animal Husbandry, Dependence on Agriculture, Intensity of Agriculture, Roots and Tubers, Animals and Plow Cultivation, and Sex Differences in Agriculture. See Table A1 for a description and Table A26 for summary statistics.

that can be matched, we can conclude that there is no evidence that the family structure that we found to be associated with sugar planting under slavery in previous sections can be traced back to the prevailing customs among the African ethnicities that were represented among slaves in Louisiana.

8 Conclusion

In this paper, we empirically assess the effect of historical slavery on the African American family structure, as proxied by the likelihood that a household is headed by a single woman. Our hypothesis is that the black family structure is more likely to emerge in association not with the intensity of historical slavery per se, but with slavery in sugar plantations. This is because sugar planting determined, for the slave population, extreme demographic outcomes that favored the emergence and persistence of the patterns of family formation underlying the black family structure. These patterns can be linked to the diffusion, in sugar plantations, of matrifocality, forced celibacy for male slaves, early widowhood for female slaves, and father absence for small children.

We test our hypothesis by exploiting the exogenous variation in sugar suitability across U.S. counties. We first establish that indeed, as of 1850, sugar suitability is associated with a higher ratio of males to females and low fertility within the slave population. Over the period 1880-1940, higher sugar suitability determines a higher likelihood of single female headship, while the slave share in 1860 bears no influence. The effect of sugar is driven by blacks and starts fading in connection with the Great Migration. OLS estimates are complemented with a matching estimator and a fuzzy RDD. A variety of robustness checks include testing for alternative measures of crop suitability, controlling for scale economies, focusing on different sub-samples, building a pseudo-panel, and performing a falsification test based on suitability to rice. Furthermore, over a linked sample between 1880 and 1930, we identify an even stronger intergenerational legacy of sugar suitability for migrants, a finding that confirms the persistency of the effect of slave life in sugar plantations across generations and U.S. states. By 1990, the effect of sugar is replaced by that of past slavery and the current black share. This contemporary development reflects a spread of the influence of sugar that can be attributed to the Great Migration and the consequent relocation of the descendants of slaves throughout the country, reinforced by the diffusion of intermarriage among blacks with different exposure to sugar planting. We also establish that black incarceration, an often-invoked potential driver of the dysfunctions of today's black family, is a powerful mediator of the black share, confirming the role of the black share as a proxy for the spread of the legacy of slavery in sugar plantations. Lastly, by matching slaves' ethnic origins with ethnographic data, we rule

out any influence of African cultural traditions on the family structure that we found to be associated with sugar planting under slavery in the U.S.

To conclude, the evidence we collect provides strong support for Moynihan's belief that the African American family owes its origins to the history of slavery, that we show to be surfacing through the legacy of slave life in sugar plantations. While our focus is on family structure, we conjecture that our results carry deep ramifications for the associated *"tangle of pathology"*, and in particular with the workings of the U.S. welfare, education, and health care systems.

As we write, the outbreak of the Covid-19 pandemic in the U.S. is witnessing a disproportionate death toll among African Americans. The first commentaries on these preliminary data point to irrefutable factors such as pre-existing illnesses, access to medical treatment, and living and working conditions, as likely determinants. The higher prevalence among blacks of co-residence between grandmothers and grandchildren, again as a legacy of slavery, also ought to be evaluated as a vehicle for a faster spread of the contagion. We plan to do so in future research.

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ONLINE APPENDIX

Bitter Sugar:
Slavery and the Black Family

Graziella Bertocchi and Arcangelo Dimico

May 2020

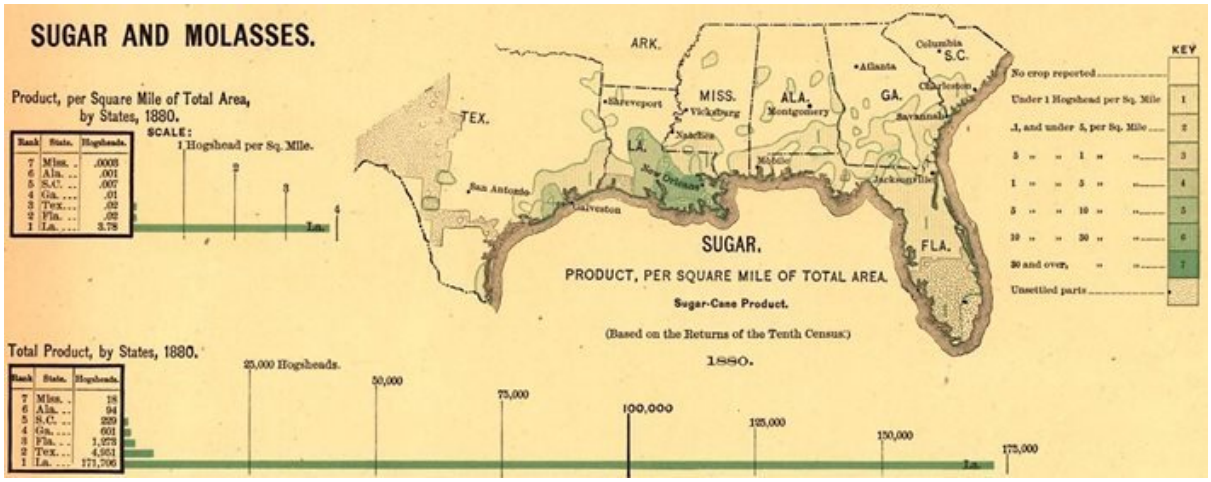

Figure A1: Sugar Production, 1880

Note: The figure shows the production of sugarcane per square mile of total area. Data are from the 1880 Census. Source: Library of Congress.

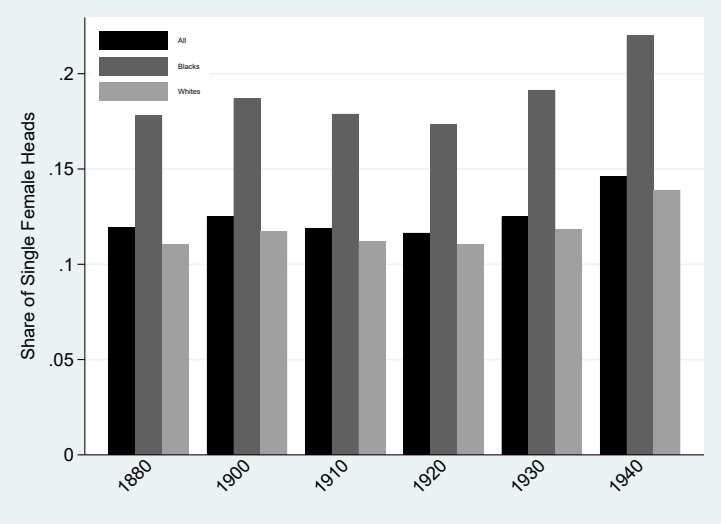

Figure A2: The Share of Single Female Household Heads, 1880-1940

Note: Single female household heads over household heads, overall and by race.

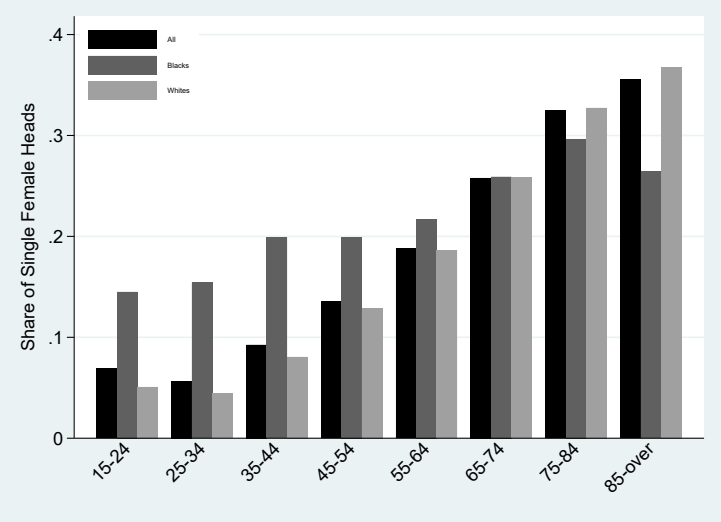

Figure A3: The Share of Single Female Household Heads, by Age, 1880-1940

Note: Single female household heads over household heads, by age brackets, overall and by race.

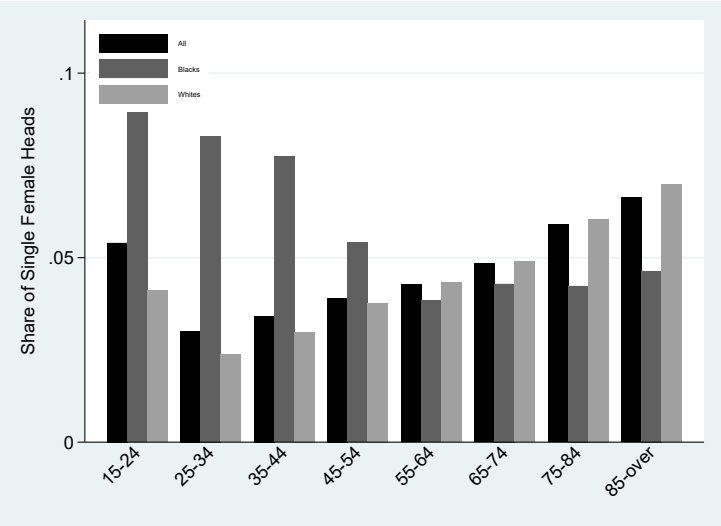

Figure A4: The Share of Single Female Household Heads, Excluding Widowed and Divorced, by Age, 1880-1940

Note: Single female household heads over household heads, excluding widowed and divorced, by age brackets, overall and by race.

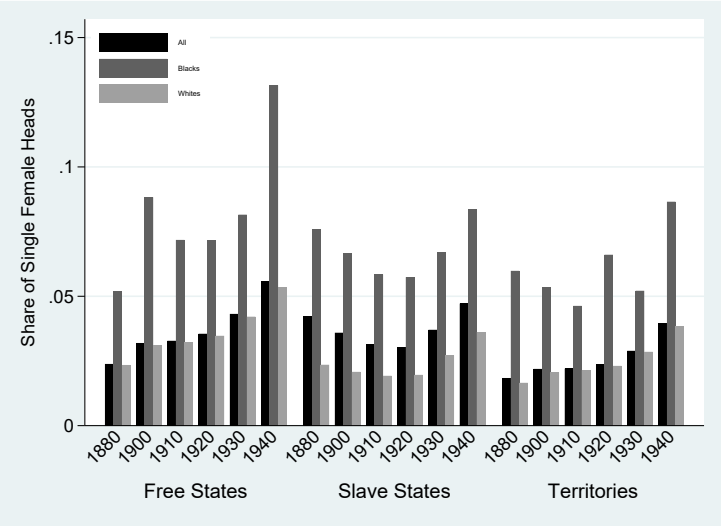

Figure A5: The Share of Single Female Household Heads, by State Type, 1880-1940

Note: Single female household heads over household heads, in free states, slave states, and territories, overall and by race.

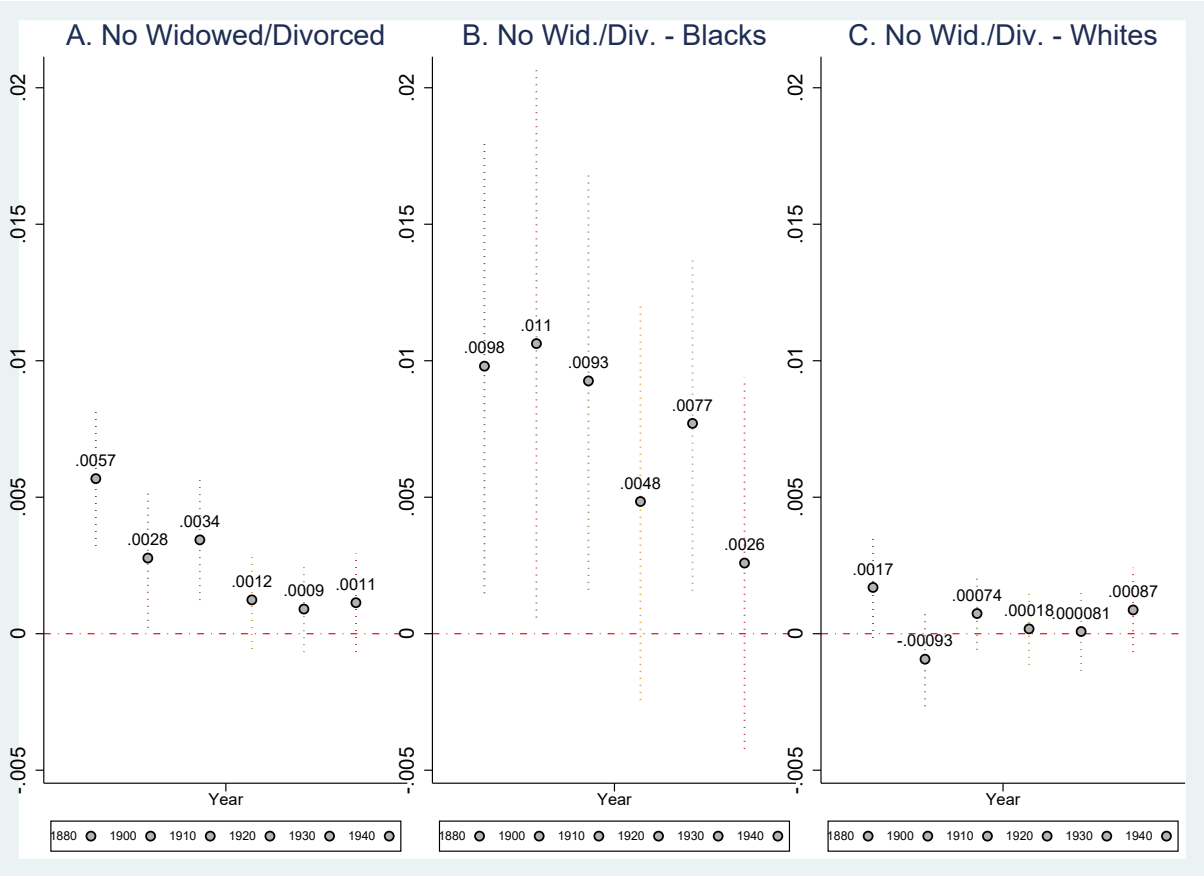

Figure A6: Single Female Headship and Sugar Suitability, 1880-1940 - Matching - Without Widowed and Divorced

Note: The dependent variable is single female headship. The dots represent the coefficients on sugar suitability obtained from OLS estimates with matching for each Census year. The values of each coefficient is also reported. Panel A includes all household heads. Panel B only includes blacks. Panel C only includes whites. Geographical controls (cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density) and matched group and state fixed effects are included. Robust standard errors are clustered at a county level. Dotted vertical lines represent 95 percent confidence intervals.

