

# Black Mobilization After Emancipation: Evidence from Reconstruction and the Great Migration \*

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## Abstract

We find that African-Americans in the South responded collectively to political and economic opportunities after the Civil War, but only in places where strong social ties emerged as an unintended consequence of the antebellum organization of production. We examine political participation during and just after Reconstruction and the movement to northern cities during the Great Migration. In contrast to most empirical work on social networks and social capital, we analyze the process of group formation from its inception (Emancipation) and utilize a plausibly exogenous source of variation in social ties among members – the share of land allocated to labor-intensive plantation crops (*plantation share*) in each southern county. Our theoretical model implies that cooperation cannot be supported at plantation shares below a threshold but that the size of the collaborating group is monotonically increasing in plantation share above that threshold. Voting and migration patterns across counties are consistent with the theory - there is no association with plantation share up to a threshold point at which a steep, monotonic relationship begins. This finding is robust to rigorous testing, and these tests show that competing hypotheses do not exhibit similar nonlinear patterns. Blacks from southern counties with high plantation shares accounted for a majority of the northern migrants, and these migrants appear to have benefited from network externalities, as they moved to the same destination cities.

*Keywords.* African-American history. Slavery. Social capital. Collective mobilization. Reconstruction. Great Migration. Networks.

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# 1 Introduction

Were African-Americans able to overcome centuries of social dislocation and form viable communities once they were free? This question has long been debated by historians, and is relevant both for contemporary social policy and for understanding the process of social capital formation.<sup>1</sup> Nevertheless, little quantitative evidence has been brought to bear on this important subject. Current racial differences in social capital (or any individual or group outcome) cannot necessarily be attributed to slavery. These differences could be the result of discrimination and injustices that occurred long after slavery ended. This paper looks *within* the African-American population *shortly after* Emancipation to identify black social capital formation. While we cannot examine the impact of slavery on black social capital - i.e., the social capital that would have prevailed in the absence of slavery - we can study whether (and where) blacks in the South formed collaborative groups after slavery ended.

In the decades following the Civil War, two significant opportunities arose for southern blacks to coordinate their behavior. First, blacks were able to vote and elect their own leaders during and just after Reconstruction, 1870-1890. Second, due to the increased demand for labor in northern cities (and new restrictions on immigrant inflows), blacks were able to leave the South during the Great Migration, 1916-1930. In both episodes, blacks could benefit more if they worked together to achieve common objectives. We find that southern blacks did indeed collectively mobilize to achieve these goals, but only in places where specific historical preconditions existed.

A distinctive feature of the antebellum South was the unequal size of slaveholdings and the uneven distribution of the slave population across counties (Stampp 1956). This variation arose as a natural consequence of geographically determined cropping patterns and the organization of production under slavery (Wright 1978, 1986). Where plantation crops such as cotton, tobacco, rice, and sugarcane could be grown, slaveholdings and the slave population density tended to be large. However, a substantial fraction of slaves lived in counties with widely dispersed family farms (Genovese 1974). The African-American population was relatively stable in the decades following the Civil War, with the county-level population correlation between 1860 and 1890 being as high as 0.85. The opportunities for social interaction and the potential to create social capital would thus have varied consistently across southern counties, depending on the crops that were grown, before and after Emancipation.

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<sup>1</sup>The traditional view among historians was that slavery, through forced separation and by restricting social interaction, permanently undermined the black community (Du Bois 1908, Frazier 1939, Stampp 1956). This was replaced by a revisionist history that documented a stable, vibrant African-American family and community, both during and after slavery (Blassingame 1972, Genovese 1974, Gutman 1976). More recently, Fogel (1989) and Kolchin (1993) have taken a position between the traditional and the revisionist view; while others have asserted that “[s]lavery was, in fact, a social system *designed* to destroy social capital among slaves” (Putnam 2000: 294) with current differences in social capital across American states partially attributed to slavery.

Our analysis uses the share of land allocated to the major plantation crops – weighted by crop-specific labor intensities – as an exogenous determinant of both plantation size and the density of blacks and, therefore, the strength of their social ties in each southern county. We refer to this measure as the “plantation share.” A critical advantage of plantation share is that it was the result of crop allocation decisions made by white landowners in the antebellum period. Black social ties would have emerged as an unintended consequence of those decisions.<sup>2</sup> Black political participation in the 1870s and black migration between 1910 and 1930 both have a nonlinear association with plantation share across southern counties. Nonlinearities are a common feature of models with network or peer effects due to the externality from individual participation. The model developed in this paper places additional (testable) structure on the observed nonlinear associations, which allows us to identify underlying coordination.

Our theory extends the canonical efficiency wage model to a setting where many individuals can collaborate to provide a service to a principal – for example, a group of blacks to a local political leader during Reconstruction or a migrant network to firms in northern cities during the Great Migration. Each group member receives a payoff for the service provided that is increasing in the group’s size. A commitment problem arises because the group’s payoff is received up front, with the expectation that each individual will exert unobserved and costly effort *ex post*. The efficiency wage model solves this problem by making the employer and the individual worker interact repeatedly and by allowing the wage to adjust so that the gain from shirking in any period is just offset by the loss in future (permanent) income. In our model, the size of the group adjusts so that participants are indifferent between working and shirking.

Individuals place more weight on the payoffs of other members of the group when social ties are strong, increasing their overall utility from cooperation. Nevertheless, cooperation cannot be sustained below a threshold level of social ties. Above this threshold, the maximum group size that can be supported is increasing in social ties. If the strength of social ties is monotonically increasing in plantation share, then our model generates precise predictions for the relationship between outcomes associated with black mobilization, such as political participation and migration, and plantation share at the county level. There should be no correlation between these outcomes and plantation share up to a threshold and a steep, monotonic association thereafter.

We derive and apply formal statistical tests of this prediction to the two historical episodes of interest. Blacks could vote and elect their own leaders for a brief period during and just after Reconstruction (Morrison 1987, Foner 1988). They would have voted for the Republican

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<sup>2</sup>The institution of slavery was based on coercion rather than cooperation and so it is reasonable to assume that plantation owners did not select slaves on the basis of their intrinsic proclivity to cooperate.

Party (the party of the Union) at this time; and so black political mobilization in each county can be measured by the number of Republican votes. We find that Republican votes in national and state-wide elections during the 1870s match the predictions of the model. Since race-specific voting data are not available, we also examine the relations between plantation share and the probability that a black leader was elected by the county to the State Senate or House. The patterns match those of Republican votes. Southern blacks were gradually disfranchised from the late 1880s through the 1890s as Jim Crow laws took effect. We find no association between plantation share and Republican votes in 1900, which provides further evidence that the nonlinear voting patterns of the 1870s were primarily driven by blacks.

Although black disfranchisement was complete by 1900, a new opportunity arose with the Great Migration. Over 400,000 blacks moved to the North between 1916 and 1918 (exceeding the total number who moved in the preceding 40 years), and over one million left by 1930 (Marks 1989). While several pull and push factors provided the impetus for this movement, the literature suggests that networks of migrants from the same origin location formed in northern cities to secure accommodation and jobs for their members (Gotlieb 1987, Grossman 1989, Carrington, Detragiache, and Vishwanath 1996). Southern counties with stronger social ties would have supported stronger networks and, therefore, greater migration levels.<sup>3</sup> We find that the relations between plantation share and various measures of black migration match our theoretical predictions once again - there is no correlation up to a threshold and a steep, monotonic association thereafter.

Our primary measure of out-migration is derived from changes in the black population in southern counties during the Great Migration, adjusting for natural changes due to births and deaths. We cross-validate this measure with another one constructed from newly-available data, which contain the city-of-residence in the 1970s (and after) of people born in Mississippi between 1905 and 1925, as well as the person's county of birth. While the year of migration is unknown, these data provide a direct measure of migration at the county level. This measure is highly correlated with the population change measure, and both variables show the same nonlinear association with plantation share across Mississippi counties that we observe across all southern counties.

Since the Mississippi data contain the (final) destination city of each migrant, we can test another prediction of the theory. Migrants who are networked will move to the same place, whereas those who move independently will be spread across the available destinations. If variation in migration levels across southern counties is driven by underlying collective mobilization, then this implies that the *number* of black migrants and the spatial *concentration* of these migrants across destinations will track together. As predicted, the Herfindahl-Hirschman Index (HHI) of spatial concentration across destination cities for the

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<sup>3</sup>See Munshi (2011) for a discussion on the contexts in which networks will support or hinder mobility.

Mississippi migrants is uncorrelated with plantation share up to the same point as the level of migration, and steeply increasing in plantation share thereafter.

Our results indicate that southern blacks formed networks after Emancipation where the initial conditions permitted stronger social ties. We consider two alternative models that can explain variation in political participation and migration without relying on decentralized collective mobilization. The first posits that an external agency, such as the Republican Party or a Northern labor recruiter, solved the commitment problem and organized black voters or migrants. As shown below, this model implies that voting and migration *levels* should shift discontinuously at a threshold plantation share, which is inconsistent with the patterns in the data.<sup>4</sup>

Another possibility is that the costs associated with voting and migration vary across counties in a way conflated with plantation shares. Three push factors prominent in the literature on the Great Migration are the decline in cotton acreage due to the boll weevil invasion; the segregation and racial violence that accompanied Jim Crow laws; and the arrival of the railroads (Marks 1983, Tolnay and Beck 1990, Wright 1986). We find that none of these factors exhibit a nonlinear relation with plantation share; indeed their associations with plantation share are weak. While these factors may be important for individual decisions to migrate, they cannot explain why the majority of black migrants came from high plantation share counties.

More generally, we cannot rule out the existence of unobserved factors that are correlated with both plantation share and black migration in a way that would generate the same patterns predicted by our theory. However, such factors would also need to explain the matching patterns in political participation fifty years earlier, as well as those we find for church congregation size in 1890 (described below). Even then, they would be hard pressed to account for the nonlinear association between plantation share and the destination-city HHI of blacks from Mississippi. If blacks' migration decisions were based on factors that did not include a coordination externality, then the probability of moving to the same destination would not track migration levels so closely.

Our statistical tests consistently find that the outcomes indicative of black mobilization (voting, church size, migration) have patterns that match the restrictions of our theory regardless of the period examined. Variables that should not be associated with black mobilization – e.g., railroad density, white church size, and white migration – do not. The implied magnitudes of the coordination effects are large - for example, over half of the migrants to the North came from the third of southern blacks who lived in the highest plantation share

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<sup>4</sup>A related alternative explanation, which is most relevant during Reconstruction is that blacks would only turn out to vote when they were sufficiently sure they could elect their own leader. This model also implies a discontinuous increase in voting levels at a threshold plantation share, which is inconsistent with the slope-discontinuity that we observe in the data.

counties, while less than fifteen percent came from the third in the lowest plantation share counties. We are the first to demonstrate that network externalities played an important role in the Great Migration, an event of great interest across many disciplines. This paper concludes by discussing the significance of this finding for the subsequent evolution of black communities in northern cities.

## 2 Postbellum Opportunities and Constraints

This section begins by describing two new opportunities that presented themselves to African-Americans in the postbellum period: (i) the opportunity to vote and elect their own leaders during and just after Reconstruction, 1870-1890 and (ii) the opportunity to migrate to northern cities during the Great Migration, 1916-1930. We subsequently discuss the determinants of black social ties during and after slavery. This section concludes with an initial description of the relationship between these social ties and the response to the new opportunities across southern counties.

### 2.1 Political Opportunities

Three amendments to the Constitution, passed in quick succession after the Civil War, gave political representation to African-Americans. The 13<sup>th</sup> Amendment, passed in 1865, abolished slavery. The 14<sup>th</sup> Amendment, passed in 1866, granted full rights of citizenship to African-Americans. And the 15<sup>th</sup> Amendment, passed in 1869, gave them the right to vote. This opportunity coincided with the Reconstruction Act of 1867, which put the Confederate states under military (Federal) rule for the next decade. Blacks voted in large numbers for the Republican party during this period and elected their own leaders. But Southern Democrats began to reassert themselves soon after Reconstruction had ended, and southern states began passing legislation from the early 1890s that effectively eliminated blacks from the electorate by 1900 (Du Bois 1908, Morrison 1987).

Although external organizations such as the Freedmen's Bureau and the Union League were active during Reconstruction, the major impetus for African-American political participation came from within (Stampf 1966, Foner 1988).<sup>5</sup> "In record time they organized, sponsored independent black leaders, and committed themselves to active participation ... It was now possible for blacks to not only field candidates for election but to influence the outcome of elections by voting" (Morrison 1987: 35). During Reconstruction, as many as 600 blacks sat in state legislatures throughout the South. While this political success is impressive, what is even more impressive is the discipline and courage shown by black voters

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<sup>5</sup>At its peak in 1866, the Freedmen's Bureau employed only 20 agents in Alabama and 12 in Mississippi. It ceased most of its activities by the end of 1868 and was officially abolished in 1872, before black political participation even began (Kolchin 1993).

in continuing to vote Republican in large numbers and to elect their own leaders through the 1880s and even into the 1890s, after Federal troops had left the South (Kolchin 1993).

Where did the black leaders come from? The church was the center of community life in the postbellum period and it was natural that black political leaders would be connected to this institution (Du Bois 1908, Woodson 1921, Frazier 1964, Dvorak 1988). "... preachers came to play a central role in black politics during Reconstruction ... Even those preachers who lacked ambition for political position sometimes found it thrust upon them" (Foner 1988:93). African-American communities did not passively support these leaders. The political support they provided gave them leverage, and benefits in return, until they were disfranchised towards the end of the nineteenth century (Morrison 1987).

## 2.2 Economic Opportunities

The first major movement of blacks out of the South after the Civil War commenced in 1916. Over the course of the Great Migration, running from 1916 to 1930, over one million blacks (one-tenth the black population of the United States) moved to northern cities (Marks 1983). This movement was driven by both pull and push factors. The increased demand for labor in the wartime economy coupled with the closing of European immigration, gave blacks new labor market opportunities (Mandle 1978, Gottlieb 1987). Around the same time, the boll weevil invasion reduced the demand for labor in southern cotton-growing counties (Marks 1989). Adverse economic conditions in the South, together with segregation and racial violence, encouraged many blacks to leave (Tolnay and Beck 1990). Their movement was facilitated by the penetration of the railroad into the deep South (Wright 1986). A confluence of favorable and unfavorable circumstances thus set the stage for one of the largest internal migrations in history.

How did rural blacks hear about new opportunities in northern cities? The first links appear to have been established by recruiting agents acting on behalf of northern railroad and mining companies (Henri 1975, Grossman 1991). Independent recruiters, who charged migrants a fee for placing them in jobs, were soon operating throughout the South (Marks 1989). Apart from these direct connections, potential migrants also heard about jobs through ethnic newspapers. The *Chicago Defender*, which has received much attention in the literature, increased its circulation from 33,000 in 1916 to 125,000 in 1918. Industries throughout the Midwest sought to attract black southerners through classified advertisements in that newspaper (Grossman 1991).

Although external sources of information such as newspapers and recruiting agents played an important role in jump-starting the migration process, and agencies such as the Urban League provided migrants with housing and job assistance at the destination, networks linking southern communities to specific northern cities, and to neighborhoods within those

cities, soon emerged (Gottlieb 1987, Marks 1991). “[These] network[s] stimulated, facilitated, and helped shape the migration process at all stages from the dissemination of information through the black South to the settlement of black southerners in northern cities” (Grossman 1991: 67).

Two broad classes of jobs were available to blacks in northern cities: unskilled service and manufacturing jobs and skilled manufacturing jobs. Connections were needed to gain access to the skilled jobs and many migrants did find positions with the help of referrals from their network. However, much of the literature on black labor market networks during the Great Migration focuses on information provision rather than job referrals (eg. Grossman in Chicago and Gottlieb in Pittsburgh). “Unlike the kinship networks among European immigrants ... which powerfully influenced the hiring of foreign-born newcomers, the southern blacks’ family and friends apparently had less leverage inside the workplace” (Gottlieb 1987: 79). A number of explanations are available for the apparent weakness of black networks. First, discrimination by employers and the exclusion of blacks from labor unions could have prevented them from entering skilled occupations in the numbers that were needed for networks to form (Grossman 1991, Collins 1997). Second, blacks may have been less socially cohesive (on average) than arriving European migrants (Frazier 1939). A black-white comparison is beyond the scope of this paper, but our analysis will take a first step towards explaining variation in the strength of black networks across northern destinations.

## 2.3 Social Constraints

Three features of U.S. slavery distinguished it from slavery elsewhere in the Americas. First, the cultivation of diverse plantation crops in the U.S. as opposed to sugarcane alone in the Caribbean and South America resulted in smaller slaveholdings and greater variation in the size of these slaveholdings. One-quarter of U.S. slaves resided in plantations with less than 10 slaves, one-half in plantations with 10-50 slaves, and the remainder in plantations with more than 50 slaves (Stampp 1956, Genovese 1974). In contrast, the median slave in Jamaica lived on a plantation with 150 slaves and one-quarter of the slaves lived on plantations with 250 slaves (Fogel 1989). Second, slaves in the antebellum period were dispersed throughout the American South, resulting in extremely low black population densities on average (Kolchin 1993). However, densities were substantially higher in counties where the geography allowed labor intensive plantation crops like tobacco, cotton, rice, and sugarcane to be grown. Although just one or two slaves worked on a family farm growing wheat or corn, approximately 100 slaves worked on a rice or sugarcane plantation in the United States, 35 on cotton plantations, and a somewhat smaller number on tobacco plantations (Fogel 1989). Third, the inter-state slave trade frequently separated families and plantation communities. This trade was responsive to changes in crop prices and cultivation patterns (Stampp 1956).



For example, close to one million slaves moved to southwestern cotton states between 1790 and 1860 as production of that crop boomed (Fogel 1989, Kolchin 1993). Although Fogel and Engerman (1974) estimate that 84 percent of the slaves that moved west migrated with their owners, most other historians assign much greater weight to slave sales (Tadman, 1989, for instance, estimates that sales accounted for 70-80 percent of the slave movement).

A community that supports collective action and punishes deviations from cooperative behavior can only form if individuals interact with one another sufficiently frequently on a regular basis. Forced separation would naturally have undermined the stability of slave communities (Du Bois 1908, Frazier 1939). Despite these challenges, the slave quarter and the independent informal church that often formed within the quarter, have been identified as domains within which cooperation, mutual assistance, and black solidarity did emerge (Blassingame 1972, Genovese 1974). “[Large plantations] permitted slaves to live together in close-knit communities – the slave quarters – where they could develop a life of their own” (Fogel 1989: 170). Most slaveholdings were too small to support such communities and interactions across plantations were relatively infrequent (Stampf 1956). Thus, viable communities could only have formed in the antebellum period in those counties where tobacco, cotton, rice, and sugarcane were grown, where plantations were large, and where high slave population densities would have supported relatively frequent social interactions. Because the flow of slaves over the course of the eighteenth and nineteenth centuries was from the Upper South to the counties where plantation crops were grown, the slave community would in addition have been more stable in those counties.

“Slavery was essential to the rise of large-scale farming units, but they did not wither away when slavery was abolished” (Wright 1986:82). Following the Civil War, most blacks did not abandon their home plantations and those who did traveled only a few miles (Mandle 1978, Foner 1988, Steckel 2000).<sup>6</sup> Given the low black population density in most counties, the opportunities for social interaction would have remained limited in the postbellum period. Once again, the greatest potential for community formation would have been in counties where labor intensive plantation crops – tobacco, cotton, rice, and sugarcane – were grown historically and continued to be grown.

Reconstruction was more radical and persistent in the deep South (Kolchin 1993). During the Great Migration, the heaviest black out-migration occurred in an area that had been dominated by the plantation cotton economy (Tolnay and Beck 1990). “Some counties were characterized by extremely high out-migration, while others maintained relatively

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<sup>6</sup>Federal assistance to former slaves who sought to acquire land was extremely limited (Kolchin 1993). 40,000 blacks in Georgia and South Carolina were granted land for homesteading by General Sherman in 1865, but the land was returned to their original owners by President Johnson. Similarly, only 4,000 blacks, most of whom resided in Florida, benefited from the Homestead Act of 1866. As noted below, the correlation in black population between 1860 and 1890 at the level of the county is as high as 0.85.

stable black populations ... Such intra-state variation raises interesting questions about the causes of the differential migration ... Was the cotton economy particularly depressed? Were blacks subjected to more brutal treatment by whites in those areas? Did economic competition between blacks and whites restrict economic opportunity, and thereby encourage out-migration?" (Tolnay and Beck 1990: 350). Our explanation for (part of) this variation across counties is based on internal rather than external forces. Plantations would have been larger and social interactions would have been more frequent and stable in counties where a greater fraction of land was allocated to the four labor intensive plantation crops (not just cotton). Based on the discussion above, social ties would have been stronger in those counties, allowing blacks to work together to achieve common objectives during Reconstruction *and* during the Great Migration.

To test this hypothesis, the first step is to construct a variable that exogenously determines social ties. The acreage allocated to different crops in a county would have determined both plantation size and black population density and, therefore, social ties. These acreage decisions were determined by geography and were made by white landowners in the antebellum period. As noted, black social ties would have been an unintended consequence of those decisions. Cropping patterns and the associated black population remained stable in the decades following the Civil War. For example, the county-level correlation between the slave population in 1860 and the black population in 1890 is as high as 0.85. Counties with strong social ties in the antebellum period would thus have remained that way in the postbellum period.