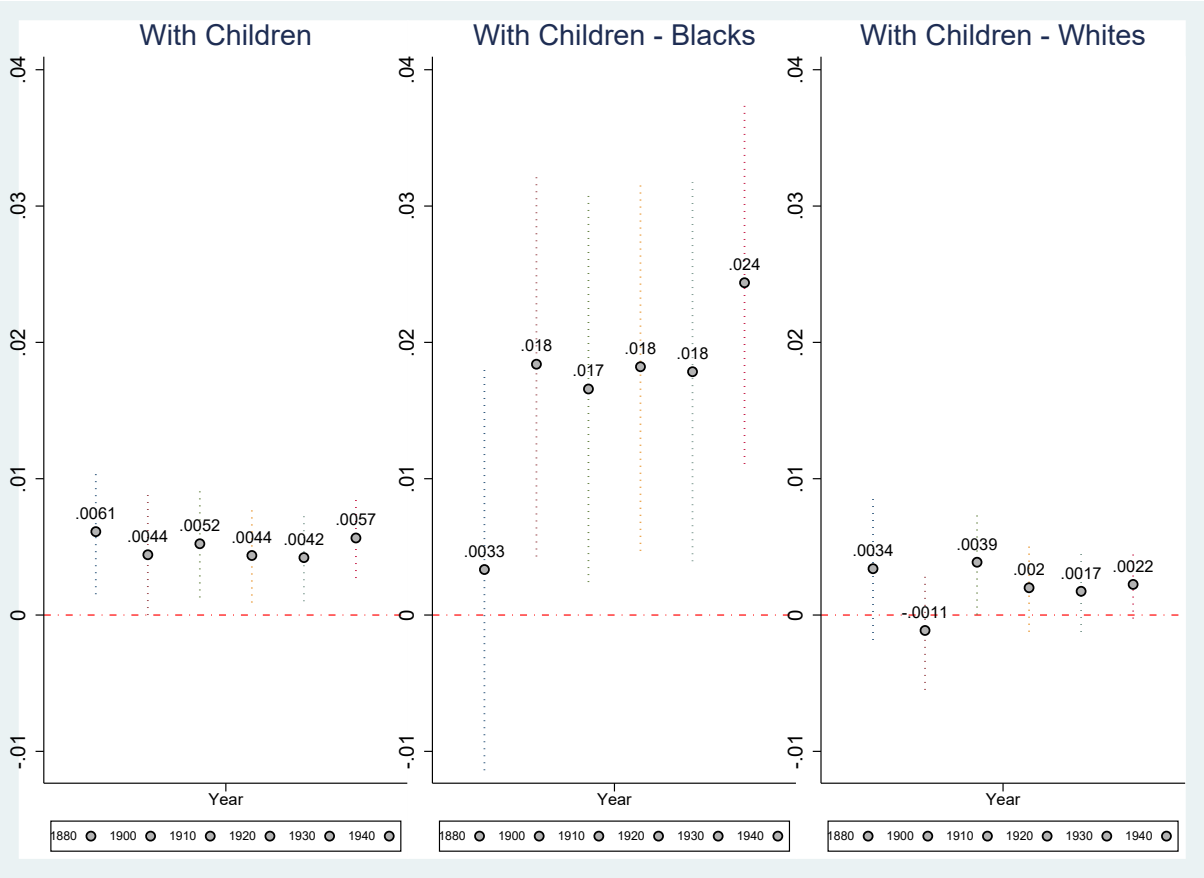

Figure A7: Single Female Headship and Sugar Suitability, 1880-1940 - Matching - With Children

Note: The dependent variable is single female headship. The dots represent the coefficients on sugar suitability obtained from OLS estimates with matching for each Census year. The values of each coefficient is also reported. Panel A includes all household heads. Panel B only includes blacks. Panel C only includes whites. Geographical controls (cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density) and matched group and state fixed effects are included. Robust standard errors are clustered at a county level. Dotted vertical lines represent 95 percent confidence intervals.

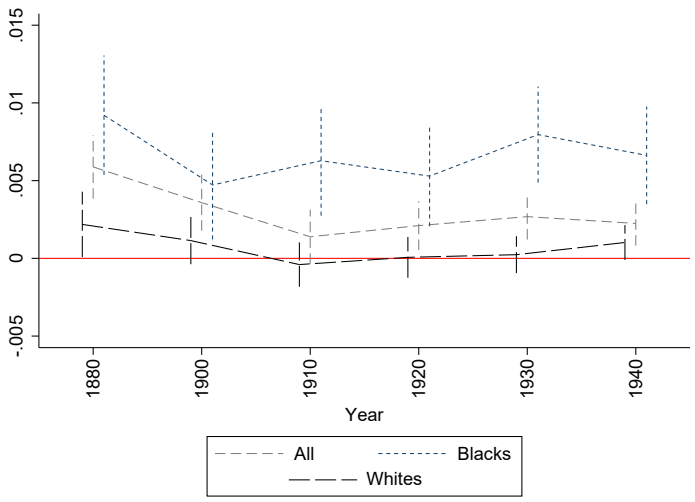

Figure A8: Single Female Headship and Sugar Suitability, 1880-1940 - Pseudo-Panel

Note: The dependent variable is single female headship. The plots represent the coefficients on sugar suitability obtained from pseudo-panel estimates. The medium-dashed line represents the sample of all household heads. The short-dashed line represents the black sample. The long-dashed line represents the white sample. Geographical controls (cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density), individual controls (age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area), and cohort, year, and state fixed effects are included. Robust standard errors are clustered at a county level. Vertical lines represent 95 percent confidence intervals.

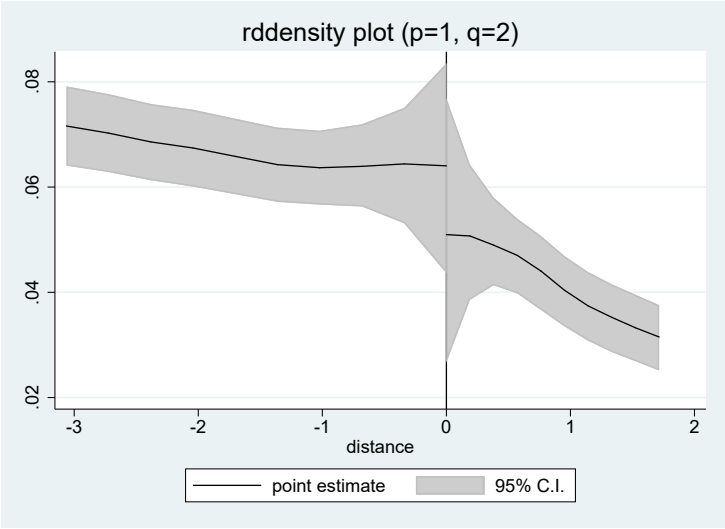

Figure A9: McCrary Test

Note: The figure shows the result of the McCrary (2008) test of continuity of the density function of the running variable at the cutoff. The integer p specifies the order of the linear local polynomial used to construct the density point estimator. The integer $q = p + 1$ specifies the order of the quadratic local polynomial used to construct the bias-corrected density point estimator. The plot is collapsed at a county level and by year because the border of sugar suitability is time invariant.

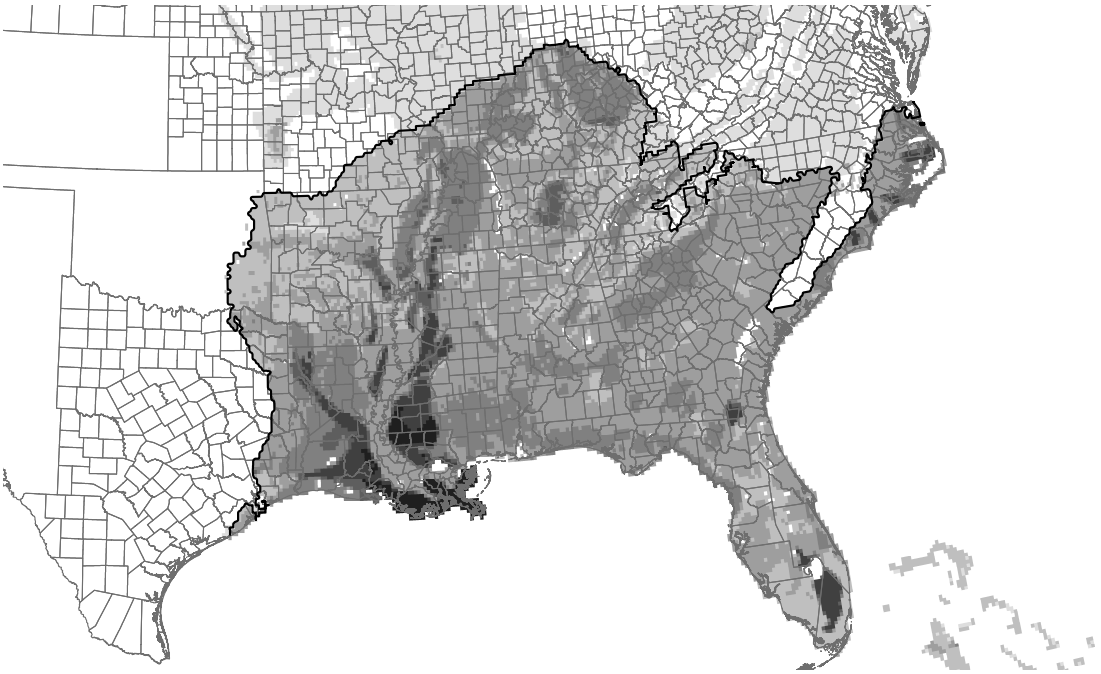

Figure A10: Border of the Rice Suitable Area

Note: The black line represents the border of the rice suitable area. The area comprises regions with rice suitability between very high (class −1) and marginal (class −6). Higher rice suitability regions are represented in a darker shade. Regions with very marginal suitability (class −8) are excluded from the rice suitable area and are represented in a lighter shade outside it. Counties are represented at 1860 boundaries.

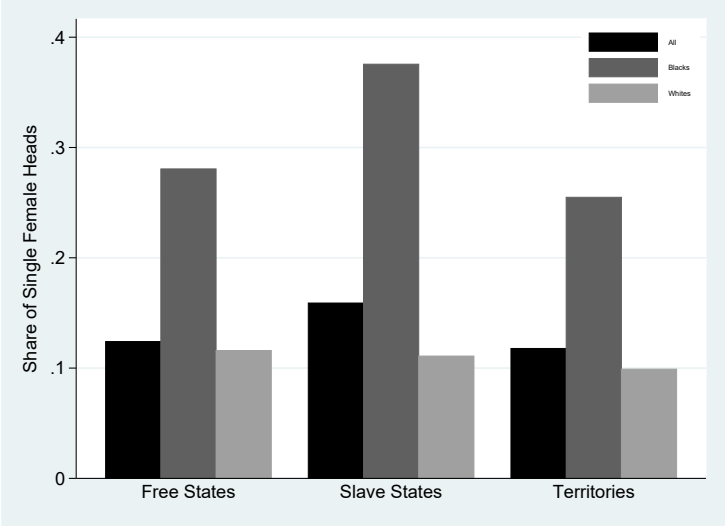

Figure A11: The Share of Single Female Household Heads, by State Type, 1990 - County Data

Note: Single female household heads over household heads, in free states, slave states, and territories, overall and by race.