The earliest year in which crop-specific acreage is available at the county level from the agricultural census is 1890.<sup>7</sup> The simplest determinant of social ties that we construct is the share of cultivated land allocated to tobacco, cotton, rice, and sugarcane in that year. A more sophisticated measure adjusts for differences in labor intensity across the four crops, normalizing the weighted statistic so that the mean and variance of the two measures are the same.<sup>8</sup> We will use the second measure – the plantation share – in all of the analysis reported below, although the results (reported in Appendix Figures A1-A3 for the main outcomes) are very similar with either measure. The implicit assumption when using 1890 acreage

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<sup>7</sup>Crop production is available from the agricultural census as early as 1840. Production reflects both the amount of land allocated to the crop as well as productivity and is therefore a less useful determinant of black population density and plantation size. We will nevertheless, check the robustness of the results to alternative production-based measures as well as plantation size prior to Emancipation in subsequent versions of the paper.

<sup>8</sup>Weighted plantation share = 0.083 cotton + 0.133 sugarcane + 0.15 rice + 0.333 tobacco, where cotton, sugarcane, rice, and tobacco are measured by the fraction of farm area assigned to each crop and the weights represent the number of workers per acre. These (technological) weights are obtained from Olstead and Rhodes (2010), Niles Weekly Register (1835), House (1954), and Earle (1992), respectively. This weighted statistic is normalized to have the same mean and standard deviation as the unweighted statistic. After this normalization, observations with values exceeding 0.3 are dropped (these outliers account for 1.5 percent of all counties).

allocation to determine social ties before and after Emancipation is that cropping patterns are relatively stable over time. To provide support for this assumption we computed the correlation between plantation share in 1890 and the corresponding measure in 1910, based on data from the agricultural census in those years. The correlation, at the level of the county, is as high as 0.92.

Figure 1 describes the plantation share in the 15 southern states in which slavery existed prior to Emancipation.<sup>9</sup> The message to take away from the figure is that there is substantial variation in this statistic across states and, more importantly, across counties within states. We will take advantage of this variation to include state fixed effects in all the results that we report, although the results (reported in Appendix Figures A1-A3 for the main outcomes) are very similar with and without fixed effects. Figure 2A provides preliminary evidence on the relationship between political participation, migration and the plantation share. Political participation is measured by the number of Republican votes in the county in the 1872 presidential election, at which point in time blacks could freely vote and elect their own leaders. Migration is measured by black population change in the county from 1910 to 1930 minus the corresponding change from 1890 to 1910 (to control for natural changes in population across counties, as described below). The nonparametric regressions presented in Figure 2A reveals a highly nonlinear relationship between plantation share and both outcomes.<sup>10</sup> Nonlinearities are commonly generated in models with network and peer effects because there is an externality associated with individual participation. The model that we develop below will provide a simple explanation, based on internal forces within the black population that vary across counties, for the nonlinearity we have uncovered in Figure 2A.

### 3 Theory with a Test

The model developed in this section places additional structure on the nonlinear relationship between political participation, migration, and plantation share. We subsequently proceed to develop statistical tests of the model's predictions. These tests will be used in Section 4 to formally validate the model and to rule out alternative explanations for the empirical results that are obtained.

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<sup>9</sup>The slave states are Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Among these states, Kentucky, Missouri, Delaware, and Maryland did not join the Confederacy.

<sup>10</sup>State fixed effects are partialled out nonparametrically using a two-step procedure in Figure 2A and all the figures that follow. In the first step, the outcome under consideration (political participation or migration) and each state dummy is separately regressed nonparametrically on plantation share. The residual from the first regression is then regressed on the residuals from the state-dummy regressions. Using the estimated coefficients, the state fixed effects can be differenced from the outcome under consideration. This differenced variable is nonparametrically regressed on plantation share in the second step.

### 3.1 Individual Payoffs

There are many economic environments in which individuals cooperate to achieve a common objective. For example, a group of individuals could form a cooperative to work together and jointly produce a good. Alternatively, a group of individuals could form a mutual insurance arrangement, pooling their incomes to smooth consumption on the basis of a pre-specified sharing rule. In the applications that we consider, a group of blacks from a southern county would have come together to provide a service to a principal, receiving benefits in return. The principal could have been, for example, a local political leader during Reconstruction. Members of the group would have canvassed potential voters and turned out themselves in local, state, and federal elections. Once the leader was elected, the group would have worked on his behalf, helping to provide goods and services to the electorate and increasing his chances of reelection. In return for these services, the group would have received a transfer of some sort. Alternatively, a group of black migrants could have worked diligently as a team for one or more northern firms during the Great Migration. In a production environment where effort was unobserved by firms, such diligence (supported by underlying social ties) would have resulted in improved employment prospects and favorable wages for the members of the network.

Because the members of the group work together, we assume that the payoff,  $U$ , received by each member from the principal is increasing in its size,  $N$ . Members of the group are substitutes for each other and so the service provided, and the per capital payoff received, will be declining in group size at the margin. We introduce social ties,  $\lambda$ , in the model by assuming that individuals in cohesive groups internalize the positive effect of their participation on other members of the group. This could be because social ties give rise to pro-social preferences or because they support greater *ex post* transfers. For analytical convenience let  $N$  and  $\lambda$  be real numbers. The overall payoff each individual receives from participation can then be described by the function  $W(N, \lambda) = U(N) + \lambda NU(N)$ , where  $U_N(N) > 0$ ,  $U_{NN}(N) < 0$ , as described above, and  $\lambda$  is the weight placed on the payoffs of other members. It is straightforward to show that  $W_N(N, \lambda) > 0$ ,  $W_{\lambda N}(N, \lambda) > 0$ , and that  $W_{NN}(N, \lambda) < 0$  if  $U(N)$  is sufficiently concave, i.e.  $(1 + \lambda N)U_{NN}(N) + 2U_N(N) < 0$ . We assume, in the discussion that follows, that this last condition is satisfied.

Let  $P$  be the population in the local area, which is defined to be small enough that only a single group is active. Individuals outside the group operate independently and we normalize so that their payoff is zero. Using the payoff in autarky as the benchmark, this implies the following boundary conditions:

$$\mathbf{C1.} \quad \lim_{N \rightarrow 0} W(N, \lambda) = 0 \quad \forall \lambda$$

$$\mathbf{C2.} \quad \lim_{\lambda \rightarrow 0} W(N, \lambda) = 0 \quad \forall N$$

This is just saying that there is no additional payoff to the individual from belonging to a group of infinitesimal size ( $N \rightarrow 0$ ), regardless of the strength of social ties,  $\lambda$ . Conversely, there is no additional payoff from belonging to a group, regardless of its size, when social ties are absent ( $\lambda \rightarrow 0$ ).

### 3.2 Maximum Stable Group Size

Given the payoffs described above, we now proceed to derive the maximum stable group size,  $N$ , that can be supported in a local area. Social ties,  $\lambda$ , vary exogenously across local areas, which are otherwise indistinguishable. Our objective is to derive the relationship between  $\lambda$  and  $N$ . During Reconstruction,  $N$  would refer to the number of individuals who would have mobilized to support the local political leader. During the Great Migration,  $N$  would refer to the size of the network that could be supported at the destination, which, in turn, would determine the level of migration from the origin county. Although migration is a dynamic process, we can think of  $N$  as the stock of migrants at a given point in time.

What prevents the entire population from joining the group? To place bounds on group size, we assume that each member incurs a private effort cost  $c$  when it provides the services described above to the principal. Benefits are received up front by the group, with the expectation that each member will exert effort *ex post*. This could well describe the timing of wage setting and work effort in northern jobs, as well as the sequence of transfers (patronage) and community effort during Reconstruction. The commitment problem that arises here is that a self-interested individual will renege on his obligation in a one-shot game. This problem can be avoided if the group interacts repeatedly with the principal. Based on the standard solution to an infinitely repeated game, cooperation can be sustained if individuals are sufficiently patient, i.e. if the discount factor  $\delta$  is large enough so that the following condition is satisfied:

$$\frac{W(N, \lambda) - c}{1 - \delta} \geq W(N, \lambda).$$

The term on the left hand side is the present discounted value of cooperation for each individual. The right hand side describes the payoff from deviating. In the first period, the deviator receives the usual per capita payoff without incurring the effort cost.<sup>11</sup> Although effort is not observed immediately, shirking is ultimately revealed to the principal at the end of the period. A single group operates in each county and the usual assumption is that deviators will be excluded from the group forever after. Since individuals operating independently receive a zero per-period payoff, the continuation payoff is set to zero. Collecting terms, the preceding inequality can be written as,

$$W(N, \lambda) \geq \frac{c}{\delta}.$$

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<sup>11</sup>Because  $N$  is a real number this is more correctly an infinitesimal number of deviators.

From condition C2, this inequality cannot be satisfied for  $\lambda \rightarrow 0$  even if the entire population joins the group. This implies that all individuals must operate independently. As  $\lambda$  increases, there will be a threshold  $\lambda^*$  satisfying the condition,

$$W(P, \lambda^*) = \frac{c}{\delta}.$$

It follows that the entire population will join the group for all  $\lambda \geq \lambda^*$ . This unrealistic result is obtained because the continuation payoff – set to zero – is independent of  $N$ . If cooperation can be sustained for a given group size  $N$ , it follows that it can be sustained for any group size larger than  $N$ . Thus, if cooperation can be sustained at all, the entire population will participate.<sup>12</sup>

Genicot and Ray (2003) face the same problem in their analysis of mutual insurance. If individual incomes are independent, then a larger network does a better job of smoothing risk, and absent other constraints the entire population should join the insurance arrangement. Genicot and Ray consequently turn to an alternative solution concept, the coalition-proof Nash equilibrium of Bernheim, Peleg, and Whinston (1987), to place bounds on the size of the group and we will do the same. An appealing and more realistic feature of this Nash equilibrium refinement in the context of collective arrangements is that it allows sub-groups rather than individuals to deviate. The continuation payoff is no longer constant because deviating sub-groups can form arrangements of their own and we will see that this pins down the maximum size that the group can attain.

The coalition-proof Nash equilibrium places two restrictions on deviating sub-groups: (i) only credible sub-groups, i.e. those that are stable in their own right, are permitted to pose a threat to the group. (ii) Only subsets of existing groups are permitted to deviate.<sup>13</sup> The condition for cooperation can now be described by the expression,

$$\frac{W(N, \lambda) - c}{1 - \delta} \geq W(N, \lambda) + \frac{\delta}{1 - \delta} [W(N', \lambda) - c],$$

where  $N'$  is the size of the deviating sub-group. The implicit assumption is that other principals are available as long as the sub-group is stable. Collecting terms, the preceding

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<sup>12</sup>We could generate a more realistic pattern of participation by introducing heterogeneity in the effort cost. Let  $c$  be distributed in the population such that  $c(N)$  is the cost of participation for the marginal participant, with  $c_N(N) > 0$ ,  $c_{NN}(N) > 0$ . If  $\lim_{N \rightarrow 0} c(N) > 0$ , the  $W(N, \lambda)$  curve will lie below the  $\frac{1-\delta}{\delta}c(N)$  curve for all  $N \leq P$  when  $\lambda$  is small from condition C2. As  $\lambda$  increases, the  $W(N, \lambda)$  curve will shift up. Because  $W(N, \lambda)$  is concave in  $N$  and  $c(N)$  is a convex function, there is a threshold  $\underline{\lambda}$  at which cooperation can just be supported (this is the point of tangency of the two curves). For  $\lambda > \underline{\lambda}$ , the  $W(N, \lambda)$  curve will intersect the  $\frac{1-\delta}{\delta}c(N)$  curve at two points, with the higher- $N$  point of intersection determining the maximum stable group size. As  $\lambda$  increases, this point of intersection will shift to the right. Although the entire population no longer participates for all  $\lambda \geq \underline{\lambda}$ , there will still be a discontinuous increase in the level of participation, from zero to  $N(\underline{\lambda})$ , at the threshold. This level discontinuity is inconsistent with Figure 2A and is rejected by the formal statistical tests that follow.

<sup>13</sup>Members of the deviating sub-group could, in principal, form a new coalition with individuals who were originally operating independently. Bernheim, Peleg, and Whinston justify the restriction they impose on the solution concept by arguing that asymmetric information about past deviations would prevent insiders and outsiders from joining together.

condition can be expressed as,

$$W(N, \lambda) - W(N', \lambda) \geq \frac{1 - \delta}{\delta} c.$$

The greatest threat to a group will be from a sub-group that is almost as large,  $N - N' \rightarrow 0$ . For analytical convenience assume that  $c$  is an infinitesimal number.<sup>14</sup> If  $c$  is of the same order as  $N - N'$ , the ratio  $\tilde{c} \equiv c/(N - N')$  will be a finite number. Dividing both sides of the preceding inequality by  $N - N'$ , the condition for cooperation is now obtained as,

$$W_N(N, \lambda) \geq \frac{1 - \delta}{\delta} \tilde{c}.$$

For a given  $\lambda$ , the left hand side of the inequality is *decreasing* in  $N$  since  $W_{NN}(N, \lambda) < 0$ . This implies that there is a *maximum* group size above which cooperation cannot be sustained for each  $\lambda$  (if cooperation can be sustained at all as discussed below). This also ensures that the deviating sub-group of size  $N'$  will be stable if the group of size  $N > N'$  is stable, as required by our solution concept.<sup>15</sup>

Genicot and Ray show that the set of stable insurance arrangements is bounded above once they allow for deviations by sub-groups. Our model, in which the group interacts with an external principal, generates stronger predictions that match Figure 2A.

**Proposition 1.** *Cooperation cannot be supported below a threshold level of social ties,  $\underline{\lambda}$ . Above that threshold, the maximum stable group size,  $N^*$ , is increasing in the strength of social ties,  $\lambda$ .*

To prove the first part of the proposition, we take advantage of condition C2, which implies that  $\lim_{\lambda \rightarrow 0} W_N(N, \lambda) = 0$ . Cooperation cannot be supported for small  $\lambda$ . As  $\lambda$  increases,  $W_{\lambda N}(N, \lambda) > 0$  implies that there will be a threshold  $\underline{\lambda}$  at which cooperation can be supported, but only for groups of infinitesimal size ( $N \rightarrow 0$ ). Above that threshold, since  $N^*$  is the largest group that can be supported in equilibrium for a given  $\lambda$ ,

$$W_N(N^*, \lambda) = \frac{1 - \delta}{\delta} \tilde{c}.$$

Applying the Implicit Function theorem,

$$\frac{dN^*}{d\lambda} = \frac{-W_{\lambda N}(N, \lambda)}{W_{NN}(N, \lambda)} > 0$$

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<sup>14</sup>This assumption, together with the assumption that  $N$  is a real number, allows us to differentiate the  $W$  function below. If we allowed  $c$  to be a finite number and  $N$  to be an integer, we would need to difference instead of differentiating, but it is straightforward to verify that the results that follow would be unchanged.

<sup>15</sup>Allowing sub-groups to deviate does not violate the assumption that only a single group can operate in a local area. If  $N - N' \rightarrow 0$ , an infinitesimal number of individuals will remain in the initial group and it follows from condition C1 that this group cannot be stable. What deviation does is to replace one principal with another (off the equilibrium path).

to complete the proof. Although Proposition 1 derives the relationship between  $N^*$  and  $\lambda$ , social ties are not directly observed by the econometrician. Social ties are associated with plantation size, the stability of the slave community, and the number of blacks in the local area, all of which should be increasing in the observed plantation share,  $S$ . Let social ties  $\lambda$  be a continuous and increasing function of  $S$ ,  $\lambda(S)$ . Proposition 1 can then be restated in terms of  $S$ : Cooperation cannot be sustained up to a threshold plantation share  $\underline{S}$ . Above that threshold, the largest stable group,  $N^*$ , is increasing in  $S$ .

Multiple equilibria evidently exist above the threshold once we characterize individual participation decisions as the solution to a noncooperative game. Apart from the equilibrium derived above, no one participates in another equilibrium.<sup>16</sup> We assume in the analysis that follows that blacks were able to solve the coordination problem and so collective mobilization in each local area is based on the maximum stable size  $N^*$  derived above. This, in turn, would have determined the level of political participation and the level of migration. The testable implication, which places additional structure on Figure 2A, is that political participation and migration should be uncorrelated with plantation share up to a threshold (not necessarily the same threshold) and increasing in plantation share thereafter.

Our model focuses on the internal forces that pin down the largest stable group size in a local area. A variant of this model that continues to be based on decentralized collective mobilization could focus instead on the interaction between blacks and whites. Consider a model that is especially relevant during Reconstruction in which blacks only mobilize when they expect to win (and elect their own leader) with sufficiently high probability. Because black population, and the share of blacks in the total population, is increasing in plantation share, this implies that blacks will not turn out to vote until a threshold plantation share, which is consistent with Figure 2A. However, this model also implies that there will be a discrete jump in voter turnout (sufficient to win the election) at that threshold. Our model tells us that there should be a slope discontinuity at the threshold instead, and formal tests reported below reject the level discontinuity that is implied by the alternative model.

With some effort, other models can be constructed to match Figure 2A. For example, introduce heterogeneity in the cost of participation and let  $c$  be distributed in the population such that  $c(N)$  is the cost for the marginal participant. Ignoring the commitment problem, for each  $\lambda$  there will now be a threshold cost  $c(\underline{N})$  below which individuals participate. This threshold is derived as the solution to a fixed point problem and satisfies the condition,  $W(\underline{N}, \lambda) - c(\underline{N}) = 0$ . If the  $W(N, \lambda)$  and  $c(N)$  functions are sufficiently flexible, this alternative model can generate a (continuous) relationship between  $\underline{N}$  and  $\lambda$  that closely matches

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<sup>16</sup>There are no other equilibria in this noncooperative game. In particular, a group smaller than the largest stable group is not an equilibrium because any individual operating independently would want to deviate and join it, making everyone better off without affecting its stability.



Figure 2A. However, this will require arbitrary and *ad hoc* functional form assumptions. One advantage of our model is that it is parsimonious, placing a small number of realistic restrictions on the  $W(N, \lambda)$  function. A second (related) advantage is that the model generates specific predictions – corresponding to the two parts of Proposition 1 – that can be readily tested.

### 3.3 An Additional Implication of the Model

The model generates predictions for variation in the *level* of political participation and migration across local areas with different plantation shares. It can be easily extended to generate predictions for the *distribution* of migrants across northern destinations. We now make the assumption that a constant number of individuals  $\theta$  migrates from each county without the support of a community network. Assume that the  $\theta$  individuals who migrate on their own are distributed evenly across  $M \geq 2$  destinations. Let  $N(S)$  be the largest stable group in a county with plantation share  $S$ . The  $N(S)$  individuals who move as a group form a network at a single destination. The Herfindahl-Hirschman Index, which is defined as the sum of the squared share of migrants across all destinations, can then be used to measure the concentration of migrants in the north. Below the threshold  $\underline{S}$ ,  $N(S) = 0$ . This implies that the Herfindahl-Hirschman Index,  $H(S) = M \left[ \frac{\theta/M}{\theta} \right]^2 = 1/M$ , is uncorrelated with plantation share. Above the threshold,

$$H(S) = \left[ \frac{\frac{\theta}{M} + N(S)}{\theta + N(S)} \right]^2 + (M - 1) \left[ \frac{\frac{\theta}{M}}{\theta + N(S)} \right]^2.$$

Differentiating this expression with respect to  $S$ ,

$$H_S(S) = \frac{2(M - 1)\frac{\theta}{M}N(S)N_S(S)}{[\theta + N(S)]^3} > 0,$$

since  $N_S(S) > 0$  for  $S \geq \underline{S}$  from Proposition 1. The specific nonlinear relationship between the level of migration and plantation share that we derived in Proposition 1 should apply to the distribution of migrants at the destination as well.<sup>17</sup>

Figure 2B describes migration to northern cities from counties in the state of Mississippi as a function of the plantation share. These data are constructed by merging Medicare records with social security records, as described below, allowing migrants from each Mississippi county during the Great Migration to be linked to northern destination cities.<sup>18</sup> Providing independent support for the relationship we uncovered in Figure 2A across all southern counties, there is no association between plantation share and the level of migration up to the same threshold as in that figure, after which a monotonic relationship begins.

<sup>17</sup>This result will be obtained even if the network channels its members to more than one destination as long as there is some degree of spatial clustering (that does not vary with plantation share).

<sup>18</sup>We are grateful to Dan Black, Seth Sanders, and Lowell Taylor for providing us with these data.

More importantly, the level of migration and the concentration of migrants in northern cities, measured by the Herfindahl-Hirschman Index (HHI), track very closely together in Figure 2B.

Variation in clustering could arise because migrants from some southern counties are endowed with attributes that are only suitable at a limited number of destinations. The fact that the number *and* the concentration of migrants track together, however, is less easy to explain without a role for networks. For this the migrants from counties with access to a limited number of northern destinations would need to have been endowed with a skill or attribute that allowed them to perform especially well at those urban destinations. This is unlikely to have been the case for the rural blacks who migrated. In our model, social ties determine the size of the largest stable network and, hence, the level of migration. Because the members of the network move as a group to the same destination, it follows that the number and the distribution of migrants will naturally track together. This also tells us that the *number* of migrants (and the number of voters) rather than the corresponding *share* of the population is the appropriate measure of collective mobilization when testing the theory.

### 3.4 Testing the Model

The model indicates that political participation and migration have no association with plantation share up to a threshold share and a positive relationship thereafter. If the location of the threshold were known it would be relatively straightforward to test this prediction. Because the model is silent about the precise location of the threshold, we estimate a series of piecewise linear regressions that allow for a slope change at different *assumed* thresholds. The pattern of coefficients that we estimate, with accompanying t-ratios, will locate our best estimate of the *true* threshold and formally test the specific nonlinearity implied by the model.

Ignoring the state fixed effects to simplify the discussion that follows, the piecewise linear regression that we estimate for each assumed threshold,  $S$ , is specified as

$$y_i = \beta_0 + \beta_1 S_i + \beta_2 D_i (S_i - S) + \beta_3 D_i + \epsilon_i \quad (1)$$

where  $y_i$  is political participation or migration in county  $i$ ,  $S_i$  is the plantation share in that county,  $D_i$  is a binary variable that takes the value one if  $S_i \geq S$ , and  $\epsilon_i$  is a mean-zero disturbance term.  $\beta_1$  is the baseline slope coefficient,  $\beta_2$  is the slope change coefficient, and  $\beta_3$  is the level change coefficient (measuring the level discontinuity at the threshold). We will estimate this regression for a large number of assumed shares, in increments of 0.001, over the range  $[0, 0.3]$ .

To derive the pattern of t-ratios we expect to obtain, we generated a data set that consists of two variables: the actual plantation share in our southern counties,  $S_i$ , and a hypothetical

outcome,  $\tilde{y}_i$ , that is constructed to be consistent with the model. The true threshold is specified to be 0.09. The value of the hypothetical outcome in each county is then obtained by setting  $\beta_0 = 670$ ,  $\beta_1 = 0$ ,  $\beta_2 = 7700$ ,  $\beta_3 = 0$ , and  $S = 0.09$  in equation (1) and then adding a mean-zero noise term. These parameter values are derived from a piece-wise linear regression of Republican votes in the 1872 presidential election on plantation share, with state fixed effects and the break at 0.09.<sup>19</sup> Notice that the baseline slope coefficient ( $\beta_1$ ) and the level change coefficient ( $\beta_3$ ) are set to zero, while the slope change coefficient is positive ( $\beta_2 > 0$ ) when generating the hypothetical outcome to be consistent with Proposition 1. To verify that the data we have generated match the model, we nonparametrically regress  $\tilde{y}_i$  on  $S_i$  in Figure 3A. All the nonparametric regressions in this paper are estimated with a narrow bandwidth. Despite the noise that we have added to the outcome, a slope change near the “true” threshold, 0.09, is clearly visible in the figure.

Having generated data that match the model, we next proceed to estimate equation (1) sequentially over a large number of assumed thresholds. The t-ratios for  $\beta_1$  and  $\beta_2$  are reported in Figure 3B for each of these assumed thresholds. The t-ratio for the baseline slope coefficient remains close to zero for all assumed thresholds below the true threshold and starts to increase thereafter. The t-ratio for the slope change coefficient starts close to zero, then increases steadily reaching a maximum well above two where the assumed threshold coincides with the true threshold, and then declines thereafter.

To understand why the t-ratios follow this pattern, return to Figure 3A and consider the piecewise linear regression line that would be drawn for an assumed threshold to the left of the true threshold. The best fit to the data at that assumed threshold sets  $\hat{\beta}_1 = \hat{\beta}_3 = 0$  and  $\hat{\beta}_2 > 0$ . This implies that the t-ratio on the baseline slope coefficient will be zero and the t-ratio on the slope-change coefficient will be positive. Now suppose we shifted the assumed threshold slightly to the right. It is evident that we would continue to have  $\hat{\beta}_1 = \hat{\beta}_3 = 0$  since there is no change in the slope to the left of the assumed threshold, but  $\hat{\beta}_2$  would increase and the regression line would do a better job of fitting the data to the right of the threshold. The t-ratio on the baseline slope coefficient would remain at zero, while the t-ratio on the slope-change coefficient would increase. This would continue as the assumed threshold shifted gradually to the right until it reached the true threshold.

Once the assumed threshold crosses to the right of the true threshold, the piecewise linear regression line that best fits the data will set  $\hat{\beta}_1 > 0$ . Although the magnitude of the baseline slope coefficient will increase as the assumed threshold shifts further to the right, the regression line will do an increasingly poor job of fitting the data to the left of the threshold.

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<sup>19</sup>We set the true threshold at 0.09 to be consistent with our best estimate of that threshold using the joint-test that will be discussed below. The variance of the mean-zero noise term in the simulation is set to match the variance of the residuals from this piece-wise linear regression.

This implies that the t-ratio on the baseline slope coefficient is not necessarily monotonically increasing to the right of the true threshold, although it must be positive. In practice, this t-ratio will increase monotonically with both political participation and migration.

To derive the corresponding change in the t-ratio for the slope change coefficient, recall that the hypothetical outcome increases linearly to the right of the true threshold. Once the level change coefficient is introduced, which must now be positive,  $\hat{\beta}_3 > 0$ , this implies that the regression line to the right of the assumed threshold will perfectly fit the data, except for the noise we have added to the outcome. This line maintains the same slope, and continues to precisely match the data, as the assumed threshold shifts further to the right. However, since the regression line to the left of the assumed threshold is growing steeper and is less precisely estimated as the assumed threshold shifts to the right, the *slope-change* coefficient and the t-ratio on that coefficient will unambiguously decline.

The preceding discussion and Figure 3B tell us what to expect when the data are consistent with the model. They also locate our best estimate of the true threshold. This will be the assumed threshold at which the t-ratio on the baseline coefficient starts to systematically increase *and* the t-ratio on the slope change coefficient reaches its maximum value.<sup>20</sup> For the outcomes that we consider, the t-ratio on the baseline coefficient does start to increase above zero at a plantation share close to the point where the t-ratio on the slope change coefficient reaches its maximum value. Given the noise in the data, however, these points do not always coincide. This motivates a joint-test of the model's predictions, which provides us with a single best estimate of the true threshold's location.<sup>21</sup>

Returning to equation (1), consider the following hypothesis:

$$H_0 : \beta_1 \neq 0 \text{ or } \beta_2 = 0$$

$$H_1 : \beta_1 = 0 \text{ and } \beta_2 \neq 0.$$

It follows that we will reject the null hypothesis if the data generating process is consistent with the model and the regression corresponding to equation (1) is estimated at the true threshold. The preceding discussion and Figure 3B tell us that we should be less likely to reject the null as the assumed threshold moves away from the true threshold.

Two problems arise when testing this hypothesis. First, any joint-test statistic that we construct will not have a single value under the null because its components, separated by the “or” statement, must be evaluated independently. Second, the parameter space under the null (specifically, the  $\beta_1 \neq 0$  component) must be bounded away from zero (the reason

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<sup>20</sup>We could alternatively have plotted the baseline and slope change coefficients instead, over the range of assumed thresholds. The advantage of the t-ratios is that they allow us to test and compare the model across multiple outcomes.

<sup>21</sup>We are grateful to Yuya Sasaki for his help in deriving the test.

for this will be apparent momentarily). We consequently consider the modified hypothesis:

$$H_0 : \beta_1 \geq |\epsilon h| \text{ and } \beta_2 = 0$$

$$H_1 : (i)\beta_1 < |\epsilon h| \text{ and } \beta_2 \neq 0, (ii)\beta_1 < |\epsilon h| \text{ and } \beta_2 = 0, (iii)\beta_1 \geq |\epsilon h| \text{ and } \beta_2 \neq 0,$$

where  $\epsilon$  is arbitrarily small and  $h$  is a scale parameter to be set by the econometrician.  $\hat{\beta}_1$  will be mechanically further away from zero when the outcome variable has a larger mean or variance. To make the joint-test comparable across outcomes, we thus set  $h$  to be the standard deviation of the outcome under consideration multiplied by a constant.

We will now reject the null hypothesis if the data generating process is consistent with (i) our model:  $\beta_1 < |\epsilon h|$  and  $\beta_2 \neq 0$ , (ii) a model in which the outcome is uncorrelated with plantation share:  $\beta_1 < |\epsilon h|$  and  $\beta_2 = 0$ , and (iii) a model in which the outcome is monotonically increasing in plantation share:  $\beta_1 \geq |\epsilon h|$  and  $\beta_2 \neq 0$ . Although the parameter space under the alternative hypothesis has now expanded, we will see momentarily that the joint test statistic that we construct is able to distinguish between competing models when the null is rejected. This statistic has the following form:

$$T(\beta) = \phi\left(\frac{\beta_1}{h}\right)\beta_2,$$

where  $\phi$  is a symmetric and continuous function that reaches its maximum value at zero and the  $h$  parameter once again ensures that deviations in  $\hat{\beta}_1$  away from zero are penalized consistently across outcomes. By the delta method,

$$\sqrt{n}\left(T(\hat{\beta}) - T(\beta)\right) \xrightarrow{d} N\left(0, DT(\beta)VD T(\beta)'\right)$$

where  $V = \begin{bmatrix} V_{\beta_1} & V_{\beta_1\beta_2} \\ V_{\beta_1\beta_2} & V_{\beta_2} \end{bmatrix}$  and  $DT(\beta) = \left[\frac{1}{h}\phi'\left(\frac{\beta_1}{h}\right)\beta_2 \quad \phi\left(\frac{\beta_1}{h}\right)\right]$ .

$T(\beta) = 0$ , under the null  $H_0$  because  $\beta_2 = 0$ . Substituting the expressions for  $V$  and  $DT(\beta)$ , under the null

$$\sqrt{n}T(\hat{\beta}) \xrightarrow{d} N\left(0, \left[\phi\left(\frac{\beta_1}{h}\right)\right]^2 V_{\beta_2}\right).$$

Dividing by the standard deviation and then squaring,

$$\frac{n\left[T(\hat{\beta})\right]^2}{\left[\phi\left(\frac{\beta_1}{h}\right)\right]^2 V_{\beta_2}} \xrightarrow{d} \chi_1^2.$$

Under the null,  $\beta_1$  has a range of values. We select the “least favorable” null,  $\beta_1 = |\epsilon h|$ , which minimizes the value of the preceding statistic.<sup>22</sup> If we do reject the null, this

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<sup>22</sup>Note that if  $\beta_1 \neq 0$  under  $H_0$ , then the “least favorable” null is not defined. When the null is bounded away from zero,  $\beta_1 \geq |\epsilon h|$ , the “least favorable” null is precisely  $\beta_1 = |\epsilon h|$ , where  $\epsilon$  can be arbitrarily small.

implies that we would reject the null for any  $\beta_1 \geq |\epsilon h|$ . Following standard practice when implementing the Wald test, we replace  $V_{\beta_2}$  with  $\hat{V}_{\beta_2}$ . Substituting the expression for  $T(\hat{\beta})$ , we arrive at the statistic that is used for the joint test of the model,

$$n \frac{[\phi(\frac{\hat{\beta}_1}{h})]^2}{[\phi(\epsilon)]^2} \frac{\hat{\beta}_2^2}{\hat{V}_{\beta_2}} \xrightarrow{d} \chi_1^2.$$

Because  $\epsilon$  can be arbitrarily small, we set  $\epsilon$  equal to zero when computing the joint-test statistic. We will reject the null hypothesis if this test statistic exceeds the critical value for the chi-squared distribution with one degree of freedom.

If the data generating process is consistent with the model,  $\hat{\beta}_1 = 0$  for all assumed thresholds to the left of the true threshold. However,  $\hat{\beta}_2$  is increasing as we shift closer to the true threshold *and* is more precisely estimated. This implies that our joint-test statistic will be increasing in magnitude as the assumed threshold moves closer to the true threshold. After reaching its maximum value at the true threshold, where we are most likely to reject the null, the statistic will drop rapidly to zero if the  $\phi$  function and the scale parameter,  $h$ , together place sufficient penalty on deviations in  $\hat{\beta}_1$  away from zero. Recall that  $\hat{\beta}_2$  is declining and less precisely estimated as the assumed threshold shifts further to the right of the true threshold, reinforcing this effect. In contrast, the (multiplicative) joint-test statistic that we have constructed will be zero when the data generating process is consistent with model (ii), and we will not reject the null hypothesis, since  $\beta_2 = 0$ . We will not reject the null under model (iii) either, if  $\beta_1$  is sufficiently large and the  $\phi$  function places sufficient penalty on deviations from zero. Our test statistic thus identifies a specific model, consistent with Proposition 1, when the null is rejected.<sup>23</sup>

Figure 3C reports the joint-test statistic across the entire range of assumed thresholds, in increments of 0.0001, with our simulated data. We use the density of the standard normal distribution to characterize the  $\phi$  function and set  $h$  equal to three-quarters of the standard deviation of the outcome under consideration, in the simulation exercise and in the analysis that follows.<sup>24</sup> The joint-test statistic is increasing in the assumed threshold in Figure 3C until it reaches its maximum value near the true threshold (0.09), declining steeply thereafter. The 95 percent critical value for the chi-squared distribution with one degree of freedom is 3.84, which implies that we can reject the null hypothesis at conventional levels for a range of assumed thresholds around the true threshold. We are nevertheless most likely to reject the null hypothesis where the joint-test statistic reaches its maximum value, and this will be our best estimate of the true threshold.

<sup>23</sup>In the empirical analysis that follows, we will consistently reject the null hypothesis for outcomes associated with black mobilization, where the data generating process based on the t-ratio test is consistent with (i). In contrast, we will not reject the null for other outcomes where the t-ratio test matches model (ii) or model (iii).

<sup>24</sup>The results are robust to alternative multipliers (0.5, 1.0).

## 4 Empirical Analysis

This section begins by providing empirical support for plantation share as a determinant of social ties. We subsequently document the response to political and economic opportunities in the postbellum South across counties with different plantation shares. This response is consistent with our model of decentralized collective mobilization. The empirical analysis concludes by verifying that alternative models can match some but not all the patterns observed in the data.

### 4.1 Social Ties

When deriving the implications of the model in terms of observed plantation share,  $S$ , we made the assumption that social ties,  $\lambda$ , are a continuous and increasing function of  $S$ . Social ties in the postbellum South would have been stronger where plantations were larger, where black population densities were larger, and where forced separation under slavery was less frequent. Although the black population in each county is available before and after Emancipation, its spatial distribution within the county is not observed. The black population density thus cannot be directly measured and data limitations also prevent us from measuring forced separation at the county level. The first step in the empirical analysis is to establish that our only directly observed measure of social ties – plantation size – is monotonically increasing in plantation share.

The 1860 population census provides the number of slaveholdings by size-category in each county.<sup>25</sup> A hypothetical ranking of all slaves in a county can then be constructed based on the size of the plantation to which they were assigned. Figure 4A nonparametrically regresses plantation size for the median slave, and the slave at the 25<sup>th</sup> and 75<sup>th</sup> percentile of the size distribution, on plantation share. As discussed, tobacco, cotton, rice, and sugarcane were grown on large plantations. Not surprisingly, the size of the slaveholding at each pre-specified percentile level is monotonically increasing in plantation share in the figure. Consistent with this observation, the t-ratio on the baseline slope coefficient is greater than two and increasing everywhere in Figure 4B for median plantation size. Figure 4C reports the corresponding joint-test statistic and we see that we cannot reject the null anywhere. This is evidently because the baseline slope coefficient  $\hat{\beta}_1$  is always significantly different from zero and the  $\phi$  function places sufficient penalty on deviations from zero.

We turn next to the 1870 census to estimate the relationship between the black population in the postbellum period shortly after Emancipation and the plantation share. The black population in each county is regressed on plantation share in Figure 4D. The accompanying

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<sup>25</sup>These categories are all integers up to 9, 10-14, 15-19, 20-29, 30-39, 40-49, 50-69, 70-99, 100-200, 200-300, and greater than 500.

t-ratio test is reported in Figure 4E and the joint-test in Figure 4F. As with plantation size, these tests indicate that black population is monotonically increasing in plantation share. Although information on the spatial distribution of the black population within the county is unavailable, preventing us from directly measuring population density, notice from Figure 4D that the area of the county in 1880 (the closest available census year with this information) is actually mildly *declining* in plantation share. Given that blacks would have tended to be *more* spatially concentrated in the high plantation-share counties, this observation provides indirect support for the assumption that black population density was monotonically increasing in plantation share.<sup>26</sup>

We implicitly assume that black population,  $P$ , is not a binding constraint when deriving the largest stable group,  $N^*$ , in the model. Suppose, instead, that blacks did not mobilize collectively and that they voted and migrated independently. Now the level of voting and migration would track with the black population if individuals voted and migrated with fixed probability. An alternative explanation for the patterns in Figure 2A would then be that the relationship between black population and plantation share exhibits the same nonlinearity. Figures 4D-4F rule out this explanation since they indicate that black population is monotonically increasing in plantation share. Political participation and migration are uncorrelated with plantation share up to a threshold despite the fact that the black population is increasing in plantation share everywhere. As discussed in Section 4, the alternative explanation based on independent individual decisions would also not explain why the level of migration and the distribution of migrants at the destination track together in Figure 2B.

## 4.2 Response to Political Opportunities

Black mobilization in a county during Reconstruction would have resulted in greater political participation in the population. Because blacks would have voted Republican at this time, our primary measure of political participation is the number of Republican votes in the county. This statistic is reported at three points in time in Figure 5A, for the 1872, 1880, and 1900 presidential elections. The pattern of votes in 1872, which is at the height of black political power, was reported earlier in Figure 2A. Although Southern Democrats started to take control and blacks were gradually disfranchised once Reconstruction ended in 1877, blacks continued to vote and to elect their own leaders, with less and less success, into the 1890s. As expected, the increase in Republican votes past the plantation share threshold is weaker in 1880 than in 1872. However, the specific nonlinearity associated with collective mobilization continues to be obtained. This contrasts with the pattern in 1900, by

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<sup>26</sup>Although we do not report the relationship between plantation share and the black population – to – county area ratio, given the limitations of this measure, results from the t-ratio test and the joint-test are similar to what we obtain with black population in Figures 4E and 4F.



which point in time blacks would have been completely disfranchised and where we see no relationship between the number of Republican votes and plantation share.

Figure 5B formally tests whether the nonlinear voting pattern we uncovered in Figure 5A in 1872 matches the model. The t-ratio on the baseline slope coefficient is close to zero up to the threshold plantation share in Figure 5A and increasing thereafter. The t-ratio on the slope change coefficient increases steadily up to that threshold, reaching a maximum value of four, and then declines thereafter. Figure 5C reports the joint-test statistic across the range of plantation shares. This statistic reaches its maximum value, well above the 95 percent critical value for the chi-squared distribution with one degree of freedom, close to the threshold in Figure 5A. It declines steeply, on both sides, away from our best estimate of the true threshold (around 0.09). These patterns match the model’s predictions and the simulations, based on a piecewise linear data generating process, in Figures 3B and 3C. This contrasts with what we observed for plantation size in Figures 4B and 4C and black population in Figures 4E and 4F.

We next proceed to establish the robustness of this result. Federal, state, and local elections are synchronized in the American political system and so the voter turnout across counties that we observe for presidential elections should also apply to local elections occurring at the same time, where the implications of the model may be more relevant. Figure 5D regresses Republican votes in gubernatorial and congressional elections (separately) on plantation share, uncovering the same pattern that we obtained with 1872 presidential elections.<sup>27</sup> Figure 5E reports t-ratios for gubernatorial elections, which once again match the model. The relationship between Republican votes and the plantation share is robust to the type of election and we expect that the same relationship would be obtained with state and local elections, although those data are unavailable.

While the robust nonlinear relationship between Republican votes and plantation share we have uncovered is indicative of black political mobilization above a threshold share, we do not have direct evidence that the increase in Republican votes was driven by black voters. White “carpetbaggers” from the North and white “scalawags” from the South also voted Republican in southern counties at this time. If the number of white Republican votes was correlated with plantation share, this could confound our interpretation of the results in Figure 5A. One observation from that figure that goes against this alternative explanation is that the number of Republican votes and plantation share were unrelated in 1900, by which time blacks were effectively disfranchised. To provide further support for our hypothesis, we take advantage of the fact that black mobilization should have generated an increase in

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<sup>27</sup>Republican votes in gubernatorial and congressional elections are available, by county, from ICPSR. Gubernatorial elections were held at four-year intervals but were not synchronized across states. Figure 5D is thus based on all gubernatorial elections held between 1871 and 1873. Data on congressional elections are obtained for 1872.

black leaders, to the extent that blacks wanted to elect members of their own race.

Foner (1993) provides a complete list of black officeholders during Reconstruction. Almost all of these officeholders were elected to positions in state government. We therefore construct two measures of leadership based on his data: whether a black state representative and whether a black state senator was elected from each county in this period. These measures are regressed nonparametrically on plantation share in Figure 6A. The probability that a black leader, especially a state representative, was elected from a county tracks closely with the pattern of Republican votes in 1872 and 1880, indicating that voting patterns in those years were indeed being driven by black voters. Figure 6B completes the analysis of black leadership by testing the nonlinear relationship with plantation share obtained for state representatives (who accounted for most black leaders) in Figure 6A. Matching Figures 5B and 5E, which test the corresponding relationship for Republican votes, the  $t$ -ratio for the baseline slope coefficient is zero up to the same threshold share and increasing thereafter. The  $t$ -ratio on the slope change coefficient increases up to that threshold, reaching a maximum above five, and then declines thereafter. Voting patterns and black leadership during Reconstruction match closely with our model of collective mobilization.

The county covers a large area. Given the high transportation and communication costs at the time, it is unlikely that the residents of an entire county were able to work together to support a political leader. As described in Section 2, community life in the postbellum period was centered on the church and not surprisingly African-American churches played an important political role during Reconstruction (Frazier 1964, Dvorak 1988). African-American politicians were disproportionately drawn from the clergy and church congregations worked together to support local leaders (Woodson 1921, Foner 1988). If the county was divided into smaller spatial units within which a single group could form as in the model, then the level of collective mobilization can be conveniently measured by the (maximum) size of the church congregation that could be supported in equilibrium. The level of collective mobilization in each local area would then map into the level of mobilization in the county as a whole as described above, up to a positive constant.<sup>28</sup>

While slaves worshipped in multiracial churches for the most part, they did appear to have some autonomy in the choice of denomination and most chose to be either Baptist or Methodist (Woodson 1921, Boles 1988, Genovese 1974). When southern blacks were forming their own congregations after Emancipation, they could remain part of the mainstream Baptist and Methodist denominations they belonged to as slaves, or they could affiliate with exclusively African-American sub-denominations, that spread throughout the South after

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<sup>28</sup>Suppose that each county is divided into  $L$  local areas. Our estimates of church congregation-size provide a measure of the level of collective mobilization that can be supported in each area. Multiplying congregation-size at each plantation share by  $L$  times an appropriate constant, it is evident that mobilization at the local and county level will display the same nonlinear pattern.

the Civil War. Some of these sub-denominations, such as the African Methodist Episcopalian (AME) Church and the African Methodist Episcopalian Zion (AMEZ) Church, were established by freed blacks in northern cities at the beginning of the nineteenth century (Du Bois 1908). Black Baptist sub-denominations coalesced much later (Frazier 1964).