Table A1: Variable Definitions and Sources

Variable	Definition	Source
Slave Share 1850	Slaves over population, 1850	ICPSR
Sex Ratio	Male slaves over female slaves, 1850	ICPSR
Birth Rate	Slave births over slave population, 1850	ICPSR
Infant Share	Children below age 1 over slave population, 1850	ICPSR
Death Rate	Slave deaths over slave population, 1850	ICPSR
Total Population	Total population, 1850	ICPSR
Urban Population	Population in places 2,500+, 1850	ICPSR
Single Female Headship	Binary variable taking value 1 if the household head is female without a co-living spouse, and 0 otherwise, 1880-1940	IPUMS USA
Age	Years of age, from 15 to 89, 1880-1940	IPUMS USA
Race	Categorical variable taking 7 values (1=White, 2=Black/African American/Negro, 3=American Indian or Alaska native, 4=Chinese, 5=Japanese, 6=Other Asian or Pacific Islander, and 7=Other race), 1880-1940	IPUMS USA
Marital Status	Categorical variable taking 6 values (1=Married, spouse present, 2=Married, spouse absent, 3=Separated, 4=Divorced, 5=Widowed, and 6=Never married/single), 1880-1940	IPUMS USA
Number of Children	Number of own children in the household, 1880-1940	IPUMS USA
Number of Children Below Age 5	Number of own children below age 5 in the household, 1880-1940	IPUMS USA
Number of Families	Number of families in the household, 1880-1940	IPUMS USA
Labor Force Status	Binary variable taking value 1 if not in the labor force and 2 if in the labor force, 1880-1940	IPUMS USA
Duncan Socioeconomic Index	Categorical variable constructed as a weighted sum of occupational education and income measures and taking values from 1 to 100, 1880-1940	IPUMS USA
Occupational Earnings Score	Median earned income per occupation based on education levels and taking values from 1 to 100, 1880-1940	IPUMS USA
Metropolitan Area	Categorical variable taking 4 values (1=Not in metro area, 2=In metro area, Central/principal city, 3=In metro area, outside central/principal city, and 4=Central/principal city status unknown), 1880-1940	IPUMS USA
Crop Suitability	Sugar, cotton, tobacco, and rice suitability indices for low input levels and rain-fed production, ranging from -1 to -8, with -1 denoting maximal suitability.	FAO GAEZ
Slave Share 1860	Slaves over population, 1860	ICPSR
Soil Nutrients	Soil and terrain condition	FAO GAEZ
Soil pH	Soil and terrain condition	FAO GAEZ
Malaria Endemicity	Index representing the contribution of regionally dominant vector mosquitoes to the force of malaria transmission	Kiszewski et al. (2004)
Temperature	Climatic variable	FAO GAEZ
Precipitation	Climatic variable	FAO GAEZ
Elevation	Soil and terrain condition	FAO GAEZ
Water Basins	Water resources variable	FAO GAEZ
Ruggedness	Mean difference between a central pixel and its surrounding cells	QGIS
Latitude	Geographic coordinate in Y-values	IPUMS NHGIS Shapefile
Longitude	Geographic coordinate in X-values	IPUMS NHGIS Shapefile
Population Density	Population over surface area, 1880-1940	IPUMS USA, QGIS
Sugar Production	Average production of cane sugar in 1000-pound hogsheads, 1850-1860	ICPSR
Rice Production	Average production of rice in pounds, 1850-1860	ICPSR
Border Distance	Distance from the sugar or rice suitability border	FAO GAEZ
Single Female Headship	Single female household heads over household heads, 1990	IPUMS NHGIS
Black Single Female Headship	Black single female household heads over black household heads, 1990	IPUMS NHGIS
White Single Female Headship	White single female household heads over white household heads,	IPUMS NHGIS
Black Share	Blacks over population, 1990	IPUMS NHGIS
Population	Total population, 1990	IPUMS NHGIS
Black Incarceration	Black jailed population over total jailed population, 1986-1990 average	Vera
Black Female Employment	Black women employed and in armed force over black women employed, in armed force, and unemployed, 1990	IPUMS NHGIS
Ethnographic Variables	Binary variables for Extended Family (coded on v8), Nuclear Family (v9), Patrilocality (v12), Matrilineal Descent (v43), and Root and Tubers (as major crop, as opposed to cereals, v29), and categorical variables for Post-Partum Sex Taboos (v36), Norms of Premarital Sexual Behavior for Girls (v78), Animal Husbandry (v4), Dependence on Agriculture (v5), Intensity of Agriculture (v28), Animals and Plow Cultivation (v39), and Sex Differences in Agriculture (v54)	Murdock (1967)

Table A2: Descriptive Statistics, County Data, 1850

	Obs.	Mean	S.D.	Min	Max
Slave Share	1623	0.171	0.216	0.000	0.934
Sex Ratio	973	0.976	0.164	0.000	2.250
Birth Rate	930	0.029	0.012	0.000	0.200
Infant Share	930	0.029	0.012	0.000	0.200
Death Rate	875	0.016	0.014	0.001	0.333
Sugar Suitability	1616	-7.569	1.000	-8.000	-2.725
Total Population	1623	14289.511	23143.277	8.000	515547.000
Urban Population	1623	2202.400	18217.156	0.000	515547.000

Table A3: Descriptive Statistics, Individual Data, 1880-1940

	Obs.	Mean	S.D.	Min	Max
			1880		
Single Female Headship	101750	0.119	0.324	0.000	1.000
Age	101628	43.076	13.991	15.000	89.000
Race	101750	1.136	0.362	1.000	4.000
Marital Status	101750	1.794	1.658	1.000	6.000
Nr of Children	101750	2.416	2.144	0.000	9.000
Nr of Children Below 5	101750	0.639	0.876	0.000	5.000
Nr of Families	101750	1.331	1.034	1.000	29.000
Labor Force Status	101676	1.886	0.318	1.000	2.000
Duncan Socioec. Index	90218	21.056	18.751	4.000	96.000
Occupational Earnings Score	90159	33.133	28.440	1.200	100.000
Metropolitan Area	101750	1.249	0.543	1.000	3.000
Sugar Suitability	101750	-7.758	0.754	-8.000	-2.725
Cotton Suitability	101750	-5.925	1.941	-8.000	-1.200
Rice Suitability	101750	-6.754	1.282	-8.000	-1.063
Tobacco Suitability	101750	-4.186	1.247	-8.000	-1.000
Slave Share 1860	94547	0.111	0.202	0.000	0.925
Soil Nutrients	101750	1.921	0.828	0.000	6.000
Soil pH	101750	25.808	6.859	10.000	77.857
Malaria Endemicity	101750	0.043	0.057	0.000	2.311
Temperature	101750	11.751	3.605	-1.691	23.340
Precipitation	101750	1059.094	221.236	139.780	2023.798
Elevation	101750	244.025	271.658	1.600	3536.923
Water Basins	101750	2.059	3.689	0.000	67.103
Ruggedness	101750	346.155	896.449	3.409	18137.340
Latitude (000s)	101750	284.599	456.612	-1218.284	1518.435
Longitude (000s)	101750	970.322	824.619	-2303.025	2199.204
Population Density (000s)	101369	4895.262	19376.235	0.023	115420.352
Sugar Production	101750	89.768	1059.106	0.000	27748.000
Sugar Treated Counties	101750	0.083	0.277	0.000	1.000
Distance Sugar Suit. Border	101750	-0.006	0.005	-0.031	0.006
Rice Production (000s)	101750	141.797	2002.700	0.000	51285.211
Rice Treated Counties	101750	0.218	0.413	0.000	1.000
Distance Rice Suit. Border	100210	-0.003	0.005	-0.030	0.007
			1900		
Single Female Headship	162231	0.125	0.331	0.000	1.000
Age	162118	44.022	14.034	15.000	89.000
Race	162231	1.134	0.397	1.000	6.000
Marital Status	162231	1.867	1.713	1.000	6.000
Nr of Children	162231	2.186	2.099	0.000	9.000
Nr of Children Below 5	162231	0.525	0.828	0.000	7.000
Nr of Families	162231	1.312	1.057	1.000	30.000
Labor Force Status	162204	1.894	0.308	1.000	2.000
Duncan Socioec. Index	145627	23.773	20.299	3.000	96.000
Occupational Earnings Score	145593	37.620	30.124	1.200	100.000
Metropolitan Area	162231	1.397	0.647	1.000	3.000
Sugar Suitability	162156	-7.759	0.767	-8.000	-2.725
Cotton Suitability	162156	-5.999	1.950	-8.000	-1.200
Rice Suitability	162156	-6.800	1.274	-8.000	-1.063
Tobacco Suitability	162156	-4.270	1.313	-8.000	-1.000
Slave Share 1860	143180	0.097	0.189	0.000	0.925
Soil Nutrients	162196	1.857	0.817	0.000	7.000
Soil pH	162196	26.373	7.318	10.000	97.000
Malaria Endemicity	162196	0.044	0.075	0.000	2.809
Temperature	162196	11.701	3.772	-7.583	23.852
Precipitation	162196	1035.851	248.847	139.780	2221.804
Elevation	162196	266.049	309.715	1.600	3536.923
Water Basins	162196	2.033	3.786	0.000	80.097
Ruggedness	162196	385.389	928.831	3.409	15742.728
Latitude (000s)	162196	294.832	473.363	-1223.146	1519.304
Longitude (000s)	162196	861.382	901.690	-2303.025	2199.191
Population Density (000s)	161638	6570.893	20949.477	0.169	176762.719
Sugar Production	162231	78.492	1002.577	0.000	27748.000
Sugar Treated Counties	162196	0.080	0.271	0.000	1.000
Distance Sugar Suit. Border	162196	-0.006	0.006	-0.061	0.007
Rice Production (000s)	162231	97.860	1611.040	0.000	51285.211
Rice Treated Counties	162231	0.203	0.402	0.000	1.000
Distance Rice Suit. Border	159385	-0.004	0.006	-0.064	0.007

Table A3 Continued: Descriptive Statistics, Individual Data, 1880-1940

	Obs.	Mean	S.D.	Min	Max
			1910		
Single Female Headship	204246	0.119	0.324	0.000	1.000
Age	204100	44.064	14.096	15.000	89.000
Race	204246	1.128	0.395	1.000	6.000
Marital Status	204246	1.824	1.679	1.000	6.000
Nr of Children	204246	2.015	2.020	0.000	9.000
Nr of Children Below 5	204246	0.484	0.796	0.000	5.000
Nr of Families	204246	1.301	1.076	1.000	28.000
Labor Force Status	204224	1.891	0.312	1.000	2.000
Duncan Socioec. Index	182684	25.751	21.358	3.000	96.000
Occupational Earnings Score	182549	40.684	31.163	0.600	100.000
Metropolitan Area	204246	1.470	0.680	1.000	3.000
Sugar Suitability	204184	-7.765	0.765	-8.000	-2.725
Cotton Suitability	204184	-6.029	1.940	-8.000	-1.200
Rice Suitability	204184	-6.828	1.270	-8.000	-1.063
Tobacco Suitability	204184	-4.360	1.357	-8.000	-1.000
Slave Share 1860	174260	0.092	0.183	0.000	0.925
Soil Nutrients	204220	1.846	0.815	0.000	7.000
Soil pH	204220	26.630	7.497	10.000	97.000
Malaria Endemicity	204220	0.046	0.086	0.000	2.809
Temperature	204220	11.773	3.814	-7.695	23.852
Precipitation	204220	26.630	7.497	10.000	97.000
Elevation	204220	280.174	326.050	1.600	3536.923
Water Basins	204220	2.034	3.701	0.000	80.097
Ruggedness	204220	407.767	953.246	3.409	15742.728
Latitude (000s)	204220	299.226	495.806	-1223.146	4215.343
Longitude (000s)	204220	771.099	1051.813	-6224.211	2199.191
Population Density (000s)	204028	8966.915	28375.333	0.599	153742.500
Sugar Production	204246	71.975	972.441	0.000	27748.000
Sugar Treated Counties	204220	0.077	0.266	0.000	1.000
Distance Sugar Suit. Border	204220	-0.007	0.007	-0.064	0.007
Rice Production (000s)	204246	90.444	1578.549	0.000	51285.211
Rice Treated Counties	204246	0.186	0.389	0.000	1.000
Distance Rice Suit. Border	202859	-0.004	0.007	-0.064	0.007
			1920		
Single Female Headship	242977	0.116	0.321	0.000	1.000
Age	242801	44.706	14.099	15.000	89.000
Race	242977	1.120	0.400	1.000	6.000
Marital Status	242977	1.797	1.650	1.000	6.000
Nr of Children	242977	1.906	1.966	0.000	9.000
Nr of Children Below 5	242977	0.439	0.759	0.000	6.000
Nr of Families	242977	1.208	0.849	1.000	30.000
Labor Force Status	242945	1.889	0.314	1.000	2.000
Duncan Socioec. Index	216229	27.155	21.784	3.000	96.000
Occupational Earnings Score	215953	43.964	31.334	0.600	100.000
Metropolitan Area	242977	1.559	0.711	1.000	3.000
Sugar Suitability	242895	-7.771	0.763	-8.000	-2.116
Cotton Suitability	242895	-6.085	1.928	-8.000	-1.200
Rice Suitability	242895	-6.861	1.243	-8.000	-1.063
Tobacco Suitability	242895	-4.388	1.361	-8.000	-1.000
Slave Share 1860	204273	0.085	0.176	0.000	0.925
Soil Nutrients	242977	1.865	0.839	0.000	7.000
Soil pH	242977	26.975	7.664	10.000	97.000
Malaria Endemicity	242977	0.046	0.098	0.000	2.809
Temperature	242977	11.814	3.811	-7.695	23.852
Precipitation	242977	1014.662	275.711	116.758	2386.278
Elevation	242977	281.064	324.911	1.600	3536.923
Water Basins	242977	2.292	4.018	0.000	79.626
Ruggedness	242977	431.376	955.950	3.409	15742.728
Latitude (000s)	242977	298.630	487.395	-1251.709	1519.304
Longitude (000s)	242977	758.008	1024.448	-2303.825	2199.191
Population Density (000s)	242972	13940.265	54387.367	0.090	358851.969
Sugar Production	242977	59.490	844.688	0.000	27748.000
Sugar Treated Counties	242977	0.074	0.261	0.000	1.000
Distance Sugar Suit. Border	242977	-0.007	0.007	-0.064	0.007
Rice Production (000s)	242977	77.063	1419.331	0.000	51285.211
Rice Treated Counties	242977	0.169	0.375	0.000	1.000
Distance Rice Suit. Border	242977	-0.004	0.007	-0.064	0.007