The Census of Religious Bodies (CRB) provides information on churches in each county, by denomination, at roughly ten-year intervals from 1860 onwards.<sup>29</sup> We measure average congregation size in each denomination by the ratio of church members to the number of churches. The 1890 census round is the only round in the postbellum period that provides information separately for exclusively African-American sub-denominations within the Baptist and Methodist churches. The advantage of having this information is that the average congregation-size we compute for them will be based entirely on black congregations. Southern whites, like southern blacks, were most often Baptist or Methodist (Kolchin 1993). The average congregation-size that we compute for the Baptists and the Methodists as a whole will thus be based on black as well as white congregations. For this reason, the analysis of congregation-size that follows will be restricted to the 1890 census and will separately consider Baptists and Methodists, African-American sub-denominations among the Baptists and Methodists, and other non-Black denominations such as the Presbyterians, Episcopalians, and Catholics.<sup>30</sup>

Figure 7A nonparameterically regresses average congregation size in each set of denominations described above on plantation share. The pattern for the Baptists and Methodists and for the African-American sub-denominations matches the corresponding pattern for black political participation and leadership that we obtained earlier: average congregation size is roughly unchanged up to a threshold share and increasing in plantation share thereafter. Notice that the increase in congregation size is greater for the African-American sub-denominations than for Baptists and Methodists as a whole. This implies that the results are not being driven by variation in the size of white congregations across counties. Consistent with this interpretation, no particular relationship between congregation size and plantation share is observed for other (non-black) denominations. Figure 7B formally tests whether the nonlinear pattern observed in Figure 7A for the Baptists and the Methodists is consistent with our model of collective mobilization. The t-ratios for the baseline slope and slope change coefficients display the familiar pattern and the same result is obtained with the African-American sub-denominations in Figure 7C, except that the coefficient on

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<sup>29</sup>The CRB was conducted as part of the population census from 1860 to 1890, with census enumerators collecting information from individual churches in each county. Subsequently, the U.S. Bureau of the Census conducted the CRB separately from the population census in ten-year intervals from 1906 to 1936.

<sup>30</sup>The African-American sub-denominations included in the 1890 CRB are Regular Baptist (colored), African Methodist Episcopal, African Methodist Episcopalian Zion, Colored Methodist Episcopalian, and Colored Cumberland Presbyterian. Among these sub-denominations, only the Cumberland Presbyterians, who had a small following, fell outside the umbrella of the Baptists and the Methodists.

the slope change variable is slightly less precisely estimated. Figure 7D reports the joint-test for the African-American sub-denominations. The joint-test statistic increases steeply in the assumed threshold until it reaches its maximum value and declines steeply thereafter, closely matching what we obtained for Republican votes in Figure 5C. Although we cannot reject the null hypothesis at conventional levels, our best estimate of the true threshold is close to what we obtained earlier for voting and black leadership. The analysis of church size thus provides micro-foundations, based on collective mobilization at a more local level, for variation in political participation and black leadership across counties.

Table 1 completes the analysis of political mobilization by reporting regression results at our best estimate of the true threshold (from the joint-test). Plantation size is the dependent variable in Column 1 and black population in 1870 is the dependent variable in Column 2. We see that the baseline slope coefficient and the slope change coefficient are significant with both outcomes. In contrast, the baseline slope coefficient is insignificant in Columns 3-8 for all political outcomes and for church size. The slope change coefficient is large and precisely estimated in Columns 3-8, although it fails to achieve statistical significance at conventional levels for church size.<sup>31</sup> Notice also that the level change coefficient, estimated at the threshold, is always insignificant. This result will be useful below when ruling out alternative explanations.

### 4.3 Response to Economic Opportunities

We begin by examining the relationship between the level of migration and plantation share across southern counties. The population census provides the state but not the county of birth. We cannot, therefore, use the birth-location of blacks residing in northern counties in 1920 and 1930 to measure the level of migration from each southern county. What we do instead is to indirectly measure migration at the onset of the Great Migration by the change in black population in southern counties from 1910 to 1920,  $P_{1910} - P_{1920}$ . The corresponding statistic over the duration of the Great Migration is the change from 1910 to 1930,  $P_{1910} - P_{1930}$ . Population changes could arise due to migration or because births and deaths do not balance. To account for natural changes in the population due to excess fertility or mortality, we construct double-differenced measures of migration:  $(P_{1910} - P_{1920}) - (P_{1900} - P_{1910})$  and  $(P_{1910} - P_{1930}) - (P_{1890} - P_{1910})$ . The implicit assumption when constructing the short (long) double-difference is that natural population change is stable over a twenty (forty) year period.

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<sup>31</sup>Recall that the t-ratio of the slope change coefficient exceeded two in Figure 7B, with all Baptist and Methodist churches, and just missed significance in Figure 7C, once the analysis was restricted to African-American sub-denominations. The slope change coefficients in Columns 7-8 are less precisely estimated because the regressions in Table 1 are estimated at the threshold obtained from the joint-test, which does not exactly coincide with the assumed threshold at which the slope change coefficient reaches its maximum value.

Figure 8A nonparametrically regresses the change in population,  $P_{1910} - P_{1920}$  and  $P_{1900} - P_{1910}$ , separately for black and whites, on plantation share.  $P_{1900} - P_{1910}$  for blacks is negative everywhere and mildly declining in plantation share. This implies that the black population was increasing on net throughout the South prior to the Great Migration, which commenced in 1916, particularly in counties with large plantation shares. This pattern is reversed in the subsequent decade. There is no population change up to a threshold plantation share and a large *decline* in the population thereafter, which we attribute to migration. In contrast, population change for the whites is stable over the two decades, providing a useful benchmark for the results we obtain for the blacks.

Figure 8B adjusts for natural population change by nonparametrically regressing the short double-difference,  $(P_{1910} - P_{1920}) - (P_{1900} - P_{1910})$ , and the long double-difference,  $(P_{1910} - P_{1930}) - (P_{1890} - P_{1910})$ , on plantation share. The regression with the long double-difference was reported earlier in Figure 2A and we see that the same pattern is obtained with the short double-difference. Our measure of black migration is uncorrelated with plantation share up to a threshold and increasing steeply in plantation share thereafter. This contrasts with white migration (not reported), where no discernable relationship with plantation share is obtained. Figures 8C and 8D formally test the nonlinear migration patterns for the short double-difference and the long double-difference, respectively. The t-ratios for the baseline slope coefficient and the slope change coefficient are consistent with the model for both the short double-difference and the long double-difference. Figure 8E reports the joint-test statistic for the long double-difference. As with voting and church size, this statistic spikes close to the point where the baseline coefficient starts to increase away from zero and the slope change coefficient reaches its maximum value. The maximum value of the joint-test statistic exceeds the 95 percent critical value for the chi-squared distribution with one degree of freedom, providing further support for the model.

Although it does account for natural population change, the double-differenced statistic is still an indirect measure of migration. To verify the robustness of the results in Figure 8 we consequently utilize newly available data from the state of Mississippi that link southern counties to northern destinations. These data include the zip code of residence of all recipients of Medicare Part B between 1976 and 2001. The Medicare records, which are reliably available from the 1905 birth-cohort onward, were merged with social security records (the Numident file), which include the town of birth. Under the assumption that individuals remained in the city (MSA) to which they moved, we can compute the number of migrants and the distribution of migrants across northern cities, by race, for each Mississippi county. These statistics are computed for individuals born between 1905 and 1925 because these are the individuals most likely to have migrated between 1910 and 1930, either as young adults or as children with their parents. While the large number of cohorts allows us to

measure migration from each southern county with precision, this also implies that some individuals who moved after the Great Migration will be included in these cohorts. This will not qualitatively change the analysis that follows, because southern counties that channeled their members to particular northern destinations during the Great Migration would have continued to do so thereafter.

Figure 9A nonparametrically regresses the short and long double-difference statistics that we use to indirectly measure migration, and a direct measure based on the 1905-1925 birth cohorts, on plantation share across Mississippi counties.<sup>32</sup> Reassuringly, these measures of migration track closely together and, moreover, match the pattern that was obtained across all southern counties. Although not reported, this pattern is obtained across Mississippi counties for Republican votes in 1872, the probability that a state representative was elected, and church congregation size (Baptist and Methodist as well as African-American sub-denominations). Figure 9B reports nonparametric regressions with the number of migrants and the distribution of migrants, measured by the Herfindahl-Hirschman Index. As observed in Figure 2B, both statistics for blacks are uncorrelated with plantation share up to the same threshold and increasing in plantation share thereafter. In contrast, the number and the distribution of white migrants is uncorrelated with plantation share. The specific nonlinearity we have uncovered appears consistently across multiple outcomes associated with black mobilization. Notice that it is not obtained with other outcomes such as church size in non-black denominations and white migration.

#### 4.4 Alternative Explanations

The analysis concludes by examining two alternative models in which social ties are irrelevant and assesses their ability to match the results presented above. The first alternative assumes that an external agency organizes political participation during Reconstruction and the movement north during the Great Migration. The second alternative drops the collective aspect and assumes that individuals participate and receive benefits independently, but adds heterogeneity to the cost of participation. These two models cover the major explanations for variation in political participation and migration across counties that have appeared in the literature.

Consider a model of centralized mobilization in which an external agency solves the commitment problem and organizes the residents of the county. Depending on the context, this agency could be the Republican party or a northern labor recruiter. The value to the agency  $V(N)$  is an increasing function of the number of individuals,  $N$ , that it can mobilize.

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<sup>32</sup>All the nonparametric regressions up to this point in the analysis have included state fixed effects. Since we are now focussing on a single state, the two-step procedure used to partial out the state fixed effects is no longer required.

It is reasonable to assume that  $N$  is an increasing function of the black population of the county, which, in turn, is increasing in the plantation share  $S$  in our data.  $N$  is thus an increasing function of  $S$ ,  $N(S)$ . The alternative model can thus explain the increase in Republican votes and migration to the right of a plantation share threshold, simply because there is a larger black population to draw from. To explain the absence of such a relationship to the left of the threshold, we introduce a fixed cost  $k$ . The external agency will only enter counties where it expects to mobilize a sufficiently large number of individuals. Because  $V$  is increasing in  $N$ , and  $N$  is increasing in  $S$ , there exists a threshold  $\underline{S}$  below which there is no entry.<sup>33</sup>  $N$  is constant (zero) to the left of  $\underline{S}$  and increasing in  $S$  to the right of  $\underline{S}$ . This alternative model has many features in common with our model of *decentralized* collective mobilization. What distinguishes the alternative model from our model is a level discontinuity at the threshold (a discrete jump to  $N(\underline{S})$ ) which is needed to just offset the fixed cost and which is not implied by our model. We do not observe a discrete jump at the threshold in any of the figures presented in this paper. What we observe instead is a change in the slope at the threshold. Formal tests of the model at our best estimate of the true threshold, reported in Table 1, are also consistent with this observation. We will see momentarily that the level change coefficient estimated at the threshold is insignificant with migration as well.

The second alternative model that we consider assumes that individuals vote and migrate in response to external forces that vary across counties. For example, three push factors that have featured prominently in the literature on the Great Migration are the arrival of the railroad, racial intimidation and violence, and the boll weevil invasion in cotton-growing counties. A well documented feature of the Great Migration is positive selection on education (eg. Lieberman 1978, Margo 1990, Tolmay 1998). Although education does not play a role in our model it could easily be incorporated by allowing educated individuals to get jobs at the destination without the support of a network. Positive selection on education can then be generated under reasonable conditions (as long as the network is not too strong). It is entirely possible that the strength of these push factors and other factors that determined the response to new opportunities in the postbellum period varied with plantation share. To allow for this possibility, let the individual's cost of political participation or migration consist of a county-level component  $c(S)$  and an (additive) idiosyncratic component  $\epsilon$ . Let the distribution of  $\epsilon$  be characterized by the function  $F$ , and denote the benefit from these activities by  $W$ . Both costs,  $c(S) + \epsilon$ , and benefits,  $W$ , will vary with the type of activity (political participation or migration). An individual will participate in a given activity if  $W - c(S) - \epsilon \geq 0$ , which implies that a fraction  $F(W - c(S))$  of the county participates.

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<sup>33</sup>This threshold must satisfy the condition  $V(N(\underline{S})) = k$ .  $V(N(S)) < k$  for  $S < \underline{S}$  since  $V_S(N(S)) > 0$  and so there is no entry below the threshold.

Denote the black population of the county by the function  $P(S)$ . It follows that the overall response,

$$N(S) = F(W - c(S))P(S).$$

We saw earlier that black population  $P(S)$  was a monotonically increasing function of the plantation share. For  $N(S)$  to be unchanged below a threshold plantation share, as observed for the political variables and migration, the first term on the right hand side of the preceding equation must just offset changes in the black population to the left of the threshold. It is highly unlikely that this condition will be (coincidentally) satisfied.

Figure 10A nonparametrically regresses the number of miles of railroad in 1911 divided by the area of the county (available in 1880) on plantation share.<sup>34</sup> Access to railroads is essentially uncorrelated with plantation share. Figure 10B regresses the number of black lynchings in each southern county between 1882 and 1915 (just before the onset of the Great Migration) on plantation share. Very few lynchings are actually reported in this period, and although the data are quite noisy, no apparent trend is once again detectable. The boll weevil invasion commenced in the cotton south around 1890, so Figure 10C regresses the percentage change in cotton acreage from 1890 to 1920, as well as the corresponding change from 1910 to 1920 at the onset of the Great Migration, on plantation share.<sup>35</sup> There was indeed a massive decline in cotton acreage from 1890 to 1920 and, somewhat surprisingly, a small increase from 1910 to 1920. Leaving aside the sharp change close to zero plantation share, however, there is little variation in these changes with the plantation share. Finally, Figure 10D regresses literacy in 1910, by race, on plantation share. The ability to mobilize collectively would have allowed blacks in counties above the threshold plantation share to set up schools more easily. At the same time, the returns to education might well have been lower in those counties, since agricultural labor was the dominant occupation. What we find is that black literacy is declining mildly in plantation share, while the pattern for white literacy is reversed.

Table 2 tests the significance of the relationship between the push factors we have considered and plantation share. We begin in Columns 1-2 with the short and long double-difference migration measures as the dependents variables. The piecewise linear regression is estimated with the threshold set at the best estimate from the corresponding joint-test. As with the political outcomes, the baseline slope coefficient is small and insignificant, while the slope change coefficient is large and precisely estimated. The level change coefficient at

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<sup>34</sup>We are grateful to Jeremy Atack and Bob Margo for providing us with these data.

<sup>35</sup>We are interested in measures that are associated with the individual's probability of migration. Assuming that the alternatives to cotton had lower labor intensities, the percentage change in the cotton acreage measures the change in the probability of employment, which, in turn, would have determined migration. An alternative measure, based on the percentage change in cotton production, generates similar results (not reported).



the threshold is once again insignificant. Because the push factors we consider are supposed to provide an alternative explanation for the patterns of migration we uncover, Columns 3-7 regress our measures of these push factors on plantation share, with the threshold set to coincide with our best estimate of the threshold for migration (the long double-difference). As discussed, these push factors would need to offset the increase in black population to explain the absence of variation in migration below the threshold. What we see instead is that the baseline slope coefficient, the slope change coefficient, and the level change coefficient are all insignificant in Columns 3-7. The same absence of significance is obtained (not reported) using the best estimate of the threshold from the joint-test for each push factor. Moreover, as shown in Appendix Figure A4, the joint-test does not locate a statistically significant interior maximum with any of these alternative explanations. The same pattern is observed for outcomes such as Republican votes in 1900, church size in other denominations, and white migration, that are not associated with black mobilization.

It is possible that our measures do not fully capture the push factors that were relevant during the Great Migration. It is also possible that white landowners selected particular types of slaves in the high plantation share counties or that subsequent sorting after Emancipation generated differences in the ability distribution across counties. An alternative explanation based on independent individual actions would need to explain political mobilization many decades earlier. All of the push factors that we consider, for example, would not apply to political participation during Reconstruction.<sup>36</sup> More importantly, external forces that increased the propensity of individuals to migrate (independently) in some counties would not necessarily channel them to a restricted number of destinations. The observation in Figure 9B (and Figure 2B) that the level of migration and the concentration of migrants across destinations track closely together is difficult to explain without a model of collective mobilization.<sup>37</sup>

## 5 Conclusion

The development process has historically been characterized, and continues to be characterized, by the movement of entire groups across space and occupations (Munshi 2011). The analysis in this paper highlights the interaction between historical preconditions and new opportunities in shaping such mobilization. Despite the adverse circumstances that they

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<sup>36</sup>The boll weevil invasion and the arrival of the railroad occurred after Reconstruction. Although blacks were quick to invest in education after Emancipation, slaves were largely illiterate (Du Bois 1908). We would thus expect little variation in black (adult) literacy rates across southern counties in 1872. Because the South was under Federal rule at that time, we would expect racial violence and intimidation to have been less relevant as well.

<sup>37</sup>This result could also be obtained with a model of centralized mobilization in which an external agency organized the movement of blacks from southern counties above a plantation share threshold. The absence of a level discontinuity at the threshold allowed us to rule out this alternative explanation above.

faced under slavery, blacks were able to solve the coordination problem and respond to new political and economic opportunities when they became available in the postbellum period. It is worth emphasizing, however, that the collective response we uncover is restricted to southern counties where specific preconditions, determined by the organization of agricultural production under slavery and thereafter, were satisfied. Over 50 percent of southern counties and one-third of the black population were situated below the threshold at which collective mobilization could be supported (at a plantation share around 0.09).

Black migrants from counties below the threshold would have moved to northern cities with relatively little social support. Blacks from counties above the threshold would have moved in large groups to a small number of northern destinations. This variation in the pattern of out-migration would have had consequences for the formation and evolution of black communities in northern cities. Relatively weak communities would have formed in destinations that received migrants who moved independently from diverse origin locations. In contrast, the small number of northern destinations that received the bulk of their migrants from southern counties above the threshold would have formed more cohesive communities. This variation in initial conditions would, in turn, have shaped the evolution of African-American communities over the course of the twentieth century.

Differential out-migration could also have had consequences for the evolution of black communities in southern counties. Given the well documented positive selection on education among northern migrants, counties above the threshold would have lost the bulk of their most able residents over the first half of the twentieth century. The resulting social dislocation could then explain Putnam's observation that those counties have relatively low social capital today. Wilson (1987) famously argued that the exit of educated black professionals from northern neighborhoods after Civil Rights and desegregation resulted in social dislocation and the concentration of poverty in inner-cities. A similar dynamic process may well have occurred in certain southern counties at the beginning of the twentieth century, paradoxically because they were better positioned to support collective migration. Slavery did have long-term effects on individual and institutional outcomes, but this worked through channels that have previously been unexplored and which we will examine in future research.

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Figure 1: Cropping Patterns Across Southern Counties in 1890

Weighted Fraction of Land  
Allocated to Plantation Crops

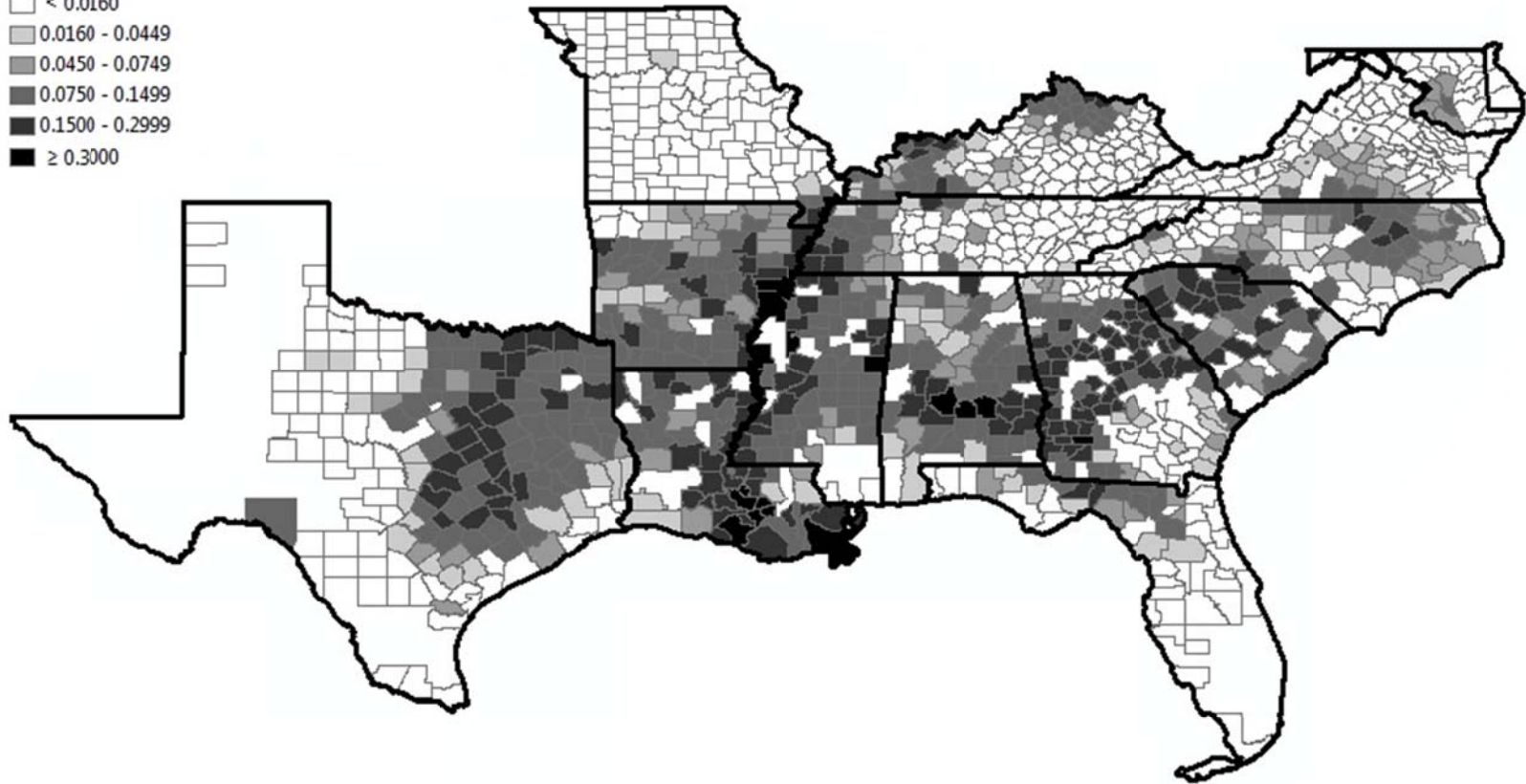
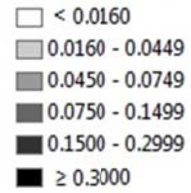
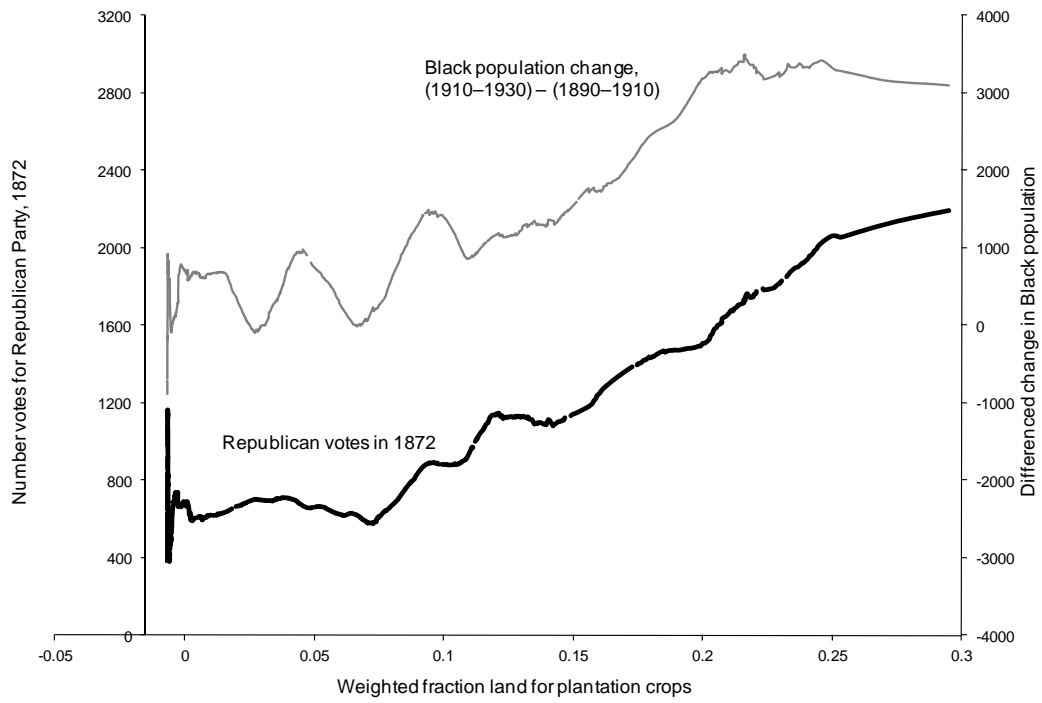


Figure 2: Response to Political and Economic Opportunities

A. Black Population Change and Republican Votes in 1872



B. Migration and Concentration in the destination for Blacks in Mississippi

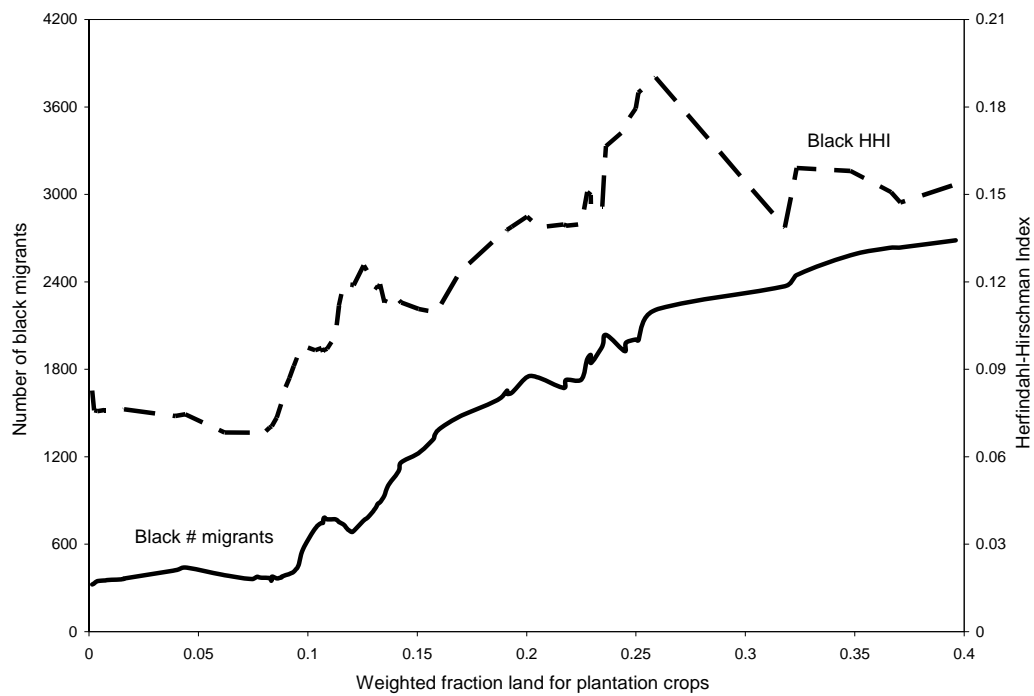
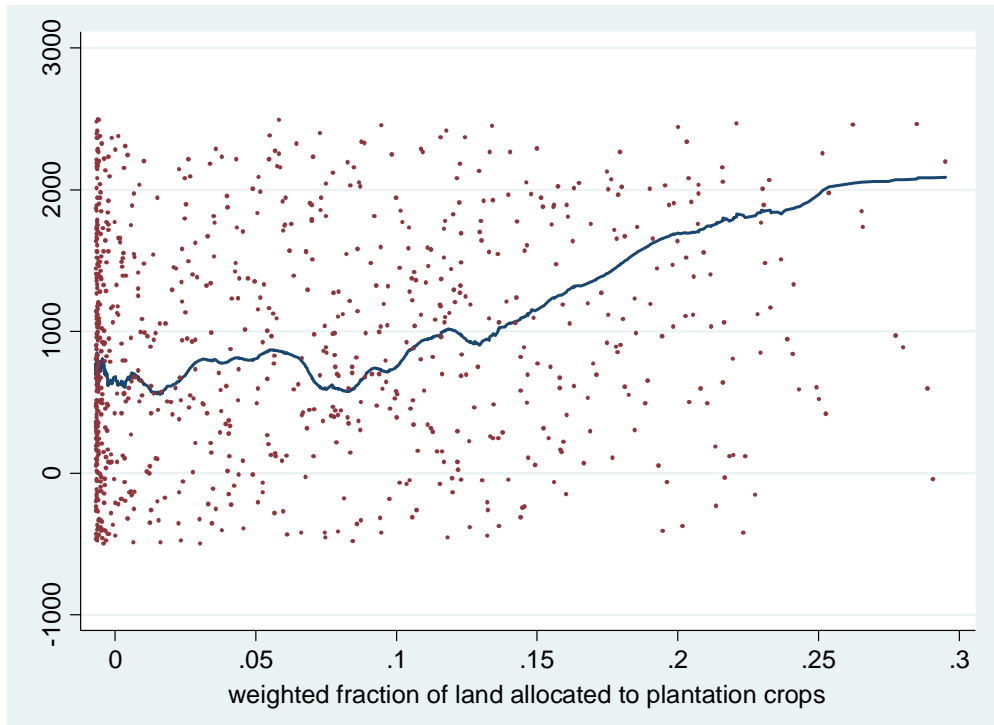


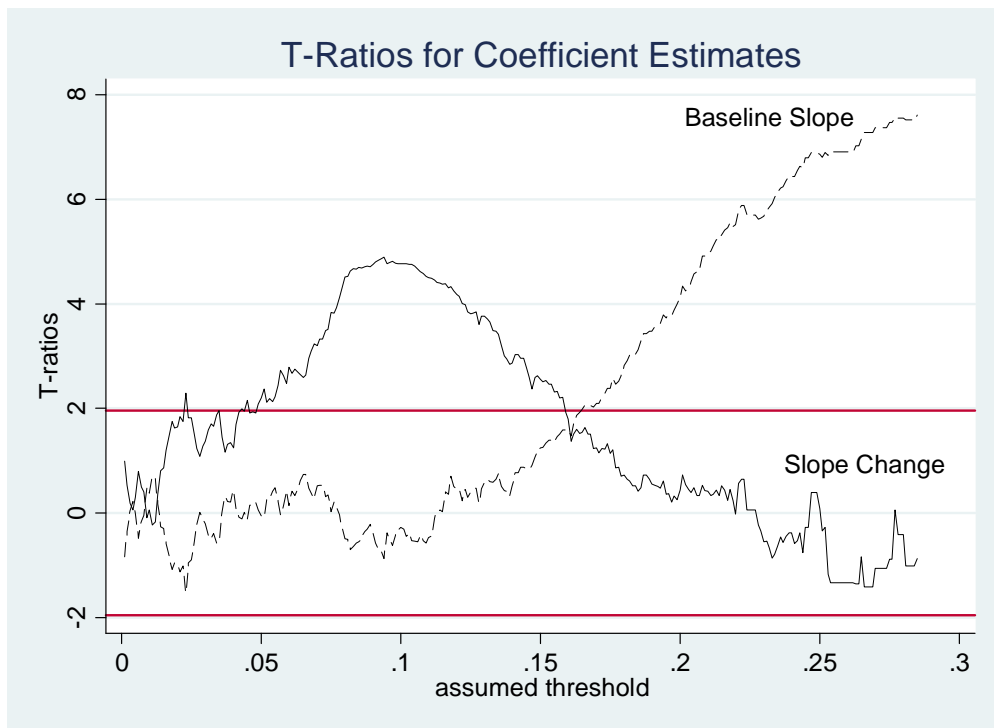


Figure 3: Model Simulation

A. Relationship between hypothetical outcome and plantation share



B. T-ratios



### C. Joint-Test Statistic

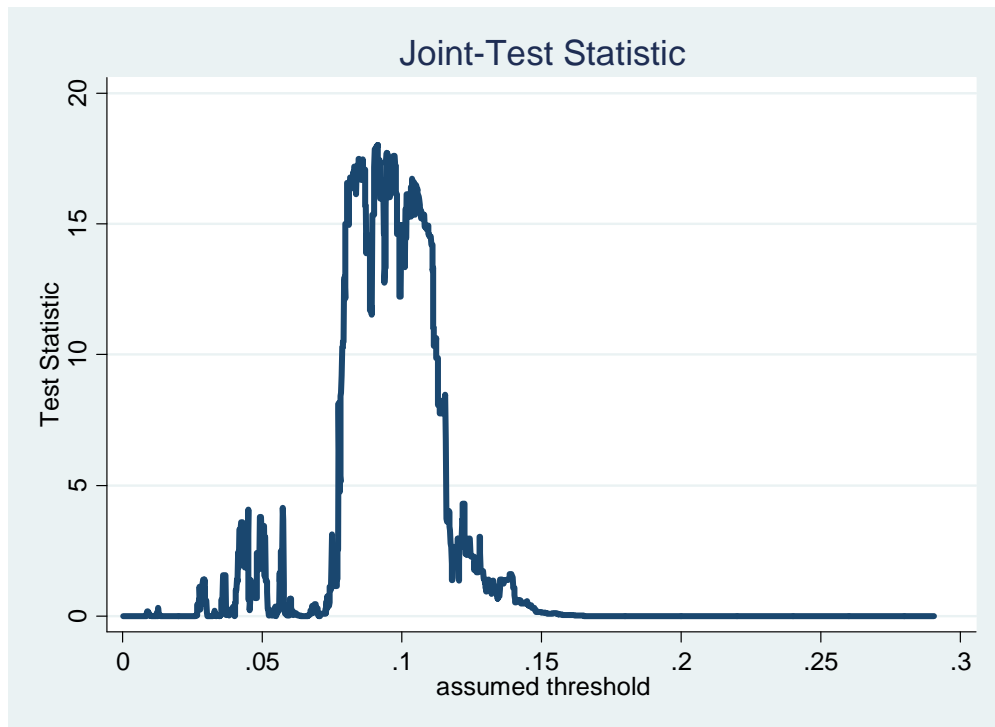
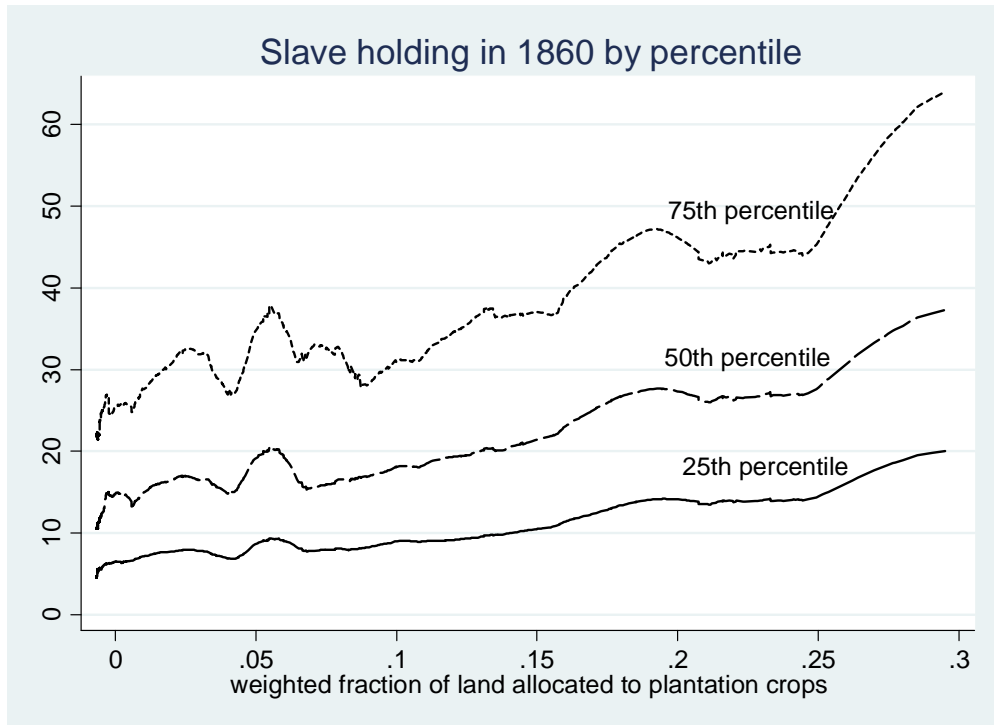
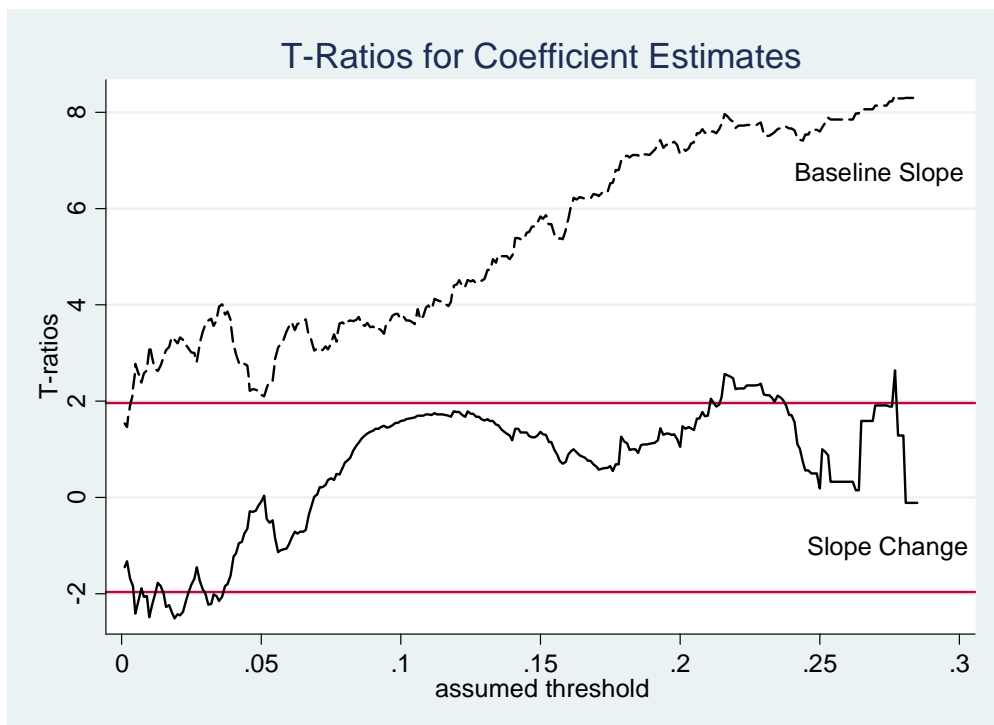


Figure 4: Measures of Social Ties

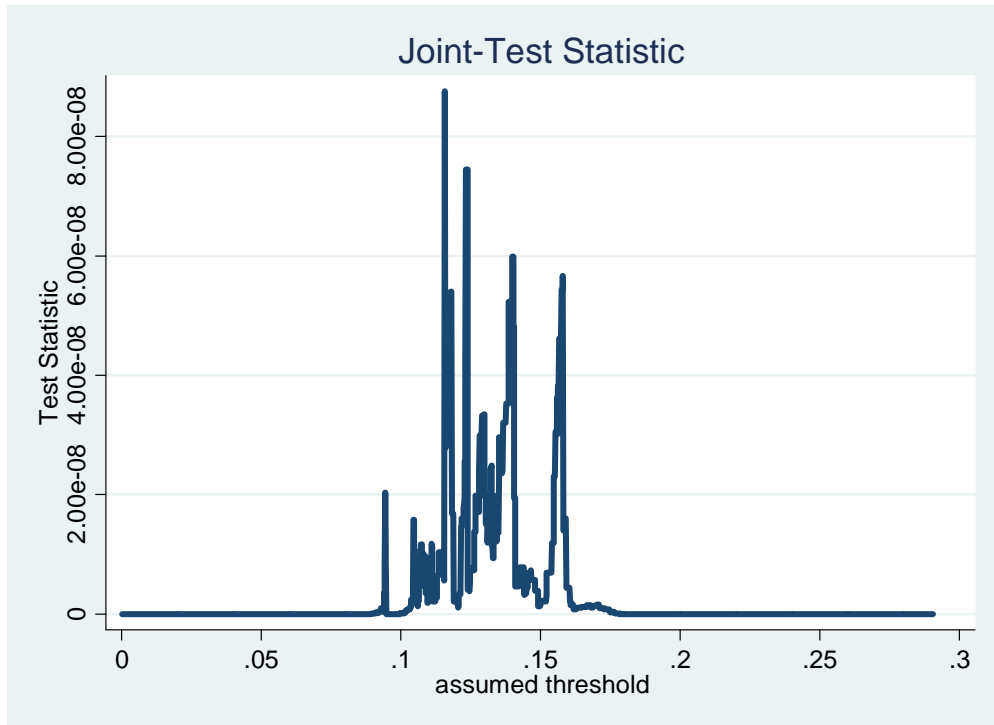
A. Slave holdings in 1860



B. T-ratios for Median Slave Holdings



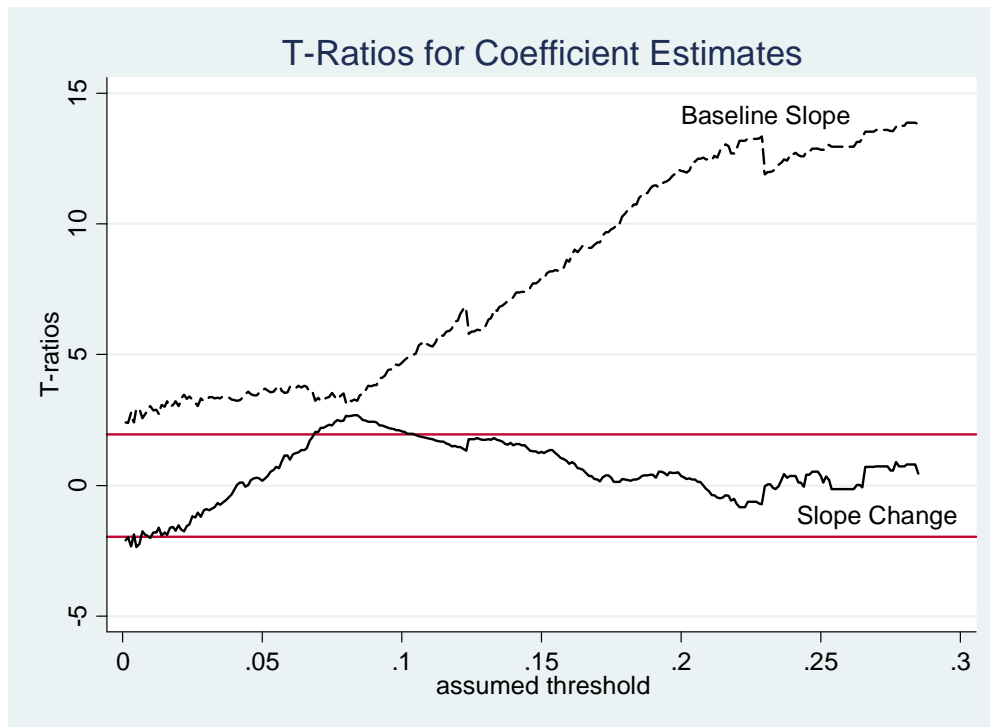
### C. Joint-Test for Median Slave Holdings