Table A3 Continued: Descriptive Statistics, Individual Data, 1880-1940

	Obs.	Mean	S.D.	Min	Max
			1930		
Single Female Headship	298004	0.125	0.331	0.000	1.000
Age	297796	45.352	14.204	15.000	89.000
Race	298004	1.114	0.393	1.000	6.000
Marital Status	298004	1.808	1.655	1.000	6.000
Nr of Children	298004	1.717	1.870	0.000	9.000
Nr of Children Below 5	298004	0.347	0.684	0.000	6.000
Nr of Families	298004	1.190	0.798	1.000	29.000
Labor Force Status	297984	1.883	0.322	1.000	2.000
Duncan Socioec. Index	263533	29.331	22.882	3.000	96.000
Occupational Earnings Score	263123	47.220	30.725	0.600	100.000
Metropolitan Area	298004	1.676	0.746	1.000	3.000
Sugar Suitability	297981	-7.768	0.788	-8.000	-2.116
Cotton Suitability	297981	-6.126	1.915	-8.000	-1.200
Rice Suitability	297981	-6.867	1.236	-8.000	-1.063
Tobacco Suitability	297981	-4.416	1.360	-8.000	-1.000
Slave Share 1860	249779	0.078	0.167	0.000	0.925
Soil Nutrients	298004	1.843	0.836	0.000	7.000
Soil pH	298004	27.231	7.784	10.000	97.000
Malaria Endemicity	298004	0.048	0.121	0.000	2.809
Temperature	298004	11.950	3.830	-7.997	23.852
Precipitation	298004	1003.474	284.904	116.758	2386.278
Elevation	298004	280.085	320.625	1.600	3536.923
Water Basins	298004	2.323	3.948	0.000	78.859
Ruggedness	298004	485.976	1017.959	3.409	15742.728
Latitude (000s)	298004	290.913	491.527	-1263.667	1519.304
Longitude (000s)	298004	715.554	1087.791	-2303.825	2199.191
Population Density (000s)	298004	13071.124	42123.821	0.108	293370.594
Sugar Production	298004	52.043	760.154	0.000	27748.000
Sugar Treated Counties	298004	0.073	0.260	0.000	1.000
Distance Sugar Suit. Border	298004	-0.007	0.007	-0.064	0.007
Rice Production (000s)	298004	61.165	1244.869	0.000	51285.211
Rice Treated Counties	298004	0.159	0.366	0.000	1.000
Distance Rice Suit. Border	298004	-0.005	0.008	-0.064	0.007
			1940		
Single Female Headship	350354	0.146	0.353	0.000	1.000
Age	350016	46.657	14.600	15.000	89.000
Race	350354	1.101	0.335	1.000	7.000
Marital Status	350354	1.882	1.702	1.000	6.000
Nr of Children	350354	1.538	1.800	0.000	9.000
Nr of Children Below 5	350354	0.275	0.613	0.000	6.000
Nr of Families	350354	1.123	0.426	1.000	5.000
Labor Force Status	350353	1.829	0.377	1.000	2.000
Duncan Socioec. Index	289006	29.931	22.806	3.000	96.000
Occupational Earnings Score	288740	48.864	29.375	0.600	100.000
Metropolitan Area	350354	1.841	0.936	1.000	4.000
Sugar Suitability	350268	-7.757	0.814	-8.000	-2.116
Cotton Suitability	350268	-6.126	1.902	-8.000	-1.200
Rice Suitability	350268	-6.849	1.250	-8.000	-1.063
Tobacco Suitability	350268	-4.429	1.359	-8.000	-1.000
Slave Share 1860	295346	0.080	0.168	0.000	0.925
Soil Nutrients	350291	1.855	0.832	0.000	7.000
Soil pH	350291	27.117	7.738	10.000	97.000
Malaria Endemicity	350291	0.049	0.126	0.000	2.809
Temperature	350291	12.025	3.825	-1.691	23.731
Precipitation	350291	1003.683	286.788	116.758	2205.195
Elevation	350291	279.142	321.825	1.600	3536.923
Water Basins	350291	2.313	3.920	0.000	78.859
Ruggedness	350291	476.584	965.378	3.409	15742.728
Latitude (000s)	350291	281.758	498.473	-1263.667	1519.304
Longitude (000s)	350291	708.406	1104.557	-2302.541	2199.191
Population Density (000s)	350291	13658.150	43442.012	0.452	296923.094
Sugar Production	350354	55.395	772.791	0.000	27748.000
Sugar Treated Counties	350291	0.077	0.267	0.000	1.000
Distance Sugar Suit. Border	350291	-0.007	0.006	-0.031	0.007
Rice Production (000s)	350354	62.716	1260.653	0.000	51285.211
Rice Treated Counties	350354	0.164	0.370	0.000	1.000
Distance Rice Suit. Border	350291	-0.005	0.007	-0.030	0.007

Table A4: Descriptive Statistics, Individual Data, 1880-1940 - Blacks

	Obs.	Mean	S.D.	Min	Max
			1880		
Single Female Headship	13085	0.178	0.383	0.000	1.000
Age	13027	39.955	14.267	15.000	89.000
Race	13085	2.000	0.000	2.000	2.000
Marital Status	13085	2.067	1.856	1.000	6.000
Nr of Children	13085	2.410	2.292	0.000	9.000
Nr of Children Below 5	13085	0.736	0.945	0.000	5.000
Nr of Families	13085	1.210	0.660	1.000	17.000
Labor Force Status	13047	1.907	0.291	1.000	2.000
Duncan Socioec. Index	11880	11.495	7.693	4.000	93.000
Occupational Earnings Score	11879	20.697	18.616	1.400	100.000
Metropolitan Area	13085	1.098	0.347	1.000	3.000
Sugar Suitability	13085	-6.976	1.253	-8.000	-2.725
Cotton Suitability	13085	-4.648	1.091	-8.000	-1.200
Rice Suitability	13085	-5.561	1.506	-8.000	-1.063
Tobacco Suitability	13085	-4.211	0.944	-8.000	-1.182
Slave Share 1860	12194	0.429	0.236	0.000	0.925
Soil Nutrients	13085	2.294	0.846	0.000	5.000
Soil pH	13085	25.212	6.075	10.000	54.500
Malaria Endemicity	13085	0.086	0.037	0.000	2.022
Temperature	13085	16.037	2.680	-0.536	23.278
Precipitation	13085	1253.412	175.716	198.943	1639.891
Elevation	13085	125.811	154.535	1.600	3356.786
Water Basins	13085	2.151	4.173	0.000	52.274
Ruggedness	13085	267.008	824.389	3.409	14228.528
Latitude (000s)	13085	-243.632	374.625	-1148.609	1259.308
Longitude (000s)	13085	983.274	540.078	-2302.688	2156.714
Population Density (000s)	12944	2065.255	12571.674	0.537	115420.352
Sugar Production	13085	418.581	2340.127	0.000	27748.000
Sugar Treated Counties	13085	0.361	0.480	0.000	1.000
Distance Sugar Suit. Border	13085	-0.001	0.003	-0.029	0.006
Rice Production (000s)	13085	824.397	4816.771	0.000	51285.211
Rice Treated Counties	13085	0.606	0.489	0.000	1.000
Distance Rice Suit. Border	13045	0.001	0.003	-0.028	0.007
			1900		
Single Female Headship	18497	0.187	0.390	0.000	1.000
Age	18452	40.920	14.306	15.000	89.000
Race	18497	2.000	0.000	2.000	2.000
Marital Status	18497	2.205	1.917	1.000	6.000
Nr of Children	18497	2.162	2.336	0.000	9.000
Nr of Children Below 5	18497	0.566	0.891	0.000	5.000
Nr of Families	18497	1.241	0.800	1.000	20.000
Labor Force Status	18488	1.943	0.232	1.000	2.000
Duncan Socioec. Index	17494	13.177	9.472	4.000	96.000
Occupational Earnings Score	17492	20.967	19.765	1.200	100.000
Metropolitan Area	18497	1.164	0.439	1.000	3.000
Sugar Suitability	18483	-6.913	1.289	-8.000	-2.725
Cotton Suitability	18483	-4.659	1.130	-8.000	-1.333
Rice Suitability	18483	-5.523	1.514	-8.000	-1.063
Tobacco Suitability	18483	-4.231	0.947	-8.000	-1.182
Slave Share 1860	16469	0.411	0.245	0.000	0.925
Soil Nutrients	18492	2.241	0.860	0.000	7.000
Soil pH	18492	25.598	6.444	10.000	97.000
Malaria Endemicity	18492	0.089	0.047	0.000	2.576
Temperature	18492	16.202	2.737	-1.171	23.659
Precipitation	18492	1255.123	178.133	198.943	1639.891
Elevation	18492	124.600	138.931	1.600	3351.378
Water Basins	18492	2.044	4.280	0.000	80.097
Ruggedness	18492	268.411	837.860	3.409	15742.728
Latitude (000s)	18492	-268.525	380.401	-1223.146	1395.827
Longitude (000s)	18492	935.415	539.610	-2277.992	2128.222
Population Density (000s)	18331	2763.253	12505.879	0.517	176762.719
Sugar Production	18497	378.627	2228.316	0.000	27748.000
Sugar Treated Counties	18492	0.381	0.486	0.000	1.000
Distance Sugar Suit. Border	18492	-0.001	0.003	-0.028	0.007
Rice Production (000s)	18497	606.518	4046.905	0.000	51285.211
Rice Treated Counties	18497	0.637	0.481	0.000	1.000
Distance Rice Suit. Border	18344	0.001	0.003	-0.028	0.007

Table A4 Continued: Descriptive Statistics, Individual Data, 1880-1940 - Blacks

	Obs.	Mean	S.D.	Min	Max
			1910		
Single Female Headship	22112	0.179	0.383	0.000	1.000
Age	22076	41.010	14.062	15.000	89.000
Race	22112	2.000	0.000	2.000	2.000
Marital Status	22112	2.092	1.833	1.000	6.000
Nr of Children	22112	1.991	2.250	0.000	9.000
Nr of Children Below 5	22112	0.511	0.862	0.000	5.000
Nr of Families	22112	1.228	0.786	1.000	22.000
Labor Force Status	22103	1.955	0.207	1.000	2.000
Duncan Socioec. Index	21185	13.423	10.067	4.000	96.000
Occupational Earnings Score	21181	21.127	20.566	0.600	100.000
Metropolitan Area	22112	1.241	0.523	1.000	3.000
Sugar Suitability	22099	-6.952	1.290	-8.000	-2.725
Cotton Suitability	22099	-4.696	1.161	-8.000	-1.333
Rice Suitability	22099	-5.592	1.529	-8.000	-1.063
Tobacco Suitability	22099	-4.263	0.964	-8.000	-1.286
Slave Share 1860	19154	0.394	0.247	0.000	0.925
Soil Nutrients	22112	2.222	0.865	0.000	7.000
Soil pH	22112	25.657	6.521	10.000	97.000
Malaria Endemicity	22112	0.090	0.064	0.000	2.809
Temperature	22112	16.195	2.775	3.251	23.852
Precipitation	22112	25.657	6.521	10.000	97.000
Elevation	22112	130.150	156.108	1.600	2711.073
Water Basins	22112	1.968	4.147	0.000	80.097
Ruggedness	22112	277.975	847.442	3.409	12293.298
Latitude (000s)	22112	-266.099	386.956	-1223.146	1378.766
Longitude (000s)	22112	916.628	582.180	-6224.211	2111.432
Population Density (000s)	22110	3635.453	15807.709	1.528	153742.500
Sugar Production	22112	329.454	2101.564	0.000	27748.000
Sugar Treated Counties	22112	0.365	0.481	0.000	1.000
Distance Sugar Suit. Border	22112	-0.001	0.003	-0.061	0.007
Rice Production (000s)	22112	553.037	3913.451	0.000	51285.211
Rice Treated Counties	22112	0.617	0.486	0.000	1.000
Distance Rice Suit. Border	22068	0.001	0.003	-0.064	0.007
			1920		
Single Female Headship	24232	0.173	0.379	0.000	1.000
Age	24190	41.969	13.808	15.000	89.000
Race	24232	2.000	0.000	2.000	2.000
Marital Status	24232	2.021	1.779	1.000	6.000
Nr of Children	24232	1.803	2.195	0.000	9.000
Nr of Children Below 5	24232	0.415	0.787	0.000	5.000
Nr of Families	24232	1.219	0.763	1.000	25.000
Labor Force Status	24224	1.948	0.222	1.000	2.000
Duncan Socioec. Index	22994	13.786	10.604	3.000	96.000
Occupational Earnings Score	22984	23.202	21.486	0.600	100.000
Metropolitan Area	24232	1.324	0.572	1.000	3.000
Sugar Suitability	24195	-7.019	1.282	-8.000	-2.116
Cotton Suitability	24195	-4.761	1.236	-8.000	-1.333
Rice Suitability	24195	-5.694	1.549	-8.000	-1.063
Tobacco Suitability	24195	-4.264	0.957	-8.000	-1.111
Slave Share 1860	20498	0.365	0.254	0.000	0.925
Soil Nutrients	24232	2.235	0.902	0.000	7.000
Soil pH	24232	25.889	7.063	10.000	97.000
Malaria Endemicity	24232	0.086	0.045	0.000	1.508
Temperature	24232	15.973	2.934	2.605	23.852
Precipitation	24232	1232.056	195.943	116.758	2221.804
Elevation	24232	129.269	148.547	1.600	2776.846
Water Basins	24232	2.215	4.962	0.000	79.626
Ruggedness	24232	286.628	836.134	3.409	14228.528
Latitude (000s)	24232	-230.209	410.375	-1251.709	1378.766
Longitude (000s)	24232	929.094	596.972	-2278.673	2199.191
Population Density (000s)	24227	7241.735	36928.733	2.314	358851.969
Sugar Production	24232	284.007	1917.630	0.000	27748.000
Sugar Treated Counties	24232	0.339	0.473	0.000	1.000
Distance Sugar Suit. Border	24232	-0.001	0.003	-0.060	0.007
Rice Production (000s)	24232	509.593	3694.862	0.000	51285.211
Rice Treated Counties	24232	0.580	0.494	0.000	1.000
Distance Rice Suit. Border	24232	0.001	0.003	-0.062	0.007