### D. Black Population and County Area



E. T-ratios for Black Population in 1870



F. Joint-Test Statistic for Black Population in 1870

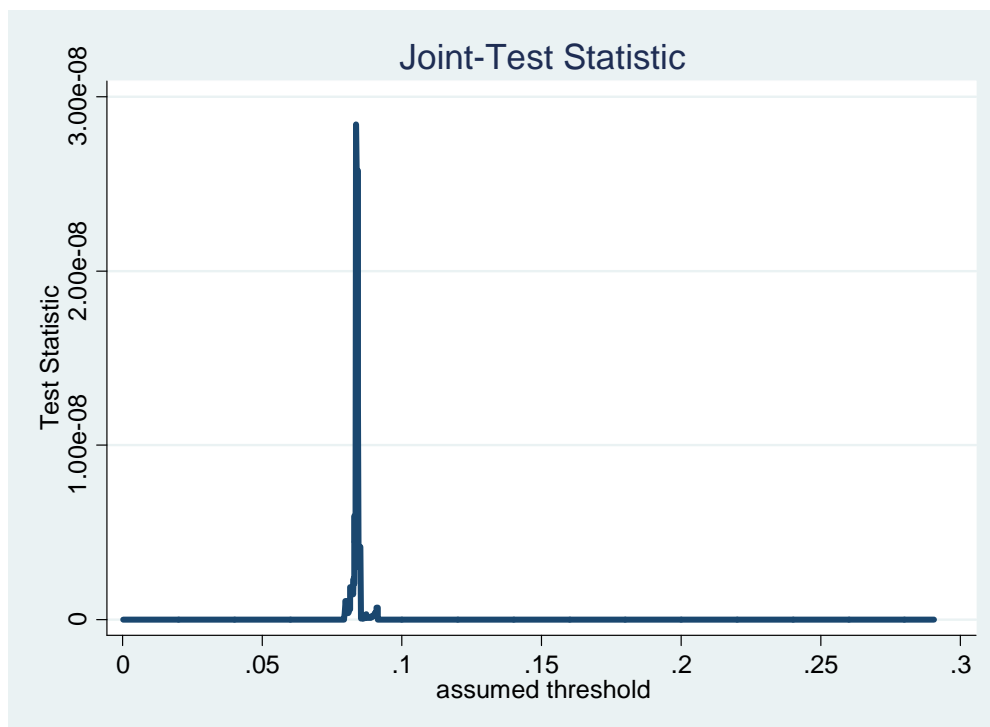
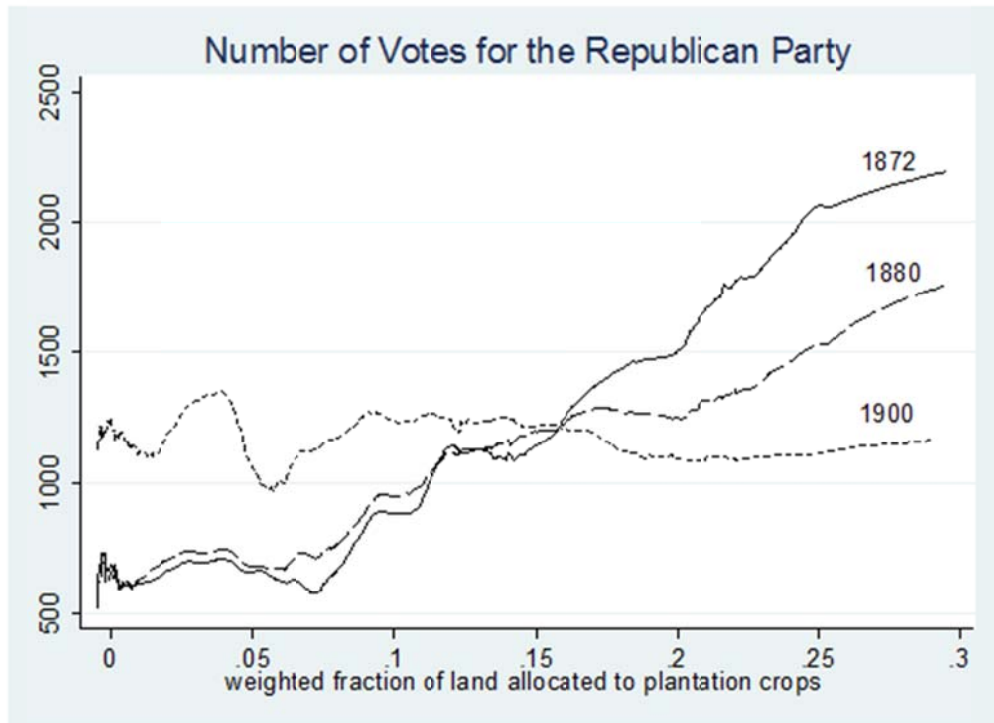
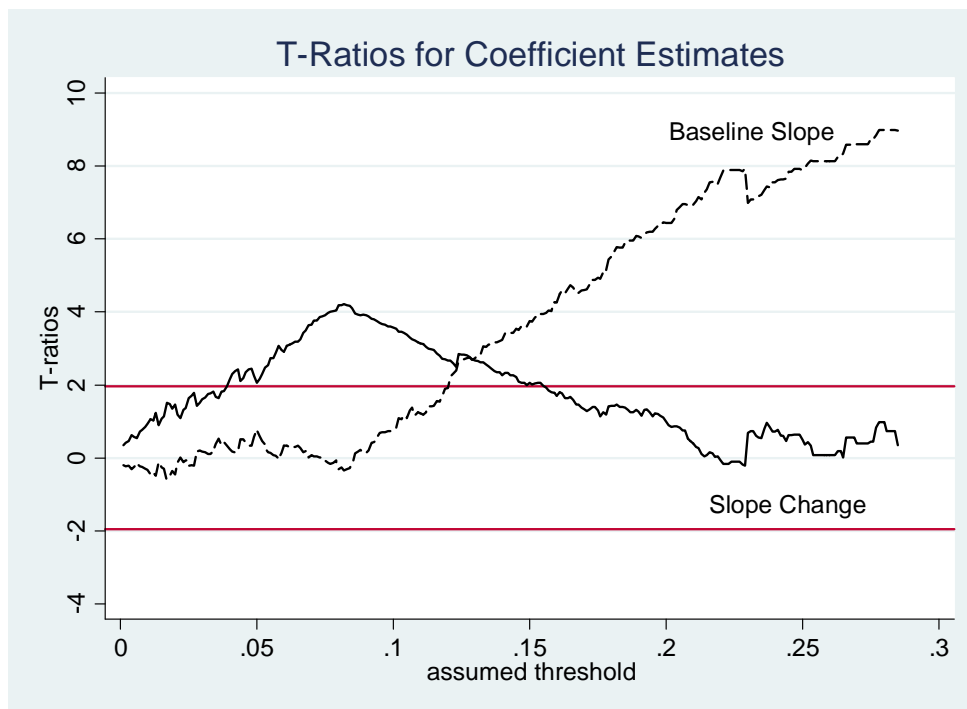


Figure 5: Voting Patterns

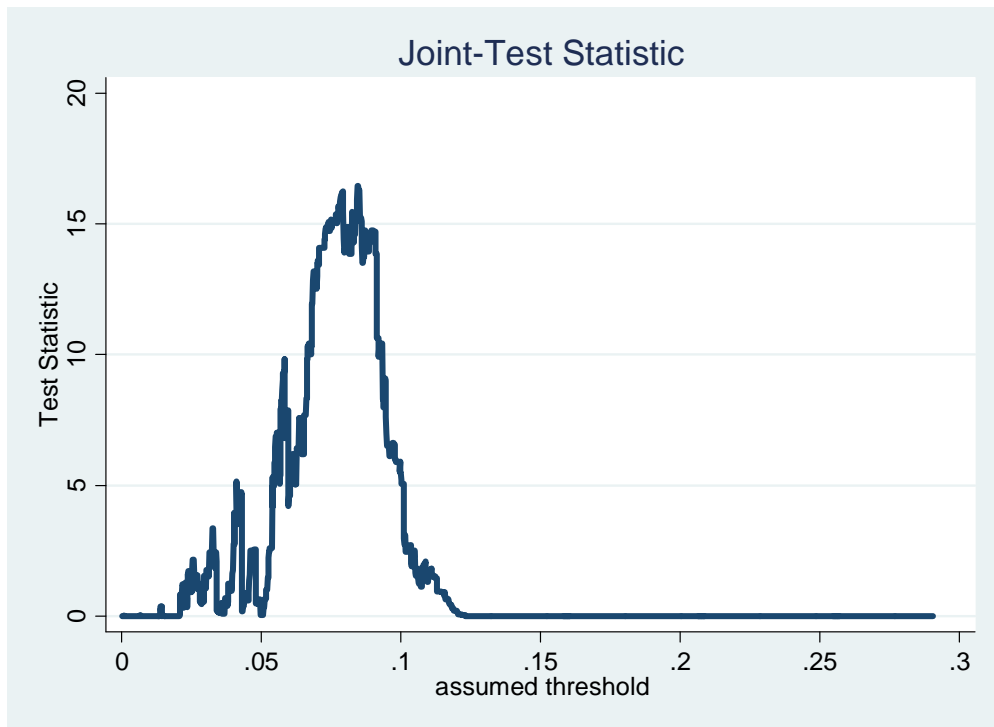
A. Republican Votes in Presidential Elections



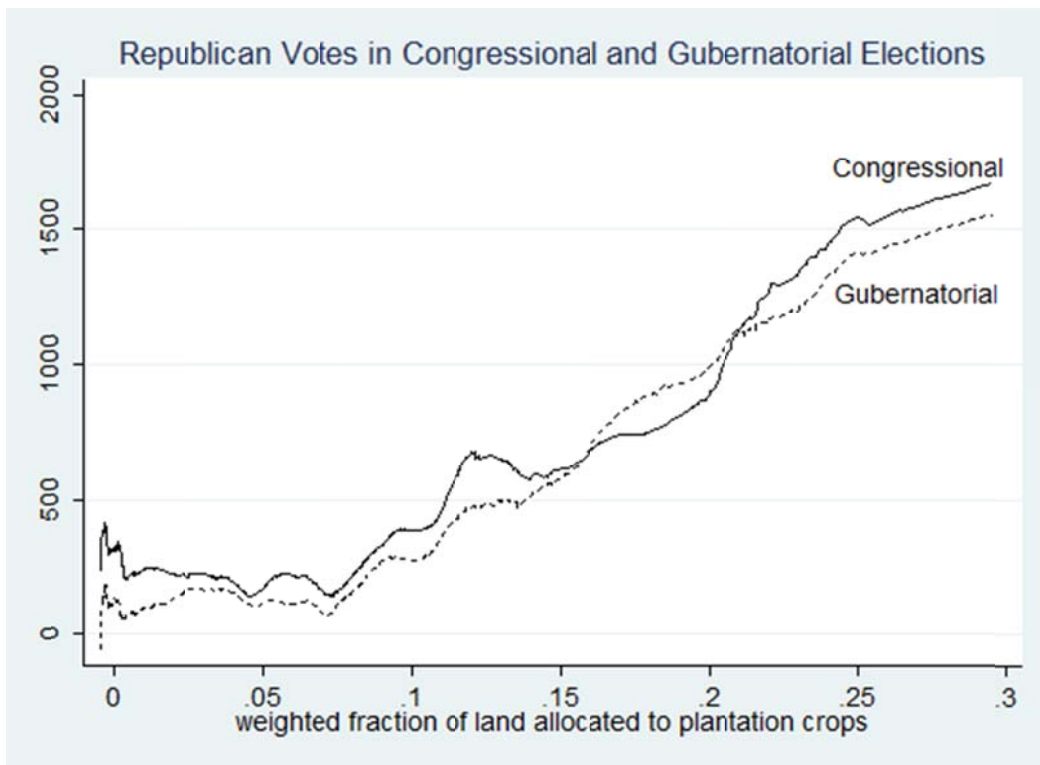
B. T-ratios for Republican Votes in 1872



C. Joint-Test for Republican Votes in 1872



D. Congressional and Gubernatorial Elections



E. T-ratios for Republican Votes in Gubernatorial Elections, 1871-1873

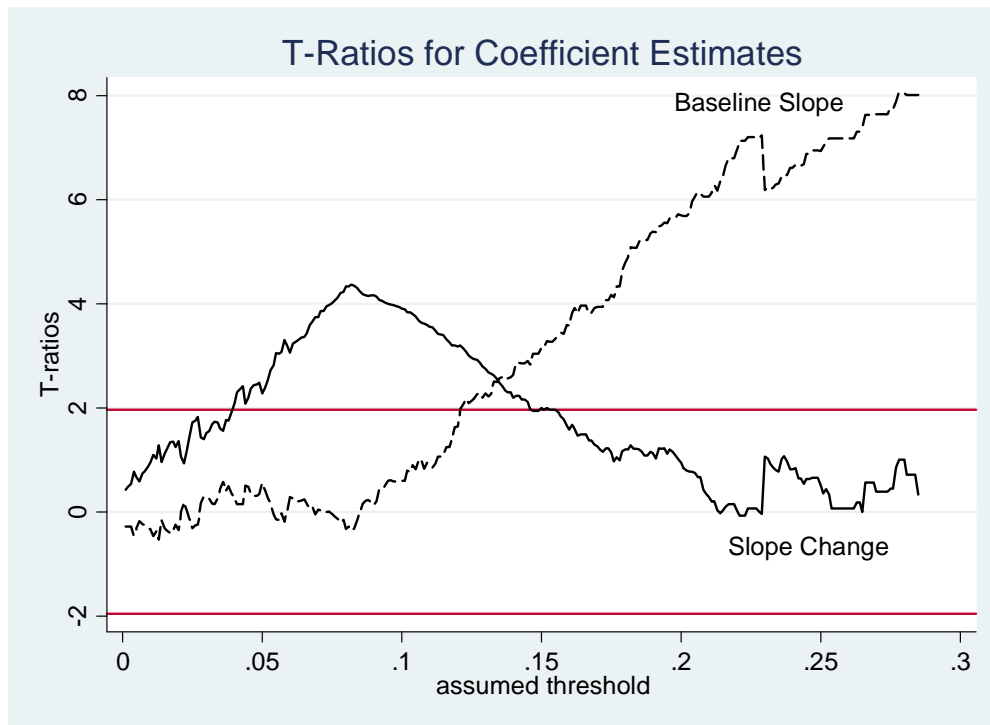
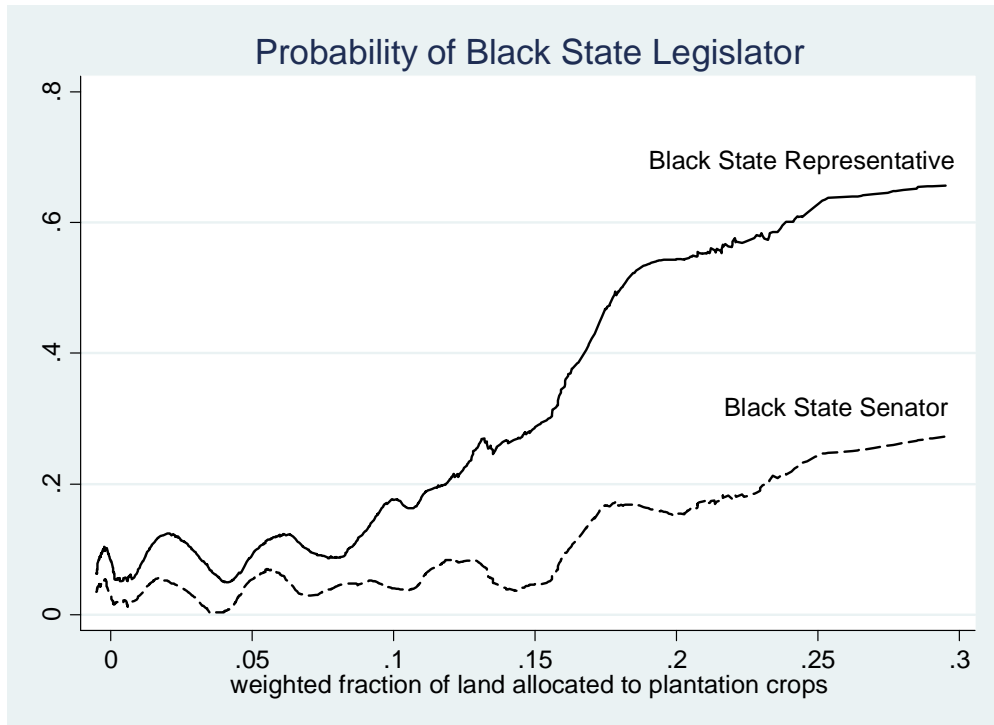




Figure 6: Elected Black Leaders

A. Black State Representative and Senator



B. T-ratios for Black State Representative

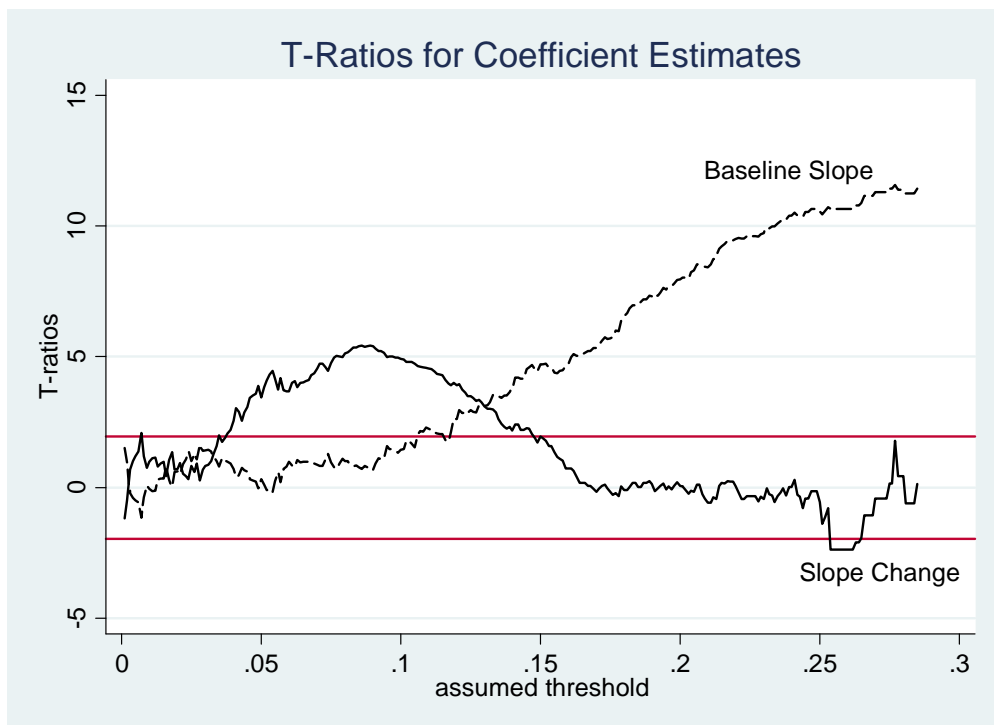
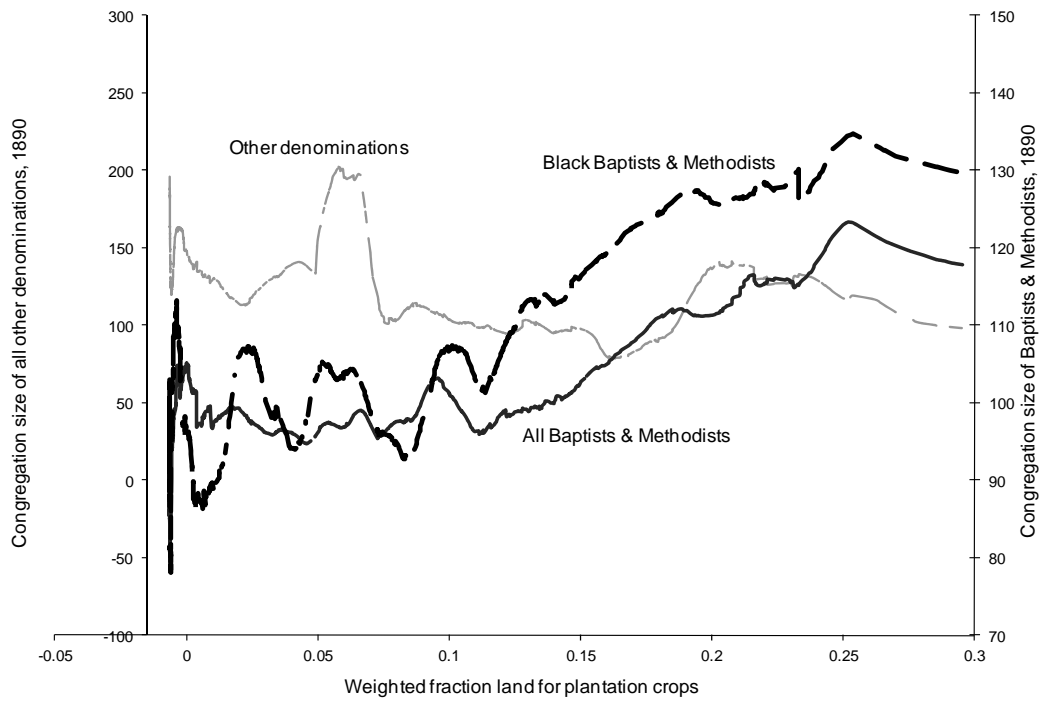
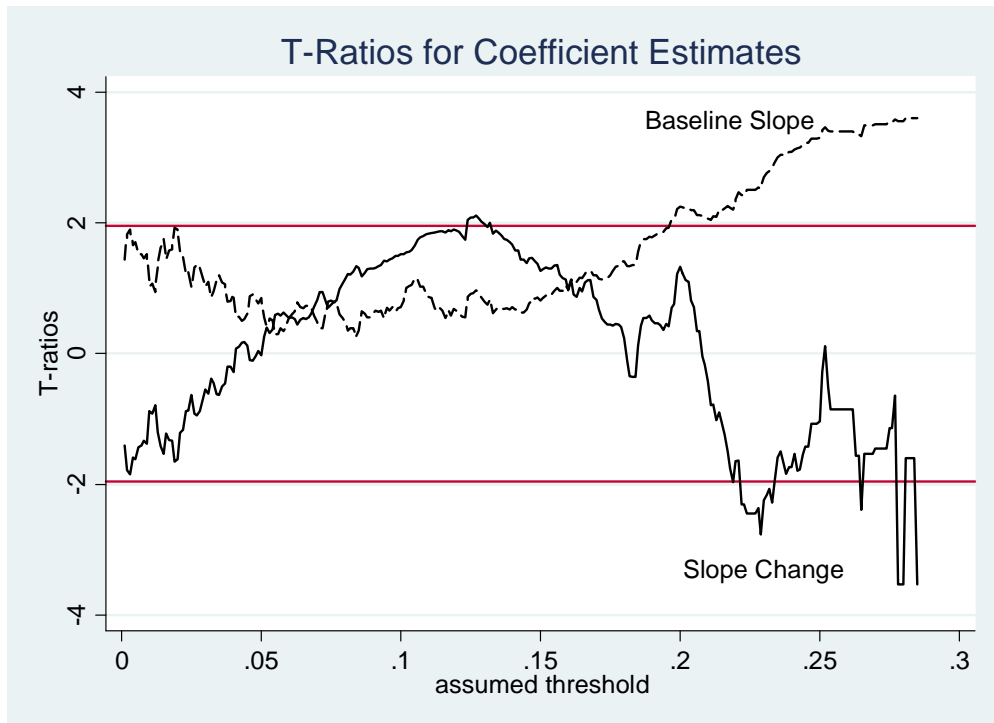


Figure 7: Church Congregation Size

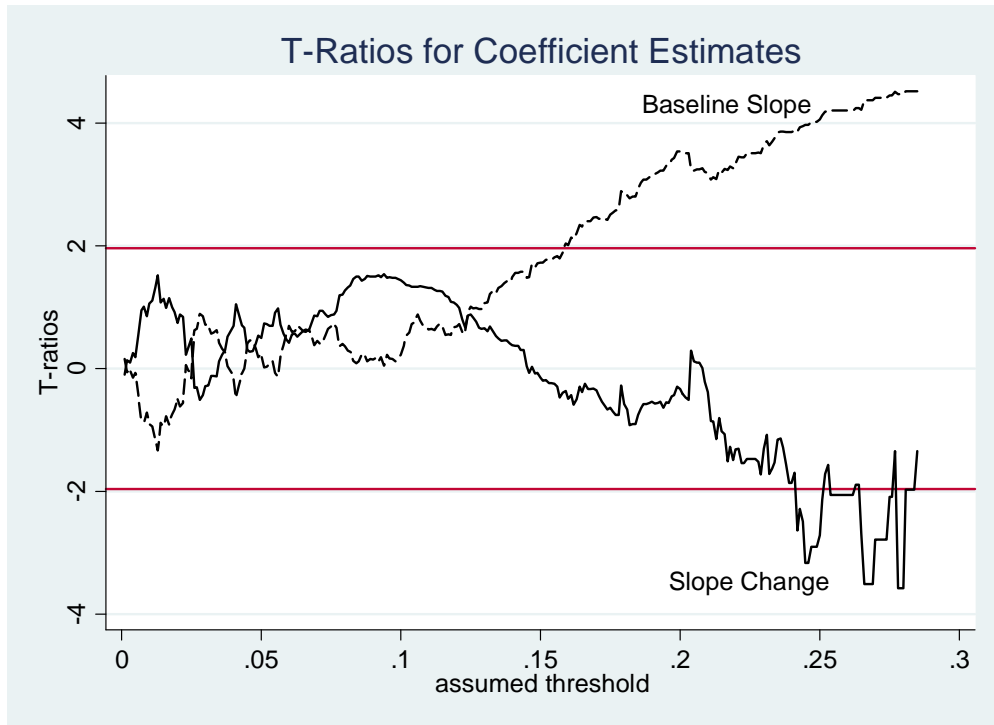
A. Congregation Size by Denomination



B. T-ratios for All Baptist and Methodist Church Size in 1890



C. T-ratios for Black Baptist and Methodist Church Size in 1890



D. Joint-Test for Black Baptist and Methodist Church Size in 1890

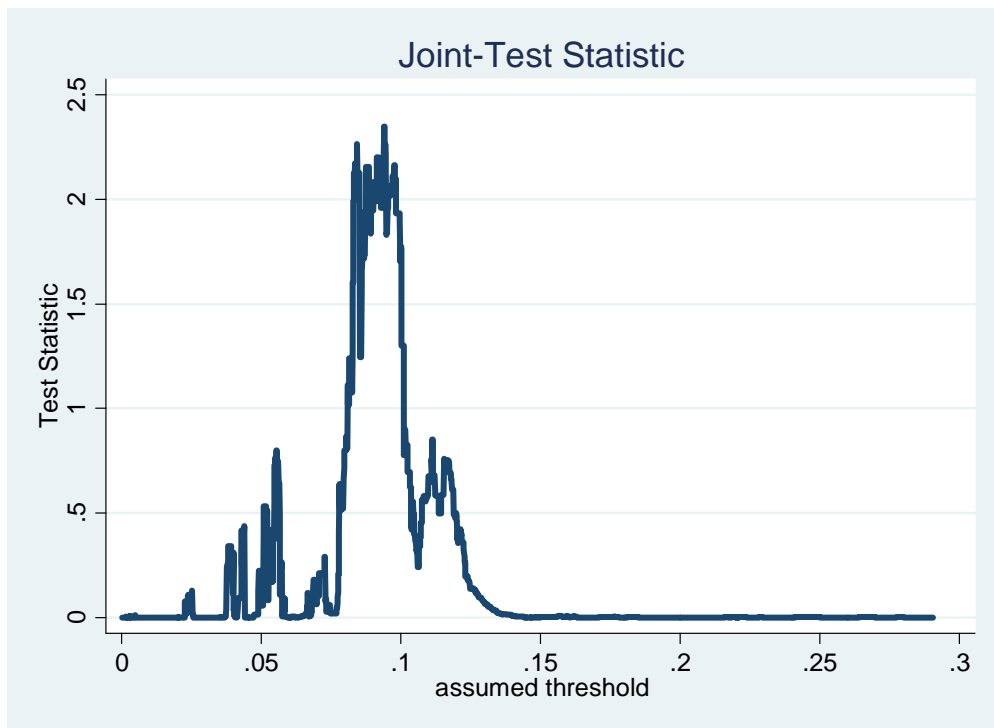
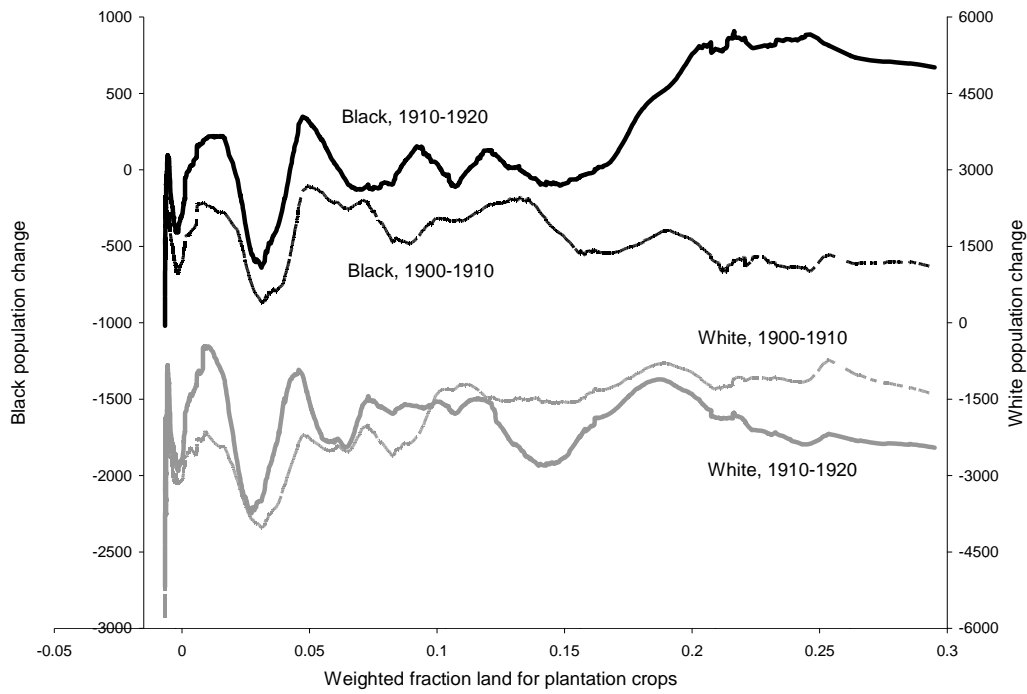
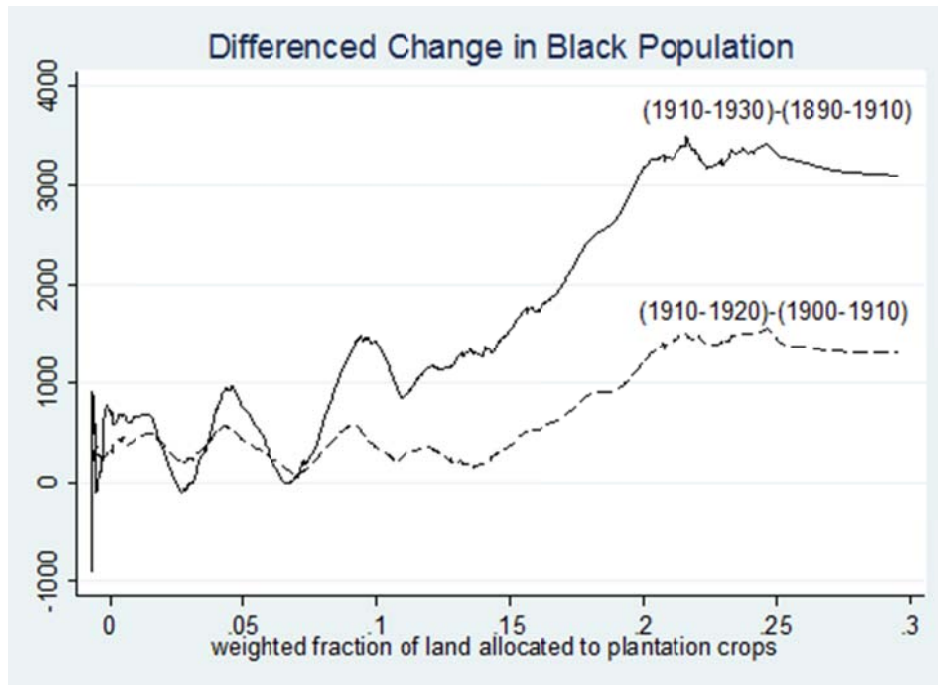


Figure 8: Migration

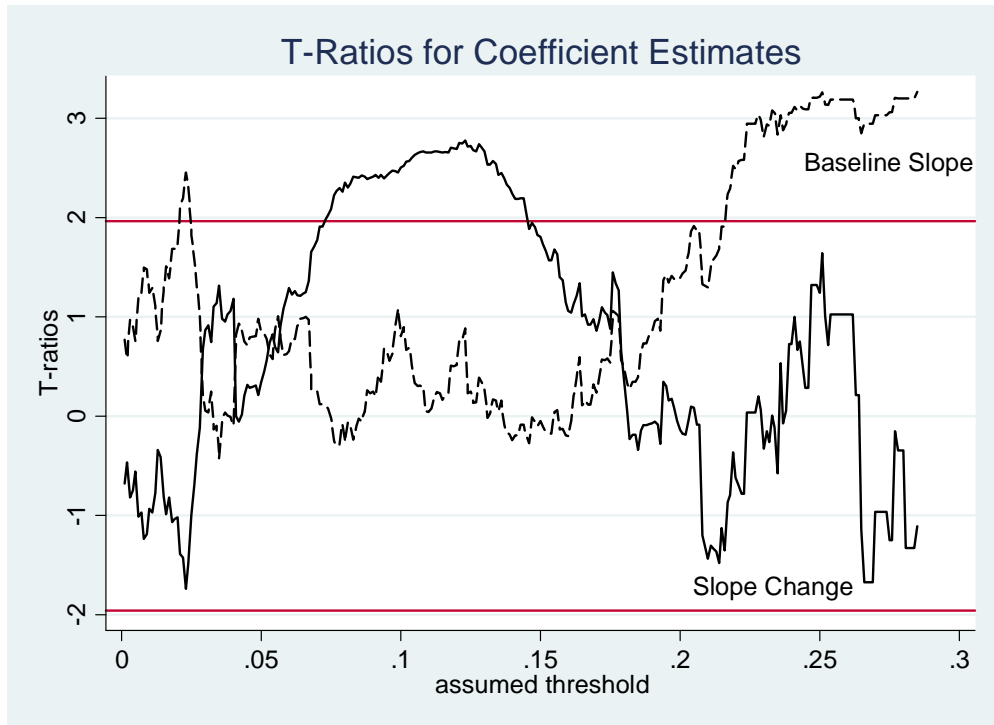
A. Population Change



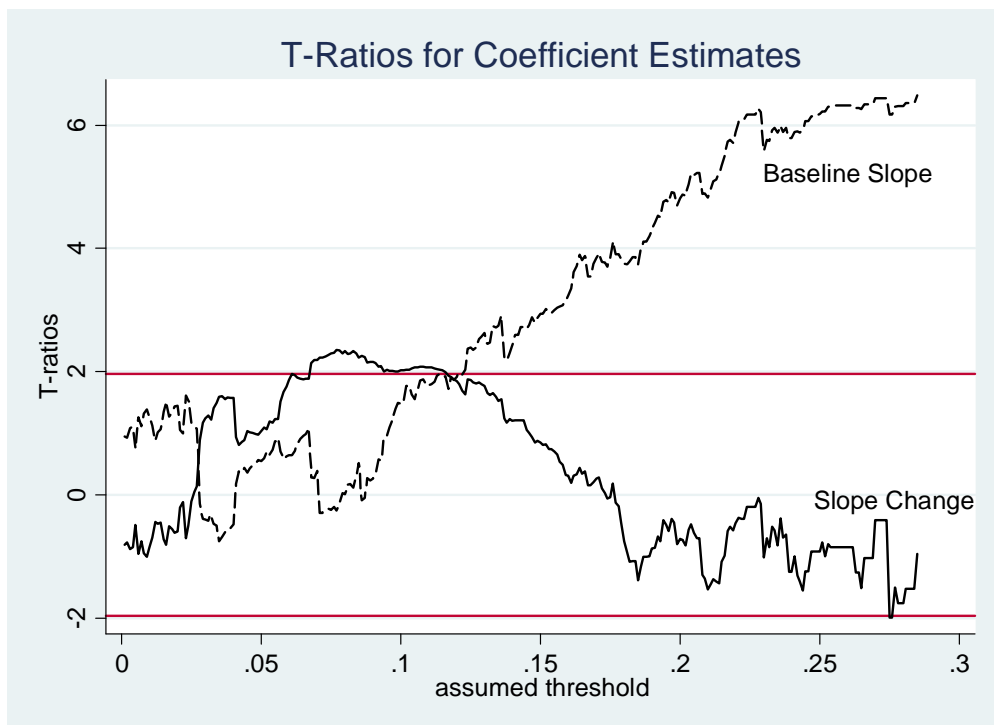
B. Differenced change in Black Population



C. T-ratios for Short Double-Difference in Black Population



D. T-ratios for Long Double-Difference in Black Population



E. Joint-Test for Long Double-Difference in Black Population

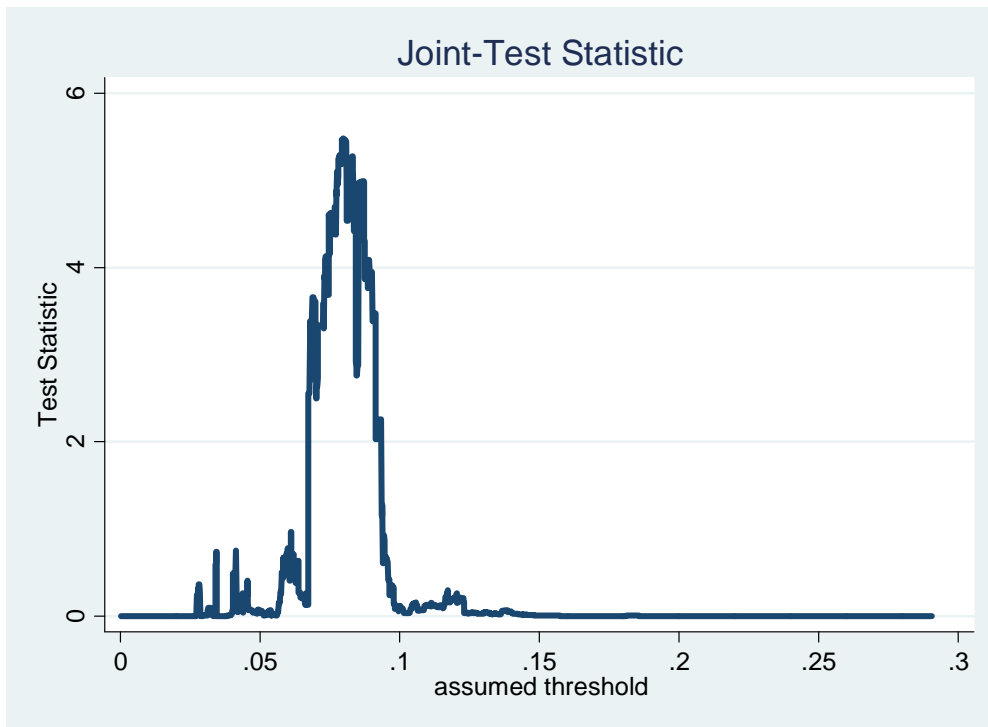
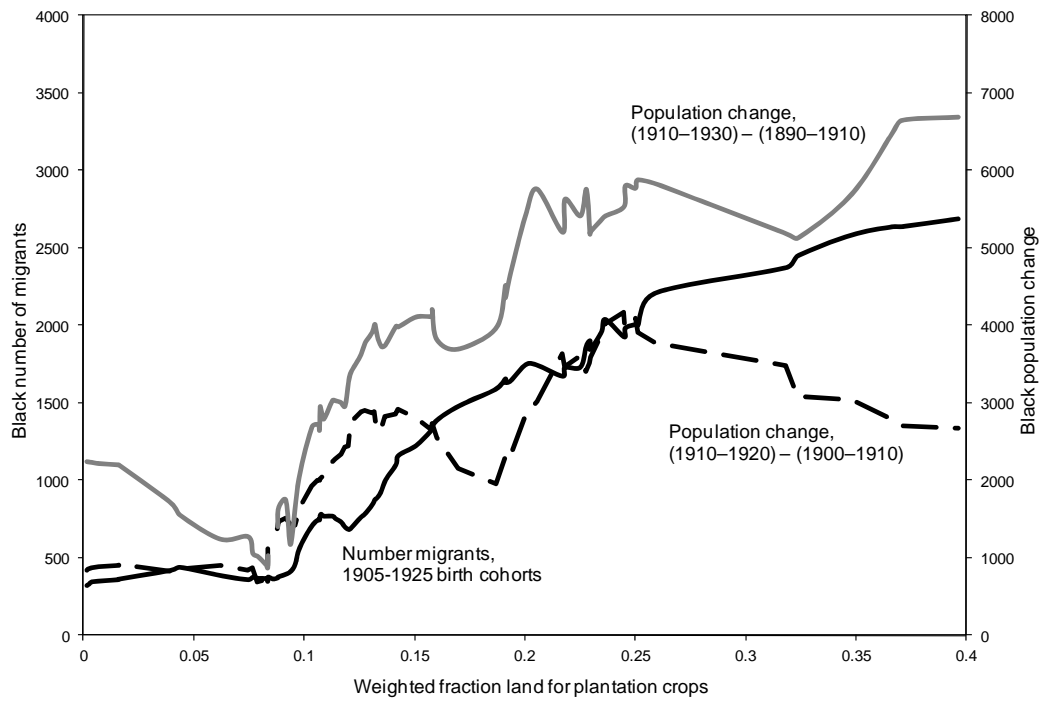