Table A4 Continued: Descriptive Statistics, Individual Data, 1880-1940 - Blacks

	Obs.	Mean	S.D.	Min	Max
			1930		
Single Female Headship	28020	0.191	0.393	0.000	1.000
Age	27987	42.072	13.635	15.000	89.000
Race	28020	2.000	0.000	2.000	2.000
Marital Status	28020	2.071	1.791	1.000	6.000
Nr of Children	28020	1.621	2.111	0.000	9.000
Nr of Children Below 5	28020	0.352	0.742	0.000	6.000
Nr of Families	28020	1.243	0.763	1.000	16.000
Labor Force Status	28017	1.938	0.240	1.000	2.000
Duncan Socioec. Index	26334	14.037	11.871	3.000	96.000
Occupational Earnings Score	26327	25.572	22.223	0.600	100.000
Metropolitan Area	28020	1.456	0.629	1.000	3.000
Sugar Suitability	28017	-7.079	1.302	-8.000	-2.116
Cotton Suitability	28017	-4.878	1.360	-8.000	-1.600
Rice Suitability	28017	-5.809	1.555	-8.000	-1.063
Tobacco Suitability	28017	-4.252	0.954	-8.000	-1.182
Slave Share 1860	23807	0.318	0.258	0.000	0.925
Soil Nutrients	28020	2.198	0.914	0.000	7.000
Soil pH	28020	26.300	7.121	10.000	97.000
Malaria Endemicity	28020	0.084	0.070	0.000	2.424
Temperature	28020	15.663	3.216	-6.231	23.852
Precipitation	28020	1213.537	209.416	116.758	2386.278
Elevation	28020	133.883	150.241	1.600	2345.257
Water Basins	28020	2.394	4.824	0.000	78.859
Ruggedness	28020	352.874	940.640	3.409	14228.528
Latitude (000s)	28020	-185.911	447.572	-1263.667	1402.243
Longitude (000s)	28020	924.223	632.025	-2291.312	2111.432
Population Density (000s)	28020	10750.055	42649.729	0.108	293370.594
Sugar Production	28020	241.744	1721.010	0.000	27748.000
Sugar Treated Counties	28020	0.313	0.464	0.000	1.000
Distance Sugar Suit. Border	28020	-0.002	0.004	-0.060	0.007
Rice Production (000s)	28020	361.290	3036.130	0.000	51285.211
Rice Treated Counties	28020	0.536	0.499	0.000	1.000
Distance Rice Suit. Border	28020	0.000	0.004	-0.062	0.007
			1940		
Single Female Headship	32069	0.220	0.414	0.000	1.000
Age	32007	44.003	14.211	15.000	89.000
Race	32069	2.000	0.000	2.000	2.000
Marital Status	32069	2.131	1.800	1.000	6.000
Nr of Children	32069	1.656	2.211	0.000	9.000
Nr of Children Below 5	32069	0.332	0.739	0.000	5.000
Nr of Families	32069	1.198	0.548	1.000	5.000
Labor Force Status	32069	1.851	0.356	1.000	2.000
Duncan Socioec. Index	27161	14.068	12.570	3.000	96.000
Occupational Earnings Score	27152	26.403	22.521	0.600	100.000
Metropolitan Area	32069	1.626	0.869	1.000	4.000
Sugar Suitability	32061	-7.071	1.316	-8.000	-2.116
Cotton Suitability	32061	-4.912	1.384	-8.000	-1.682
Rice Suitability	32061	-5.849	1.558	-8.000	-1.063
Tobacco Suitability	32061	-4.266	0.962	-8.000	-1.182
Slave Share 1860	27253	0.309	0.259	0.000	0.925
Soil Nutrients	32069	2.181	0.901	0.000	7.000
Soil pH	32069	26.209	7.194	10.000	97.000
Malaria Endemicity	32069	0.084	0.085	0.000	2.809
Temperature	32069	15.639	3.278	2.555	23.731
Precipitation	32069	1205.358	218.199	116.758	1639.891
Elevation	32069	133.928	152.754	1.600	2440.625
Water Basins	32069	2.356	4.674	0.000	78.859
Ruggedness	32069	343.418	897.717	3.409	12293.298
Latitude (000s)	32069	-178.201	457.659	-1263.667	1436.223
Longitude (000s)	32069	918.188	670.320	-2291.312	2096.906
Population Density (000s)	32069	12563.113	46363.310	2.802	296923.094
Sugar Production	32069	222.399	1609.024	0.000	27748.000
Sugar Treated Counties	32069	0.312	0.463	0.000	1.000
Distance Sugar Suit. Border	32069	-0.002	0.004	-0.029	0.007
Rice Production (000s)	32069	345.036	2973.715	0.000	51285.211
Rice Treated Counties	32069	0.512	0.500	0.000	1.000
Distance Rice Suit. Border	32069	0.000	0.004	-0.028	0.007

Table A5: Single Female Headship, 1880-1940 - OLS

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
	Panel A: Controlling for Slave Share and State Fixed Effects					
Sugar Suitability	0.0067**	0.0064**	0.0071***	0.0037*	0.0044*	0.0021
	(0.0029)	(0.0028)	(0.0026)	(0.0021)	(0.0023)	(0.0023)
Slave Share	0.0029	0.0085**	0.0069*	0.0060**	0.0039	0.0041
	(0.0035)	(0.0041)	(0.0036)	(0.0030)	(0.0031)	(0.0034)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.008	0.005	0.004	0.004	0.003	0.003
Observations	94547	143180	174260	204273	249779	295346
Counties	1995	2002	2002	2002	2002	1990
Sample Mean	0.117	0.126	0.122	0.120	0.127	0.148
	Panel B: Including All Controls and State Fixed Effects					
Sugar Suitability	0.0055***	0.0050***	0.0056***	0.0030***	0.0029***	0.0012
	(0.0015)	(0.0015)	(0.0013)	(0.0011)	(0.0010)	(0.0009)
Slave Share	-0.0038***	-0.0052***	-0.0042***	-0.0040***	-0.0015	-0.0020*
	(0.0015)	(0.0016)	(0.0013)	(0.0012)	(0.0011)	(0.0011)
Cotton Suitability	-0.0004	0.0008	0.0003	0.0000	-0.0008	0.0002
	(0.0010)	(0.0014)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Rice Suitability	-0.0022*	-0.0030**	-0.0004	-0.0001	-0.0025**	-0.0026**
	(0.0012)	(0.0014)	(0.0011)	(0.0013)	(0.0011)	(0.0012)
Tobacco Suitability	-0.0005	0.0023**	0.0006	0.0005	-0.0005	0.0007
	(0.0010)	(0.0010)	(0.0010)	(0.0009)	(0.0009)	(0.0009)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.365	0.456	0.471	0.446	0.459	0.470
Observations	83112	127390	154877	180703	219625	242741
Counties	1994	2001	2001	2002	2002	1990
Sample Mean	0.029	0.056	0.055	0.054	0.059	0.066

Note: The dependent variable is single female headship. Geographical controls include soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A6: Single Female Headship, 1880-1940 - OLS - State Level and Spatial Clustering

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
	Panel A: Controlling for Slave Share and State Fixed Effects					
Sugar Suitability	0.0067	0.0064	0.0071	0.0037	0.0044	0.0021
	(0.0028)**	(0.0026)**	(0.0026)***	(0.0020)*	(0.0040)	(0.0030)
	[0.1311]	[0.0721]*	[0.0871]*	[0.0891]*	[0.3343]	[0.5025]
	{0.0029}**	{0.0028}**	{0.0026}***	{0.0021}*	{0.0022}*	{0.0023}
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.008	0.005	0.004	0.004	0.003	0.003
Observations	94547	143180	174260	204273	249779	295346
States	41	41	41	41	41	41
Sample Mean	0.117	0.126	0.122	0.120	0.127	0.148
	Panel B: Including All Controls and State Fixed Effects					
Sugar Suitability	0.0055	0.005	0.0056	0.0030	0.0029	0.0012
	(0.0012)***	(0.0017)***	(0.0012)***	(0.0010)***	(0.0020)	(0.0010)
	[0.0270]**	[0.0110]**	[0.0090]***	[0.0140]**	[0.2252]	[0.2422]
	{0.0015}***	{0.0015}***	{0.0013}***	{0.0011}***	{0.0010}***	{0.009}
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.365	0.456	0.471	0.446	0.459	0.470
Observations	83112	127390	154877	180703	219625	242741
States	40	40	41	41	41	41
Sample Mean	0.029	0.056	0.055	0.054	0.059	0.066

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. Robust standard errors clustered at a state level in parentheses, wild bootstrap p-values in square brackets, and Conley (1999) spatial HAC standard errors for a window of 100 km in curly brackets: *** p<0.01, ** p<0.05, * p<0.1.

Table A7: Single Female Headship, 1880-1940 - OLS - A Horse Race

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
	Panel A: Sugar - Controlling for Slave Share					
Sugar Suitability	0.0075***	0.0088***	0.0090***	0.0059***	0.0059***	0.0044**
	(0.0026)	(0.0026)	(0.0025)	(0.0020)	(0.0021)	(0.0022)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.009	0.006	0.005	0.005	0.004	0.003
Observations	101750	162156	204184	242895	297981	350268
Counties	2469	2813	2950	3061	3102	3062
Sample Mean	0.114	0.122	0.118	0.115	0.123	0.145
	Panel B: Sugar - Including All Controls					
Sugar Suitability	0.0049***	0.0041***	0.0043***	0.0027***	0.0023***	0.0010
	(0.0013)	(0.0013)	(0.0012)	(0.0010)	(0.0009)	(0.0008)
Cotton Suitability	-0.0009	-0.0004	0.0004	-0.0008	-0.0009	-0.0005
	(0.0010)	(0.0014)	(0.0009)	(0.0010)	(0.0009)	(0.0009)
Rice Suitability	-0.0034***	-0.0050***	-0.0023**	-0.0025**	-0.0044***	-0.0044***
	(0.0012)	(0.0014)	(0.0011)	(0.0012)	(0.0011)	(0.0011)
Tobacco Suitability	0.0001	0.0028***	0.0008	0.0009	0.0002	0.0015*
	(0.0009)	(0.0010)	(0.0009)	(0.0008)	(0.0008)	(0.0008)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.363	0.450	0.461	0.435	0.453	0.467
Observations	89755	144982	182285	215800	263058	288629
Counties	2464	2811	2942	3058	3102	3061
Sample Mean	0.029	0.055	0.055	0.053	0.058	0.065
	Panel C: Slave Share - Controlling for Sugar					
Slave Share	0.0049	0.0105**	0.0090**	0.0071**	0.0052	0.0047
	(0.0034)	(0.0042)	(0.0037)	(0.0031)	(0.0032)	(0.0035)
Adj.R-squared	0.008	0.005	0.003	0.004	0.003	0.003
Observations	94547	143180	174260	204273	249779	295346
Counties	1995	2002	2002	2002	2002	1990
Sample Mean	0.117	0.126	0.122	0.199	0.127	0.148
	Panel D: Slave Share - Including All Controls					
Slave Share	-0.0024*	-0.0040**	-0.0030**	-0.0033***	-0.0008	-0.0018
	(0.0014)	(0.0016)	(0.0013)	(0.0012)	(0.0011)	(0.0011)
Cotton Suitability	-0.0007	0.0005	-0.0001	-0.0002	-0.0011	0.0000
	(0.0010)	(0.0014)	(0.0010)	(0.0010)	(0.0009)	(0.0010)
Rice Suitability	-0.0023*	-0.0030**	-0.0002	-0.0000	-0.0025**	-0.0026**
	(0.0012)	(0.0014)	(0.0011)	(0.0013)	(0.0011)	(0.0012)
Tobacco Suitability	-0.0004	0.0024**	0.0006	0.0005	-0.0004	0.0007
	(0.0010)	(0.0011)	(0.0010)	(0.0009)	(0.0009)	(0.0009)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.364	0.456	0.470	0.446	0.459	0.470
Observations	83112	127390	154877	180703	219625	242741
Counties	1994	2001	2001	2002	2002	1990
Sample Mean	0.029	0.056	0.055	0.054	0.059	0.066

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. Robust standard errors clustered at a a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A8: Single Female Headship, 1880-1940 - OLS - Intermediate Inputs

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
	Panel A: Controlling for Slave Share and State Fixed Effects					
Sugar Suitability	0.0063**	0.0072***	0.0069***	0.0042*	0.0065***	0.0029
	(0.0030)	(0.0027)	(0.0027)	(0.0023)	(0.0024)	(0.0027)
Slave Share	0.0030	0.0083**	0.0069*	0.0058*	0.0031	0.0036
	(0.0035)	(0.0041)	(0.0037)	(0.0030)	(0.0032)	(0.0034)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.008	0.005	0.004	0.004	0.003	0.004
Observations	94547	142753	174260	204273	249779	254650
Counties	1995	1988	2002	2002	2002	1823
Sample Mean	0.117	0.127	0.123	0.120	0.127	0.149
	Panel B: Including All Controls and State Fixed Effects					
Sugar Suitability	0.0050***	0.0050***	0.0050***	0.0029**	0.0038***	0.0023**
	(0.0015)	(0.0015)	(0.0014)	(0.0011)	(0.0010)	(0.0010)
Slave Share	-0.0038**	-0.0056***	-0.0045***	-0.0046***	-0.0023**	-0.0029**
	(0.0015)	(0.0017)	(0.0013)	(0.0012)	(0.0011)	(0.0012)
Cotton Suitability	-0.0005	0.0006	0.0005	0.0006	-0.0006	-0.0002
	(0.0011)	(0.0014)	(0.0011)	(0.0010)	(0.0010)	(0.0010)
Rice Suitability	-0.0014	-0.0009	0.0022*	0.0036***	0.0001	-0.0002
	(0.0014)	(0.0014)	(0.0013)	(0.0013)	(0.0012)	(0.0011)
Tobacco Suitability	0.0001	0.0032***	0.0006	0.0011	-0.0003	0.0013
	(0.0010)	(0.0011)	(0.0010)	(0.0009)	(0.0010)	(0.0011)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.365	0.456	0.471	0.446	0.459	0.473
Observations	83112	127022	154877	180703	219625	209296
Counties	1994	1987	2001	2002	2002	1823
Sample Mean	0.029	0.055	0.055	0.054	0.059	0.067