Figure 9: Migration from Mississippi

A. Alternative Measures of Black Migration



B. Level and Distribution of Migrants

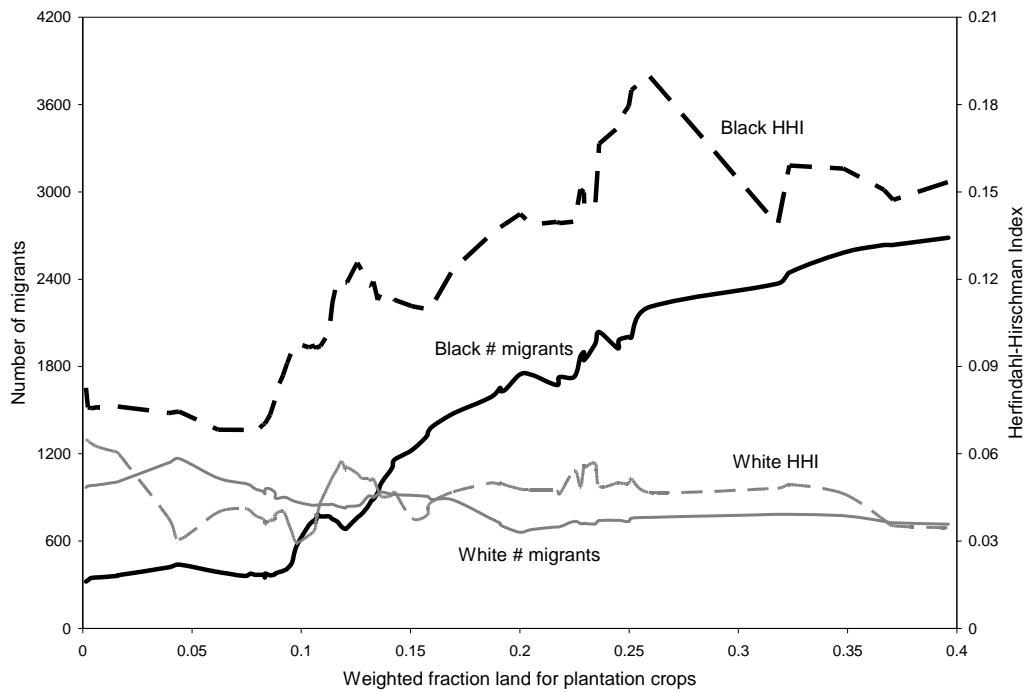
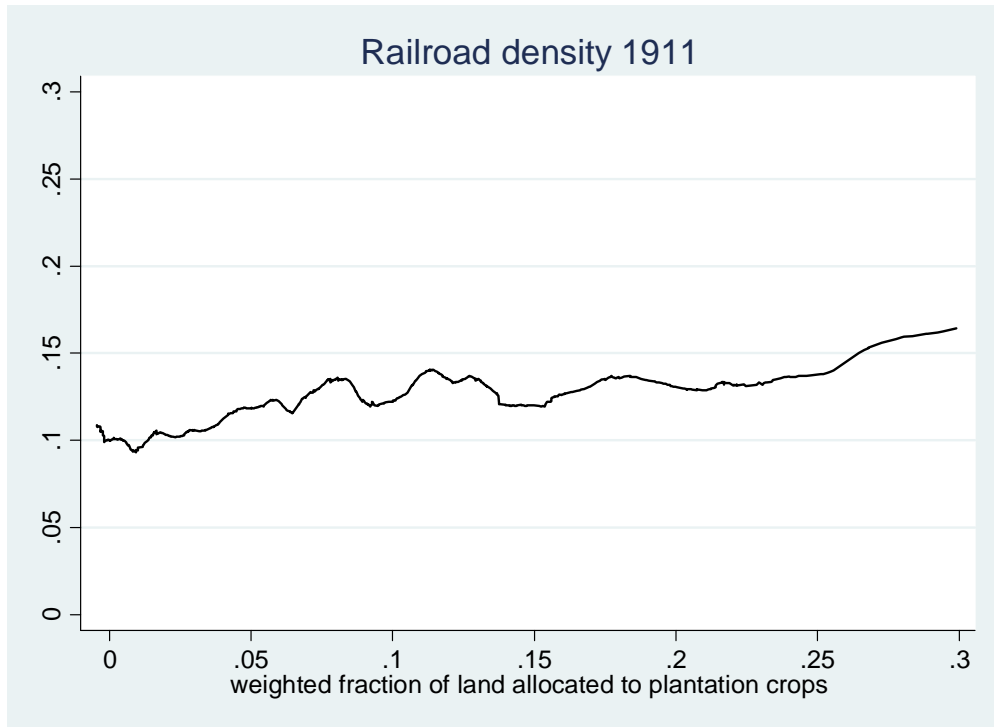
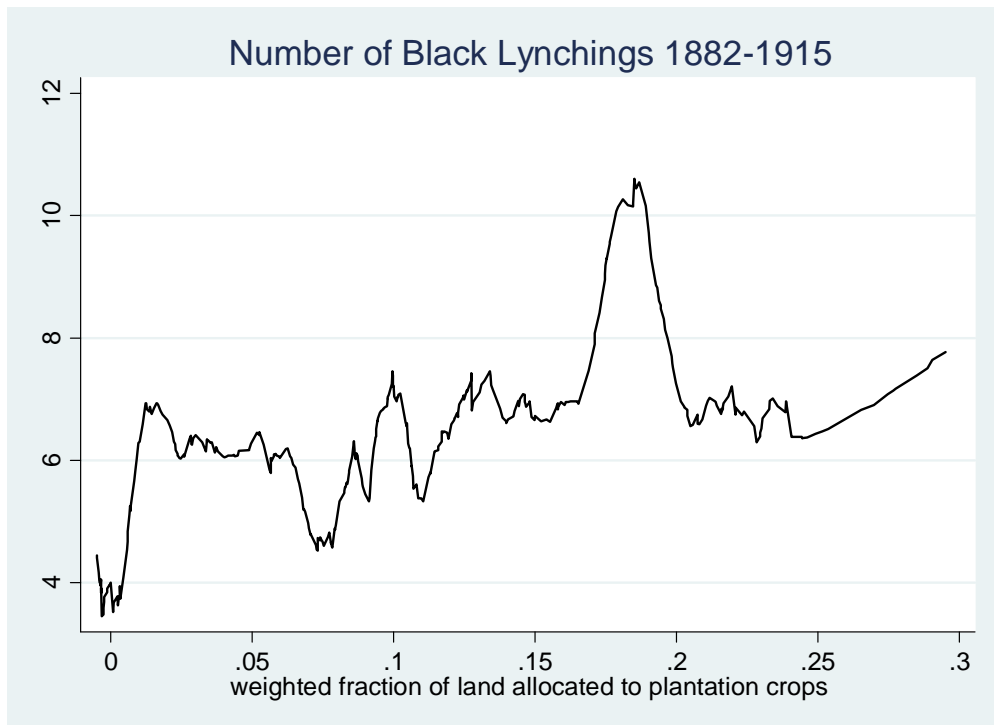


Figure 10: Alternative Explanations

A. Railroads

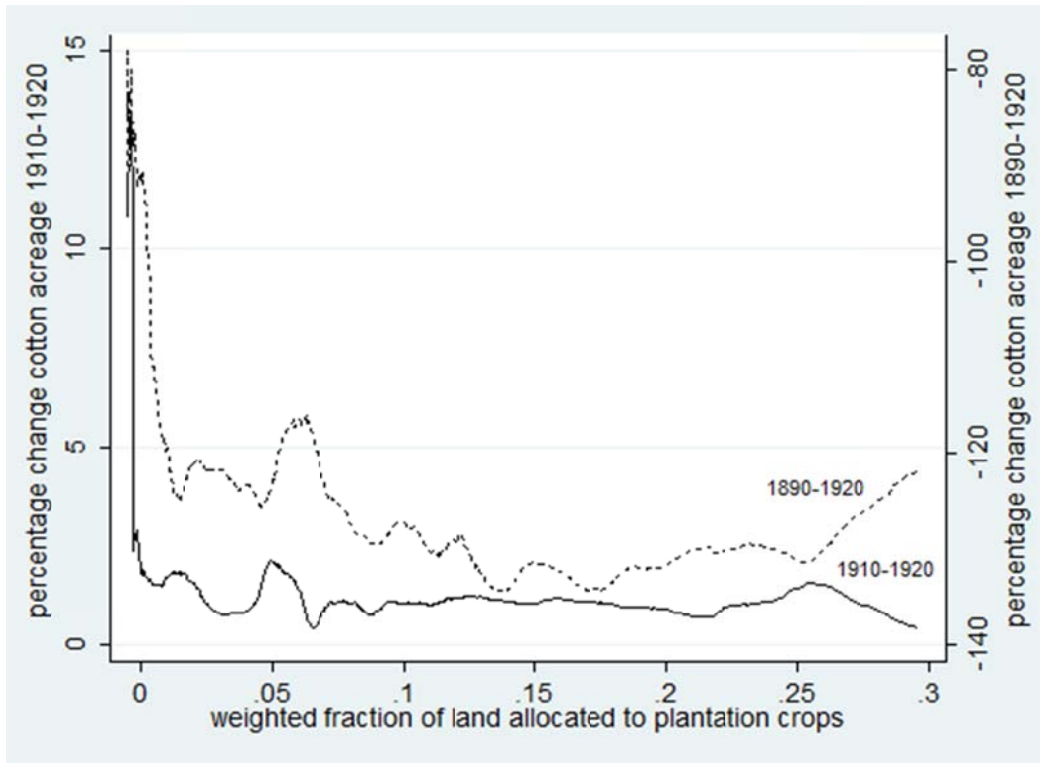


B. Lynchings





C. Boll Weevil



D. Literacy Rates

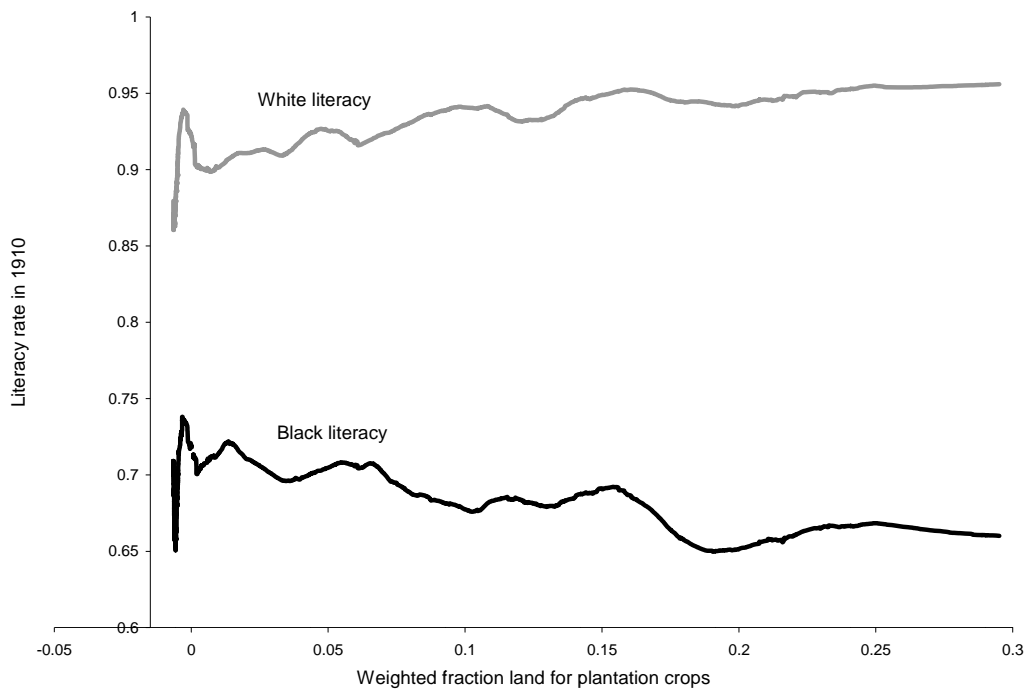


Table 1: Slope change regression results for outcome variables, thresholds determined by joint test statistic  
[absolute value of t-ratios]

	Median slave holdings in 1860	Black population in 1870	Republican votes for President in 1872	Republican votes for Governor in 1871-1873	Black State Represent.	Black State Senator	Baptist & Methodist church size in 1890	Black Bapt. & Methodist church size in 1890
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Slope change	47.74* [1.68]	21698.6*** [2.70]	7688.4*** [4.10]	7659.8*** [4.25]	3.047*** [4.32]	1.241*** [2.60]	119.06* [1.81]	165.06 [1.54]
Baseline slope	48.24*** [3.84]	17372.0*** [3.20]	-135.9 [0.10]	-60.9 [0.05]	0.004 [0.01]	0.020 [0.07]	26.15 [0.55]	4.41 [0.05]
Threshold mean shift	-0.33 [0.17]	530.2 [0.95]	118.8 [1.06]	32.5 [0.33]	-0.033 [0.81]	-0.015 [0.53]	1.55 [0.37]	8.43 [1.34]
Avg. state fixed effect	13.26	1896.6	667.58	637.04	0.074	0.034	94.54	99.06
Threshold location	0.1158	0.0837	0.0845	0.0843	0.0541	0.0834	0.1215	0.0940
p-value of joint test	0.999	0.999	0.000	0.000	0.000	0.000	0.171	0.126
R-squared	0.3452	0.3650	0.2095	0.1854	0.3356	0.1920	0.1409	0.2203
Sample size	990	1022	1040	1005	1135	1135	1112	947

Notes: Threshold locations based on the maximum joint test statistic when fixing the scale parameter to be equal to three-quarters of the standard deviation of the variable of interest. Models include state indicators in the regression, and the estimated standard errors are corrected for heteroskedasticity.

Table 2: Slope change results for competing hypotheses, thresholds fixed at 0.0797  
[absolute value of t-ratios]

	Diff-in-diffs in Black population, 1900-1920	Diff-in-diffs in Black population, 1890-1930	Railroad density in 1911	Total Black lynchings, 1882-1915	Pct. change in cotton acreage, 1910-1920	Pct. change in cotton acreage, 1890-1920	Black literacy rate in 1910
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Slope change	11136.0*** [2.72]	15579.7** [2.34]	0.192 [0.80]	2.52 [0.10]	80.33 [1.31]	2354.1 [1.61]	-0.209 [1.05]
Baseline slope	341.8 [0.23]	-54.5 [0.01]	-0.096 [0.49]	4.98 [0.23]	-81.37 [1.31]	-2328.8 [1.61]	0.040 [0.21]
Threshold mean shift	-187.8 [0.68]	337.4 [0.72]	0.021 [1.23]	0.84 [0.56]	2.05 [1.01]	49.94 [1.52]	-0.016 [1.43]
Avg. state fixed effect	298.77	382.85	0.109	6.84	4.91	124.4	0.698
Threshold location	0.1235	0.0797	0.0797	0.0797	0.0797	0.0797	0.0797
p-value of joint test	0.008	0.019	-	-	-	-	-
R-squared	0.1299	0.1434	0.0923	0.0674	0.0182	0.0248	0.2244
Sample size	1126	1125	1101	434	729	756	1119

Notes: See notes to Table 1. Threshold locations fixed at 0.0797, which is the threshold location for the “long difference” in black population changes between 1890 and 1930.

Appendix

Figure A1: Republican Votes in 1872

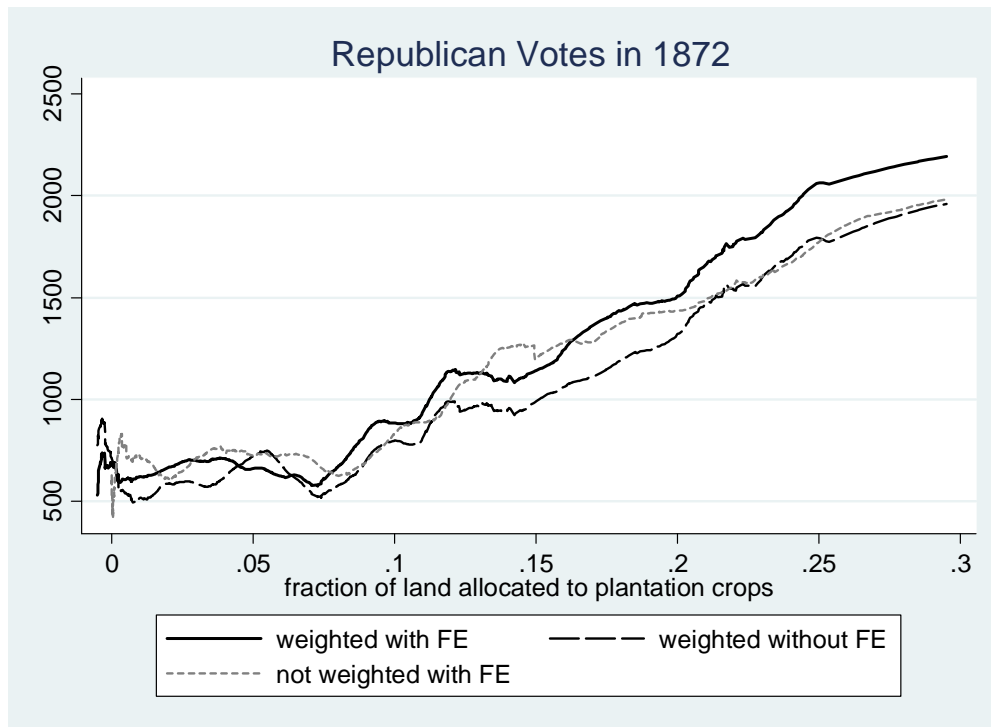


Figure A2: Black Baptist and Methodist Church Size 1890

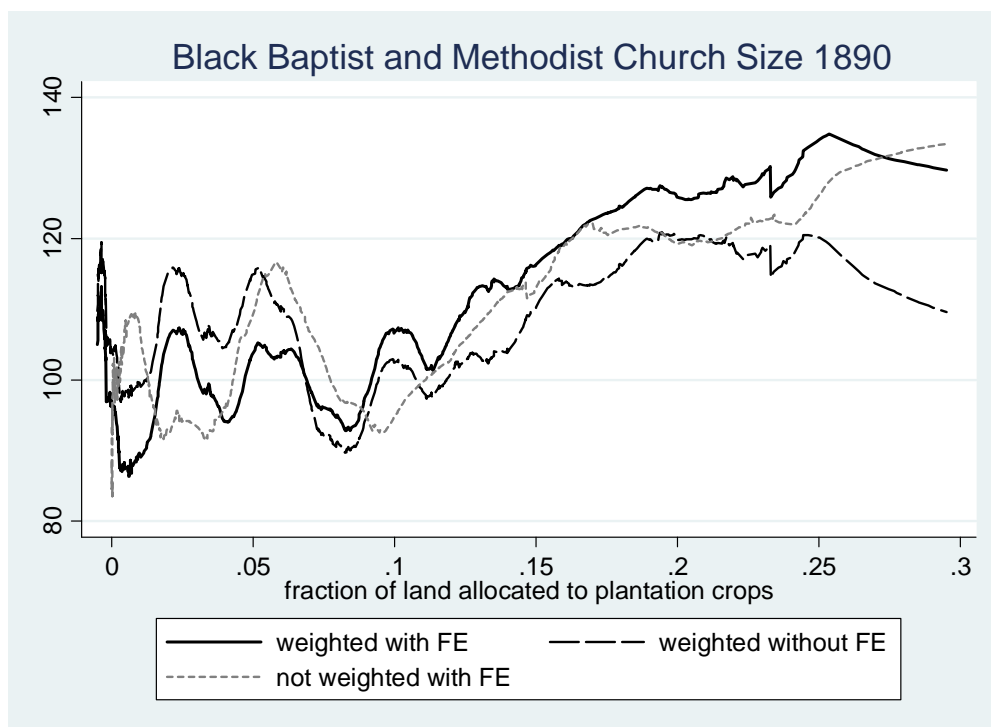


Figure A3: Long Double-Difference in Black Population

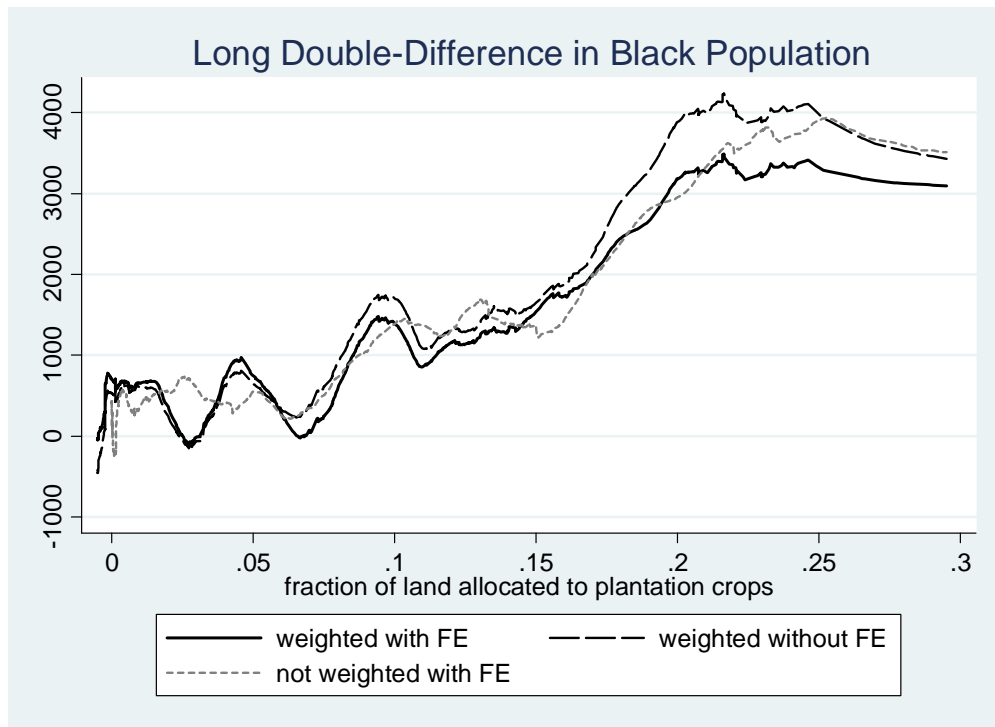


Figure A4: Push Factors and Other Outcomes Not Associated with Black Mobilization