Note: The dependent variable is single female headship. Geographical controls include soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A9: Single Female Headship, 1880-1940 - OLS - Farm Size

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
Sugar Suitability	0.0056***	0.0049***	0.0056***	0.0033***	0.0029***	0.0012
	(0.0015)	(0.0015)	(0.0013)	(0.0011)	(0.0010)	(0.0009)
Slavery	-0.0057***	-0.0061***	-0.0065***	-0.0066***	-0.0042***	-0.0028*
	(0.0019)	(0.0019)	(0.0019)	(0.0016)	(0.0014)	(0.0016)
Cotton Suitability	-0.0007	0.0007	0.0006	0.0002	-0.0007	-0.0000
	(0.0011)	(0.0015)	(0.0012)	(0.0011)	(0.0010)	(0.0011)
Rice Suitability	-0.0024*	-0.0029**	0.0005	0.0004	-0.0023**	-0.0022**
	(0.0012)	(0.0015)	(0.0012)	(0.0013)	(0.0011)	(0.0011)
Tobacco Suitability	-0.0011	0.0014	-0.0009	-0.0004	-0.0009	-0.0001
	(0.0010)	(0.0011)	(0.0011)	(0.0010)	(0.0009)	(0.0009)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.368	0.457	0.473	0.449	0.460	0.472
Observations	81511	123444	149507	174129	211426	233610
Counties	1885	1888	1888	1889	1889	1878
Sample Mean	0.029	0.056	0.056	0.055	0.059	0.066

Note: The dependent variable is single female headship. Geographical controls include soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of population density. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, residence in metropolitan area, and the shares in the county of farms of 3-9, 10-19, 20-49, 50-99, 100-499, 500-999, and over 1000 acres. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A10: Single Female Headship, 1880-1940 - Matching

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
			Panel A: All			
Sugar Suitability	0.0094***	0.0055***	0.0067***	0.0050***	0.0036**	0.0052***
	(0.0020)	(0.0021)	(0.0019)	(0.0016)	(0.0015)	(0.0016)
Adj.R-squared	0.130	0.124	0.140	0.143	0.164	0.190
Observations	40378	59110	69170	82868	106175	121089
Counties	1978	1994	1999	2002	2002	1990
Sample Mean	0.023	0.055	0.052	0.046	0.054	0.059
			Panel B: Blacks			
Sugar Suitability	0.0138**	0.0161***	0.0168***	0.0205***	0.0163***	0.0136***
	(0.0056)	(0.0056)	(0.0059)	(0.0053)	(0.0048)	(0.0052)
Adj.R-squared	0.067	0.124	0.151	0.156	0.233	0.255
Observations	7812	11217	13232	13990	15719	15627
Counties	989	1045	1072	1092	1127	1094
Sample Mean	0.088	0.145	0.145	0.127	0.135	0.135
			Panel C: Whites			
Sugar Suitability	0.0037	-0.0010	0.0037**	0.0020	0.0005	0.0021*
	(0.0023)	(0.0020)	(0.0016)	(0.0014)	(0.0014)	(0.0012)
Adj.R-squared	0.096	0.109	0.112	0.120	0.129	0.172
Observations	32499	47767	55766	68688	90230	105196
Counties	1973	1992	1995	2002	2002	1990
Sample Mean	0.016	0.046	0.041	0.038	0.046	0.053
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Matching FE	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Race is dropped in Panels B and C. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A11: Single Female Headship, 1880-1940 - OLS - Variants

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
			Panel A: Blacks			
Sugar Suitability	0.0052*	0.0092***	0.0106***	0.0069***	0.0071***	0.0051**
	(0.0029)	(0.0033)	(0.0030)	(0.0025)	(0.0026)	(0.0025)
Adj.R-squared	0.524	0.567	0.592	0.600	0.605	0.586
Observations	10881	15388	18327	19413	22360	23002
Counties	1132	1170	1199	1191	1219	1171
Sample Mean	0.092	0.148	0.157	0.143	0.151	0.153
			Panel B: Whites			
Sugar Suitability	0.0042**	0.0015	0.0035***	0.0016	0.0002	-0.0005
	(0.0017)	(0.0013)	(0.0010)	(0.0011)	(0.0009)	(0.0009)
Adj.R-squared	0.310	0.418	0.427	0.402	0.418	0.445
Observations	72030	111675	136166	160824	196667	219145
Counties	1994	1999	1999	2002	2002	1990
Sample Mean	0.024	0.049	0.048	0.048	0.052	0.060
			Panel C: Without Widowed and Divorced			
Sugar Suitability	0.0033***	0.0017*	0.0026***	0.0004	0.0008	0.0004
	(0.0011)	(0.0010)	(0.0009)	(0.0007)	(0.0006)	(0.0006)
Adj.R-squared	0.223	0.292	0.314	0.301	0.349	0.392
Observations	78209	116574	142862	167349	203572	226175
Counties	1993	2001	2001	2002	2002	1990
Sample Mean	0.009	0.017	0.019	0.021	0.026	0.034
			Panel D: Without Widowed and Divorced - Blacks			
Sugar Suitability	0.0060**	0.0035	0.0057***	0.0034*	0.0036**	0.0040**
	(0.0026)	(0.0031)	(0.0022)	(0.0018)	(0.0018)	(0.0019)
Adj.R-squared	0.414	0.441	0.452	0.469	0.487	0.484
Counties	1109	1137	1164	1163	1185	1133
Sample Mean	0.041	0.057	0.054	0.053	0.059	0.077
			Panel E: Without Widowed and Divorced - Whites			
Sugar Suitability	0.0020**	0.0001	0.0008	-0.0002	-0.0002	-0.0004
	(0.0008)	(0.0008)	(0.0006)	(0.0007)	(0.0006)	(0.0006)
Adj.R-squared	0.151	0.244	0.279	0.269	0.324	0.378
Observations	68280	103339	127170	150432	184231	205714
Counties	1992	1999	1998	2001	2002	1990
Sample Mean	0.007	0.014	0.016	0.018	0.023	0.031
			Panel F: With Children			
Sugar Suitability	0.0026*	0.0039***	0.0044***	0.0021**	0.0025***	0.0014*
	(0.0013)	(0.0013)	(0.0011)	(0.0008)	(0.0009)	(0.0008)
Adj.R-squared	0.473	0.566	0.584	0.540	0.567	0.578
Observations	65543	95119	112761	128280	149053	159105
Counties	1989	2001	2001	2002	2002	1990
Sample Mean	0.025	0.048	0.045	0.040	0.041	0.041
			Panel G: With Children - Blacks			
Sugar Suitability	-0.0021	0.0064**	0.0099***	0.0021	0.0038	0.0026
	(0.0025)	(0.0030)	(0.0026)	(0.0024)	(0.0025)	(0.0024)
Adj.R-squared	0.707	0.735	0.739	0.723	0.727	0.721
Observations	8031	10337	11823	11709	12611	12868
Counties	1043	1072	1099	1093	1096	1054
Sample Mean	0.095	0.146	0.153	0.134	0.138	0.135
			Panel H: With Children - Whites			
Sugar Suitability	0.0027	0.0012	0.0034***	0.0014	0.0009	0.0001
	(0.0017)	(0.0013)	(0.0012)	(0.0009)	(0.0008)	(0.0007)
Adj.R-squared	0.371	0.505	0.528	0.485	0.521	0.543
Observations	57449	84670	100804	116330	136106	145883
Counties	1985	1998	1999	2001	2001	1990
Sample Mean	0.020	0.042	0.039	0.034	0.035	0.036
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. Race is dropped in Panels A, B, D, E, G, and H. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A12: Single Female Headship, 1880-1940 - Matching - Variants

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
Panel A: Without Widowed and Divorced						
Sugar Suitability	0.0057***	0.0028**	0.0034***	0.0012	0.0009	0.0011
	(0.0013)	(0.0013)	(0.0011)	(0.0009)	(0.0008)	(0.0009)
Adj.R-squared	0.153	0.151	0.147	0.145	0.172	0.204
Observations	38038	53737	63245	76601	98110	113007
Counties	1977	1994	1999	2002	2002	1990
Sample Mean	0.008	0.014	0.014	0.015	0.022	0.029
Panel B: Without Widowed and Divorced - Blacks						
Sugar Suitability	0.0098**	0.0106**	0.0093**	0.0048	0.0077**	0.0026
	(0.0042)	(0.0051)	(0.0039)	(0.0037)	(0.0031)	(0.0035)
Adj.R-squared	0.052	0.102	0.126	0.145	0.234	0.250
Observations	7010	9458	11123	11929	13194	13558
Counties	970	1007	1034	1059	1085	1060
Sample Mean	0.042	0.054	0.052	0.046	0.052	0.066
Panel C: Without Widowed and Divorced - Whites						
Sugar Suitability	0.0017*	-0.0009	0.0007	0.0002	0.0001	0.0009
	(0.0009)	(0.0009)	(0.0007)	(0.0007)	(0.0007)	(0.0008)
Adj.R-squared	0.208	0.182	0.152	0.146	0.161	0.200
Observations	30966	44165	51958	64494	84711	99202
Counties	1969	1991	1994	2001	2002	1990
Sample Mean	0.004	0.011	0.010	0.012	0.020	0.027
Panel D: With Children						
Sugar Suitability	0.0061***	0.0044*	0.0052***	0.0044**	0.0042***	0.0057***
	(0.0023)	(0.0023)	(0.0020)	(0.0018)	(0.0016)	(0.0015)
Adj.R-squared	0.124	0.096	0.119	0.106	0.125	0.134
Observations	30460	41866	47149	54475	64143	70688
Counties	1963	1989	1993	1999	2001	1990
Sample Mean	0.024	0.056	0.051	0.039	0.042	0.038
Panel E: With Children - Blacks						
Sugar Suitability	0.0033	0.0184**	0.0166**	0.0182***	0.0178**	0.0244***
	(0.0075)	(0.0072)	(0.0072)	(0.0069)	(0.0071)	(0.0068)
Adj.R-squared	0.067	0.093	0.132	0.114	0.178	0.195
Observations	5508	7256	8247	8197	8185	7948
Counties	881	921	941	945	948	932
Sample Mean	0.097	0.153	0.147	0.126	0.122	0.120
Panel F: With Children - Whites						
Sugar Suitability	0.0034	-0.0011	0.0039**	0.0020	0.0017	0.0022*
	(0.0027)	(0.0022)	(0.0020)	(0.0016)	(0.0015)	(0.0013)
Adj.R-squared	0.068	0.073	0.085	0.066	0.085	0.096
Observations	24919	34543	38835	46182	55862	62596
Counties	1946	1982	1988	1998	1998	1988
Sample Mean	0.016	0.047	0.041	0.031	0.036	0.033
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Matching FE	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Race is dropped in Panels B, C, E, and F. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A13: Descriptive Statistics, Individual Data, 1880-1940 - Pseudo-Panel

	Obs.	Mean	S.D.	Min	Max
			Full Sample		
Single Female Headship	1359562	0.128	0.334	0.000	1.000
Age	1358459	45.050	14.281	15.000	89.000
Race	1359562	1.118	0.379	1.000	7.000
Marital Status	1359562	1.833	1.677	1.000	6.000
Nr of Children	1359562	1.858	1.961	0.000	9.000
Nr of Children Below 5	1359562	0.409	0.741	0.000	7.000
Nr of Families	1359562	1.218	0.841	1.000	30.000
Labor Force Status	1359386	1.873	0.333	1.000	2.000
Duncan Socioec. Index	1187297	27.219	22.003	3.000	96.000
Occupational Earnings Score	1186117	43.772	30.728	0.600	100.000
Metropolitan Area	1359562	1.601	0.783	1.000	4.000
Sugar Suitability	1359234	-7.763	0.782	-8.000	-2.116
Cotton Suitability	1359234	-6.074	1.925	-8.000	-1.200
Rice Suitability	1359234	-6.839	1.254	-8.000	-1.063
Tobacco Suitability	1359234	-4.371	1.348	-8.000	-1.000
Slave Share 1860	1161385	0.087	0.177	0.000	0.925
Soil Nutrients	1359438	1.858	0.830	0.000	7.000
Soil pH	1359438	26.857	7.598	10.000	97.000
Malaria Endemicity	1359438	0.047	0.105	0.000	2.809
Temperature	1359438	11.874	3.801	-7.997	23.852
Precipitation	1359438	866.808	434.375	10.000	2386.278
Elevation	1359438	275.657	318.010	1.600	3536.923
Water Basins	1359438	2.217	3.882	0.000	80.097
Ruggedness	1359438	439.582	965.508	3.409	18137.340
Latitude (000s)	1359438	291.177	488.631	-1263.667	4215.343
Longitude (000s)	1359438	766.112	1039.746	-6224.211	2199.204
Population Density (000s)	1358302	11377.811	40201.929	0.023	358851.969
			Black Sample		
Single Female Headship	138015	0.191	0.393	0.000	1.000
Age	137739	41.978	14.078	15.000	89.000
Race	138015	2.000	0.000	2.000	2.000
Marital Status	138015	2.097	1.822	1.000	6.000
Nr of Children	138015	1.868	2.234	0.000	9.000
Nr of Children Below 5	138015	0.449	0.820	0.000	6.000
Nr of Families	138015	1.223	0.718	1.000	25.000
Labor Force Status	137948	1.920	0.271	1.000	2.000
Duncan Socioec. Index	127048	13.539	10.893	3.000	96.000
Occupational Earnings Score	127015	23.490	21.362	0.600	100.000
Metropolitan Area	138015	1.365	0.653	1.000	4.000
Sugar Suitability	137940	-7.014	1.295	-8.000	-2.116
Cotton Suitability	137940	-4.785	1.265	-8.000	-1.200
Rice Suitability	137940	-5.702	1.545	-8.000	-1.063
Tobacco Suitability	137940	-4.253	0.956	-8.000	-1.111
Slave Share 1860	119375	0.360	0.256	0.000	0.925
Soil Nutrients	138010	2.219	0.888	0.000	7.000
Soil pH	138010	25.907	6.861	10.000	97.000
Malaria Endemicity	138010	0.086	0.064	0.000	2.809
Temperature	138010	15.905	3.014	-6.231	23.852
Precipitation	138010	1033.918	477.671	10.000	2386.278
Elevation	138010	130.476	150.484	1.600	3356.786
Water Basins	138010	2.216	4.584	0.000	80.097
Ruggedness	138010	307.586	874.349	3.409	15742.728
Latitude (000s)	138010	-221.287	420.663	-1263.667	1436.223
Longitude (000s)	138010	929.557	607.771	-6224.211	2199.191
Population Density (000s)	137701	7533.092	34680.475	0.108	358851.969

Table A14: Single Female Headship, 1880-1940 - Pseudo-Panel

	(1)	(2)	(3)	(4)	(5)	(6)
	All		Blacks		Whites	
Sugar Suitability	0.0032***		0.0073***		0.0006	
	(0.0007)		(0.0015)		(0.0005)	
Sugar Suit.*1880		0.0059***		0.0092***		0.0022**
		(0.0010)		(0.0020)		(0.0011)
Sugar Suit.*1900		0.0036***		0.0047***		0.0011
		(0.0009)		(0.0018)		(0.0008)
Sugar Suit.*1910		0.0014		0.0063***		-0.0004
		(0.0009)		(0.0018)		(0.0007)
Sugar Suit.*1920		0.0021***		0.0053***		0.0001
		(0.0008)		(0.0017)		(0.0007)
Sugar Suit.*1930		0.0027***		0.0080***		0.0002
		(0.0008)		(0.0016)		(0.0006)
Sugar Suit.*1940		0.0022***		0.0066***		0.0010*
		(0.0007)		(0.0016)		(0.0006)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.451	0.445	0.584	0.582	0.406	0.406
Observations	1008448	1184509	109371	126524	1051600	1051600
Counties	2048	3311	1557	2120	3307	3307
Sample Mean	0.057	0.056	0.145	0.146	0.049	0.049

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. Race is dropped in Models 3-6. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A15: Balancedness - Geographical Variables

	Coeff.	S.E.	Control Mean	Obs.
Cotton Suitability	-0.030	0.127	0.005	711
Rice Suitability	0.082	0.340	-0.269	1151
Tobacco Suitability	0.007	0.152	-0.269	917
Slave Share 1860	0.490**	0.211	0.111	957
Soil Nutrients	-0.186	0.247	-0.269	1250
Soil pH	2.549	2.214	-0.269	1752
Malaria Endemicity	0.001	0.003	-0.269	630
Temperature	0.600	0.552	-0.269	1478
Precipitation	1.467	65.736	-0.269	1626
Water Basins	-1.089	0.711	-0.269	1678
Elevation	2.512	33.724	-0.269	684
Ruggedness	-38.985	81.303	-0.269	1737
Population Density	-0.138	0.120	-0.269	1298

Note: Variables are collapsed at a county level. For each variable, the table shows the differences between treated and untreated counties obtained by running sharp RDD regressions where the treatment equals 1 if sugar suitability occurs. The running variable is also included among regressors. The number of observations across models changes due to the choice of the optimal bandwidth. Two different MSE-optimal bandwidth selectors (below and above the cutoff) are used. Robust standard errors clustered at a state level: *** p<0.01, ** p<0.05, * p<0.1.

Table A16: Balancedness - Individual Variables, 1880-1940

	Coeff.	S.E.	Control Mean	Obs.
		1880		
Age	0.549*	0.285	45.248	30516
Number of Children	-0.109	0.071	1.842	21179
Number of Children Below 5	-0.029	0.026	0.401	21828
Number of Families	-0.011	0.017	1.222	28430
Labor Force Status	0.007	0.006	1.870	35266
Duncan Socioeconomic Index	0.104	0.537	27.743	19549
Occupational Earnings Score	2.440*	1.298	44.880	14623
Black Share	0.149***	0.026	0.073	29459
		1890		
Age	-0.015	0.331	45.248	34615
Number of Children	-0.171**	0.077	1.842	31452
Number of Children Below 5	-0.052*	0.027	0.401	34365
Number of Families	0.000	0.019	1.222	72611
Labor Force Status	0.000	0.006	1.870	32473
Duncan Socioeconomic Index	-0.776	0.687	27.743	27375
Occupational Earnings Score	-0.871	2.072	44.880	22477
Black Share	0.147***	0.030	0.073	29290
		1910		
Age	0.866***	0.278	45.248	39670
Number of Children	-0.043	0.077	1.842	43772
Number of Children Below 5	-0.040	0.026	0.401	45330
Number of Families	0.018	0.023	1.222	49780
Labor Force Status	0.004	0.005	1.870	36959
Duncan Socioeconomic Index	-1.277	0.876	27.743	33485
Occupational Earnings Score	-2.138	2.824	44.880	23509
Black Share	0.113***	0.033	0.073	27212
		1920		
Age	0.257	0.316	45.248	54819
Number of Children	-0.045	0.088	1.842	46976
Number of Children Below 5	-0.083***	0.023	0.401	86902
Number of Families	-0.003	0.019	1.222	140160
Labor Force Status	0.005	0.006	1.870	47816
Duncan Socioeconomic Index	-1.486	1.065	27.743	38473
Occupational Earnings Score	-3.696	3.828	44.880	24711
Black Share	0.095***	0.035	0.073	29308
		1930		
Age	0.806**	0.364	45.248	57284
Number of Children	-0.170*	0.089	1.842	69317
Number of Children Below 5	-0.005	0.021	0.401	63482
Number of Families	0.022	0.019	1.222	170992
Labor Force Status	0.005	0.005	1.870	60355
Duncan Socioeconomic Index	-0.514	1.577	27.743	46627
Occupational Earnings Score	-3.064	4.152	44.880	28513
Black Share	0.102***	0.035	0.073	35219
		1940		
Age	0.806**	0.364	45.248	57284
Number of Children	-0.170*	0.089	1.842	69317
Number of Children Below 5	-0.005	0.021	0.401	63482
Number of Families	0.022	0.019	1.222	170992
Labor Force Status	0.005	0.005	1.870	60355
Duncan Socioeconomic Index	-0.514	1.577	27.743	46627
Occupational Earnings Score	-3.064	4.152	44.880	28513
Black Share	0.102***	0.035	0.073	35219

Note: For each variable, the table shows differences between treated and untreated counties obtained by running sharp RDD regressions where the treatment equals 1 if sugar suitability occurs. The running variable is also included among regressors. The number of observations across models changes due to the choice of the optimal bandwidth. Two different MSE-optimal bandwidth selectors (below and above the cutoff) are used. Robust standard errors clustered at a county level: *** p<0.01, ** p<0.05, * p<0.1.

Table A17: Single Female Headship, 1880-1940 - RDD - Non-Linear Term

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
			Second Stage			
Log Sugar Production	0.0355	0.1423	0.0969	0.0352	0.0562	0.0724
	(0.0617)	(0.4761)	(0.1664)	(0.0473)	(0.0943)	(0.1775)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	-0.020	-0.257	-0.097	-0.019	-0.054	-0.131
Observations	43484	85893	111228	79907	93461	56062
Counties	1149	1428	1537	1244	1262	785
Sample Mean	0.127	0.128	0.119	0.110	0.121	0.134
Left Bandwidth	0.0058	0.0066	0.0069	0.0054	0.0054	0.0033
Right Bandwidth	0.0006	0.0007	0.0006	0.0006	0.0008	0.0007
			First Stage			
$\mathbb{1}(\text{Distance}_{c,s} > 0)$	0.492	0.199	0.393	0.543	0.391	0.278
	(0.731)	(0.662)	(0.613)	(0.583)	(0.553)	(0.575)
Kleibergen-Paap F Stat.	0.45	0.09	0.41	0.87	0.50	0.23
Cragg-Donald F Stat.	78.51	29.16	147.96	213.90	131.78	41.10
Stock-Yogo Crit. Val.	16.38	16.38	16.38	16.38	16.38	16.38

Note: The dependent variable is single female headship. Border distance and its interaction with the treatment are also included among regressors. Two different MSE-optimal bandwidth selectors (below and above the cutoff) are used. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A18: Single Female Headship, 1880-1940 - RDD - Matching

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
			Second Stage			
Log Sugar Production	0.0070	0.0186**	0.0234**	0.0151**	0.0139*	0.0184**
	(0.0064)	(0.0074)	(0.0101)	(0.0070)	(0.0075)	(0.0086)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	-0.174	-0.158	-0.159	-0.149	-0.183	-0.208
Observations	10210	19037	18912	20394	20313	24190
Counties	586	724	633	626	551	607
Sample Mean	0.063	0.096	0.080	0.069	0.082	0.065
Left Bandwidth	0.0027	0.0029	0.0026	0.0026	0.0020	0.0025
Right Bandwidth	0.0007	0.0012	0.0007	0.0007	0.0009	0.0007
			First Stage			
$\mathbb{1}(\text{Distance}_{c,s} > 0)$	1.568***	1.605***	1.402***	1.392***	1.465***	1.373***
	(0.452)	(0.379)	(0.379)	(0.384)	(0.356)	(0.375)
Kleibergen-Paap F Stat.	12.027	17.943	13.706	14.182	16.930	13.371
Cragg-Donald F Stat.	319.248	625.577	663.505	752.593	655.456	751.519
Stock-Yogo Crit. Val.	16.38	16.38	16.38	16.38	16.38	16.38

Note: The dependent variable is single female headship. Border distance is also included among regressors. Two different MSE-optimal bandwidth selectors (below and above the cutoff) are used. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A19: Single Female Headship, 1880-1940 - IV

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
			Second Stage			
Log Sugar Production	0.0085***	0.0067***	0.0071***	0.0040**	0.0037***	0.0015
	(0.0029)	(0.0024)	(0.0020)	(0.0016)	(0.0014)	(0.0012)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	0.361	0.454	0.469	0.445	0.458	0.470
Observations	83112	127390	154877	180703	219625	242741
Counties	1994	2001	2001	2002	2002	2002
Sample Mean	0.034	0.060	0.059	0.057	0.061	0.068
			First Stage			
Sugar Suitability	0.656***	0.742***	0.783***	0.751***	0.787***	0.790***
	(0.126)	(0.114)	(0.108)	(0.109)	(0.113)	(0.116)
Kleibergen-Paap F Stat.	26.96	42.12	52.09	47.08	48.67	46.61
Cragg-Donald F Stat.	4260.989	9075.117	13114.67	14595.15	19282.97	20811.21
Stock-Yogo Crit. Val.	16.38	16.38	16.38	16.38	16.38	16.38

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, the slave share in 1860, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A20: Single Female Headship, 1880-1940 - RDD - Rice

	(1) 1880	(2) 1900	(3) 1910	(4) 1920	(5) 1930	(6) 1940
			Second Stage			
Log Rice Production	-0.0237	-0.0248	-0.0207	-0.0152	-0.0164*	-0.0054
	(0.0206)	(0.0215)	(0.0162)	(0.0102)	(0.0094)	(0.0049)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj.R-squared	-0.047	-0.048	-0.037	-0.027	-0.024	-0.002
Observations	16366	23389	20643	19690	28849	35820
Counties	452	442	328	296	342	364
Sample Mean	0.123	0.123	0.120	0.111	0.123	0.140
Left Bandwidth	0.0013	0.0015	0.0009	0.0006	0.0008	0.0008
Right Bandwidth	0.0006	0.0004	0.0003	0.0005	0.0005	0.0006
			First Stage			
$\mathbb{1}(\text{Distance}_{c,s} > 0)$	0.957	1.227	1.346	1.995*	2.246*	2.445**
	(0.703)	(0.760)	(0.862)	(1.111)	(1.175)	(1.197)
Kleibergen-Paap F Stat.	1.85	2.60	2.44	3.22	3.65	4.17
Cragg-Donald F Stat.	107.31	290.03	279.36	395.09	824.61	1095.74
Stock-Yogo Crit. Val.	16.38	16.38	16.38	16.38	16.38	16.38

Note: The dependent variable is single female headship. Border distance is also included among regressors. Two different MSE-optimal bandwidth selectors (below and above the cutoff) are used. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A21: Descriptive Statistics, Linked Data, 1880-1930

	Obs.	Mean	S.D.	Min	Max
			Full Sample		
Single Female Headship	26043	0.121	0.326	0.000	1.000
Age	26022	44.450	14.310	16.000	89.000
Age 1880	26022	29.754	18.212	0.000	112.000
Race	26043	1.063	0.246	1.000	4.000
Race 1880	26043	1.063	0.246	1.000	4.000
Marital Status	26043	1.759	1.615	1.000	6.000
Marital Status 1880	26043	4.038	2.332	1.000	6.000
Nr of Children	26043	1.598	1.779	0.000	9.000
Nr of Children 1880	26043	0.886	1.707	0.000	9.000
Nr of Children Below 5	26043	0.359	0.692	0.000	5.000
Nr of Children Below 5 1880	26043	0.239	0.612	0.000	5.000
Nr of Families	26043	1.179	0.756	1.000	29.000
Nr of Families 1880	26043	2.271	2.908	1.000	30.000
Labor Force Status	26043	1.892	0.311	0.000	2.000
Labor Force Status 1880	26043	1.247	0.759	0.000	2.000
Duncan Socioec. Index	26043	27.915	24.322	0.000	96.000
Duncan Socioec. Index 1930	26043	10.003	17.261	0.000	96.000
Occupational Earnings Sc.	23214	48.148	31.497	0.600	100.000
Occupational Earnings Sc. 1880	12701	28.703	28.371	1.200	100.000
Metropolitan Area	26043	1.593	0.751	1.000	3.000
Metropolitan Area 1880	26043	1.237	0.532	1.000	3.000
Sugar Suitability	26043	-7.801	0.698	-8.000	-2.725
Cotton Suitability	26043	-5.715	2.011	-8.000	-1.200
Rice Suitability	26043	-6.823	1.208	-8.000	-1.600
Tobacco Suitability	26043	-4.007	1.233	-8.000	-1.000
Slave Share 1860	26007	0.079	0.168	0.000	0.925
Soil Nutrients	26043	1.684	0.800	0.000	5.167
Soil pH	26043	27.285	6.466	10.000	71.407
Malaria Endemicity	26043	0.044	0.045	0.000	1.843
Temperature	26043	11.808	3.450	3.017	23.278
Precipitation	26043	1027.698	217.974	166.473	2023.798
Elevation	26043	233.306	206.500	1.600	2580.959
Water Basins	26043	2.020	3.545	0.000	67.103
Ruggedness	26043	313.056	802.588	3.409	18137.340
Latitude (000s)	26043	277.463	445.412	-1218.284	1502.953
Longitude (000s)	26043	711.185	891.404	-2303.025	2199.204
Population Density (000s)	26043	4792.821	19572.651	0.097	115420.352
			Migrants Sample		
Single Female Headship	18945	0.125	0.331	0.000	1.000
Age	18928	44.841	14.370	17.000	89.000
Age 1880	18928	31.897	18.050	0.000	112.000
Race	18945	1.057	0.234	1.000	4.000
Race 1880	18945	1.057	0.234	1.000	4.000
Marital Status	18945	1.781	1.630	1.000	6.000
Marital Status 1880	18945	3.700	2.381	1.000	6.000
Nr of Children	18945	1.583	1.775	0.000	9.000
Nr of Children 1880	18945	1.092	1.837	0.000	9.000
Nr of Children Below 5	18945	0.353	0.688	0.000	5.000
Nr of Children Below 5 1880	18945	0.297	0.671	0.000	5.000
Nr of Families	18945	1.188	0.812	1.000	29.000
Nr of Families 1880	18945	2.273	3.042	1.000	30.000
Labor Force Status	18945	1.889	0.314	0.000	2.000
Labor Force Status 1880	18945	1.294	0.721	0.000	2.000
Duncan Socioec. Index	18945	28.304	24.586	0.000	96.000
Duncan Socioec. Index 1930	18945	10.727	18.114	0.000	96.000
Occupational Earnings Sc.	16824	48.817	31.477	0.600	100.000
Occupational Earnings Sc. 1880	9293	30.407	29.061	1.200	100.000
Metropolitan Area	18945	1.590	0.746	1.000	3.000
Metropolitan Area 1880	18945	1.231	0.529	1.000	3.000
Sugar Suitability	18945	-7.838	0.624	-8.000	-2.725
Cotton Suitability	18945	-5.671	2.032	-8.000	-1.200
Rice Suitability	18945	-6.834	1.167	-8.000	-1.600
Tobacco Suitability	18945	-3.997	1.247	-8.000	-1.000
Slave Share 1860	18921	0.072	0.159	0.000	0.925
Soil Nutrients	18945	1.646	0.794	0.000	5.167
Soil pH	18945	27.488	6.436	10.000	71.407
Malaria Endemicity	18945	0.044	0.044	0.000	1.843
Temperature	18945	11.687	3.319	3.017	23.278
Precipitation	18945	1019.188	217.466	166.473	2023.798
Elevation	18945	239.861	207.806	1.600	2580.959
Water Basins	18945	1.954	3.413	0.000	67.103
Ruggedness	18945	297.609	772.389	3.409	18137.340
Latitude (000s)	18945	290.095	428.377	-1218.284	1502.953
Longitude (000s)	18945	654.389	899.484	-2303.025	2199.204
Population Density (000s)	18945	4696.772	19504.460	0.097	115420.352

Table A22: Descriptive Statistics, Linked Data, 1880-1930 - Blacks

	Obs.	Mean	S.D.	Min	Max
			Full Sample		
Single Female Headship	1619	0.195	0.396	0.000	1.000
Age	1616	42.536	13.798	17.000	88.000
Age 1880	1616	31.184	18.251	0.000	112.000
Marital Status	1619	2.119	1.808	1.000	6.000
Marital Status 1880	1619	4.011	2.281	1.000	6.000
Nr of Children	1619	1.632	2.099	0.000	9.000
Nr of Children 1880	1619	0.965	1.935	0.000	9.000
Nr of Children Below 5	1619	0.343	0.741	0.000	4.000
Nr of Children Below 5 1880	1619	0.270	0.673	0.000	4.000
Nr of Families	1619	1.246	0.748	1.000	13.000
Nr of Families 1880	1619	2.189	2.399	1.000	26.000
Labor Force Status	1619	1.937	0.243	1.000	2.000
Labor Force Status 1880	1619	1.415	0.772	0.000	2.000
Duncan Socioec. Index	1619	13.426	12.481	0.000	96.000
Duncan Socioec. Index 1930	1619	7.020	8.458	0.000	72.000
Occupational Earnings Sc.	1519	25.987	22.880	0.600	100.000
Occupational Earnings Sc. 1880	1084	17.550	18.046	1.200	87.500
Metropolitan Area	1619	1.413	0.621	1.000	3.000
Metropolitan Area 1880	1619	1.116	0.365	1.000	3.000
Sugar Suitability	1619	-6.737	1.307	-8.000	-2.725
Cotton Suitability	1619	-4.688	1.326	-8.000	-1.600
Rice Suitability	1619	-5.458	1.564	-8.000	-1.600
Tobacco Suitability	1619	-4.213	1.104	-8.000	-1.286
Slave Share 1860	1619	0.413	0.250	0.000	0.925
Soil Nutrients	1619	2.031	0.869	0.800	5.000
Soil pH	1619	26.460	6.023	10.000	54.500
Malaria Endemicity	1619	0.094	0.057	0.000	1.843
Temperature	1619	16.572	2.910	7.338	21.695
Precipitation	1619	1261.789	201.634	362.890	1639.891
Elevation	1619	111.979	104.063	1.600	1228.916
Water Basins	1619	2.472	4.159	0.000	39.473
Ruggedness	1619	342.270	973.667	3.409	9391.349
Latitude (000s)	1619	-330.984	408.279	-1004.451	846.594
Longitude (000s)	1619	760.145	592.770	-2277.992	2029.679
Population Density (000s)	1619	1360.783	8840.637	0.963	115420.352
			Migrants Sample		
Single Female Headship	1049	0.202	0.402	0.000	1.000
Age	1047	42.666	13.754	17.000	88.000
Age 1880	1047	34.598	17.744	0.000	112.000
Marital Status	1049	2.211	1.857	1.000	6.000
Marital Status 1880	1049	3.465	2.342	1.000	6.000
Nr of Children	1049	1.559	2.076	0.000	9.000
Nr of Children 1880	1049	1.370	2.195	0.000	9.000
Nr of Children Below 5	1049	0.304	0.696	0.000	4.000
Nr of Children Below 5 1880	1049	0.383	0.775	0.000	4.000
Nr of Families	1049	1.299	0.859	1.000	13.000
Nr of Families 1880	1049	2.112	2.438	1.000	26.000
Labor Force Status	1049	1.929	0.256	1.000	2.000
Labor Force Status 1880	1049	1.509	0.687	0.000	2.000
Duncan Socioec. Index	1049	13.949	13.845	0.000	96.000
Duncan Socioec. Index 1930	1049	7.534	8.963	0.000	72.000
Occupational Earnings Sc.	976	28.610	24.010	1.400	100.000
Occupational Earnings Sc. 1880	708	18.180	18.276	1.400	87.500
Metropolitan Area	1049	1.476	0.633	1.000	3.000
Metropolitan Area 1880	1049	1.131	0.385	1.000	3.000
Sugar Suitability	1049	-6.875	1.279	-8.000	-2.725
Cotton Suitability	1049	-4.738	1.408	-8.000	-1.600
Rice Suitability	1049	-5.562	1.551	-8.000	-1.600
Tobacco Suitability	1049	-4.171	1.131	-8.000	-1.286
Slave Share 1860	1049	0.391	0.263	0.000	0.925
Soil Nutrients	1049	1.976	0.879	0.800	5.000
Soil pH	1049	26.803	6.000	10.000	54.500
Malaria Endemicity	1049	0.092	0.066	0.000	1.843
Temperature	1049	16.231	3.036	7.338	21.361
Precipitation	1049	1242.265	206.588	362.890	1639.891
Elevation	1049	122.023	107.239	1.600	1228.916
Water Basins	1049	2.541	4.120	0.000	39.473
Ruggedness	1049	311.243	906.676	3.409	7079.305
Latitude (000s)	1049	-290.998	421.103	-1004.451	808.019
Longitude (000s)	1049	718.224	604.978	-2277.992	2029.679
Population Density (000s)	1049	1566.881	9522.728	0.963	115420.352

Table A23: Single Female Headship, 1880-1930 Linked Sample - Full Sample

	(1)	(2)	(3)
Sugar Suitability	0.0084***	0.0123***	0.0123**
	(0.0031)	(0.0039)	(0.0053)
1930 State FE	Yes	Yes	No
1880 State FE	No	Yes	Yes
1930 County FE	No	No	Yes
Ind. Controls	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes
Adj.R-squared	0.374	0.373	0.373
Observations	11284	11284	11284
Counties	2334	2334	2334
Sample Mean	0.058	0.058	0.058

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density, all at 1880 boundaries, and the slave share in 1860. Individual controls include age, age squared, race, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area, both in 1880 and 1930. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A24: Single Female Headship, 1880-1930 Linked Sample - Migrants - By Race

	(1)	(2)	(3)	(4)
	Blacks		Whites	
Sugar Suitability	0.0143	0.0198	0.0048	0.0072
	(0.0109)	(0.0150)	(0.0037)	(0.0045)
1930 State FE	Yes	Yes	Yes	Yes
1880 State FE	No	Yes	No	Yes
Ind. Controls	Yes	Yes	Yes	Yes
Geo. Controls	Yes	Yes	Yes	Yes
Adj.R-squared	0.435	0.429	0.363	0.363
Observations	649	649	7576	7576
Counties	356	356	1979	1979
Sample Mean	0.150	0.150	0.055	0.055

Note: The dependent variable is single female headship. Geographical controls include cotton, rice, and tobacco suitability, soil nutrients, soil pH, malaria endemicity, temperature, precipitation, elevation, water basins, ruggedness, latitude, longitude, and the log of 0.01+ population density, all at 1880 boundaries, and the slave share in 1860. Individual controls include age, age squared, marital status, number of children, number of children below age five, number of families in the household, labor force participation, Duncan socioeconomic index, occupational earnings score, and residence in metropolitan area, both in 1880 and 1930. Robust standard errors clustered at a county level in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Table A25: Descriptive Statistics, County Data, 1990

	Obs.	Mean	S.D.	Min	Max
Single Female Headship	3089	0.131	0.052	0.000	0.411
Black Single Female Headship	2703	0.301	0.183	0.000	1.000
White Single Female Headship	3089	0.107	0.027	0.000	0.269
Sugar Suitability	3062	-7.651	0.944	-8.000	-2.304
Cotton Suitability	3062	-5.865	1.933	-8.000	-1.000
Rice Suitability	3062	-6.890	1.384	-8.000	-1.200
Tobacco Suitability	3062	-4.812	1.612	-8.000	-1.000
Slave Share 1860	1946	0.148	0.211	0.000	0.925
Black Share	3089	0.080	0.136	0.000	0.862
Soil Nutrients	3063	1.777	0.876	0.000	7.000
Soil pH	3062	28.678	7.541	10.000	97.000
Malaria Endemicity	3085	12432.421	8406.265	0.000	57675.691
Temperature	3063	12.094	4.722	-11.028	23.925
Precipitation	3063	940.452	357.742	117.767	3174.455
Elevation	3063	447.128	507.311	-465.190	3428.471
Water Basins	3063	1.778	4.248	0.000	59.548
Ruggedness	3063	330.749	940.385	4.532	16277.379
Latitude (000s)	3085	163.376	555.100	-1263.667	1519.304
Longitude (000s)	3085	375.496	965.916	-2303.825	2199.191
Population (000s)	3089	80.162	265.906	0.052	8863.164
Black Incarceration	2833	0.217	0.259	0.000	0.997
Black Female Employment	2285	0.870	0.156	0.000	1.000

Table A26: Descriptive Statistics, Ethnographic Variables

	Obs.	Mean	S.D.	Min	Max
Extended Family	73	0.616	0.490	0.000	1.000
Nuclear Family	73	0.014	0.117	0.000	1.000
Patrilocality	73	0.795	0.407	0.000	1.000
Post-Partum Sex Taboos	14	4.571	1.697	2.000	6.000
Matrilineal Descent	73	0.110	0.315	0.000	1.000
Norms of Premarital Sexual Behavior	32	3.344	1.928	1.000	6.000
Animal Husbandry	69	1.884	1.334	1.000	9.000
Dependence on Agriculture	73	6.137	1.228	1.000	9.000
Intensity of Agriculture	71	3.282	0.759	2.000	6.000
Root and Tubers	71	0.014	0.119	0.000	1.000
Animals and Plow Cultivation	71	1.028	0.237	1.000	3.000
Sex Differences in Agriculture	50	3.440	1.296	1.000	5.000
Sugar Suitability	73	-5.499	0.529	-6.000	-3.952

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