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THE ECONOMIC EFFECTS OF AMERICAN SLAVERY: TESTS AT THE BORDER

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ABSTRACT

To engage with the large literature on the economic effects of slavery, we use antebellum census data to test for statistical differences at the 1860 free-slave border. We find evidence of lower population density, less intensive land use, and lower farm values on the slave side. Half of the border region was half underutilized. This does not support the view that abolition was a costly constraint for landowners. Indeed, the lower demand for similar, yet cheaper, land presents a different puzzle: why wouldn't the yeomen farmers cross the border to fill up empty land in slave states, as was happening in the free states of the Old Northwest? On this point, we find evidence of higher wages on the slave side, indicating an aversion of free labor to working in a slave society. This evidence of systemically lower economic performance in slavery-legal areas suggests that the earlier literature on the profitability of plantations was misplaced, or at least incomplete.

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I. Introduction

Social scientists have long sought to understand the effects of slavery on economic growth and development. Alexis de Tocqueville and Gustave de Beaumont, for example, wrestled with the issue during in their famous visit to America in 1831-32. While in the Northeast, the French visitors heard much about the distinctiveness of the American South, but they felt unable to sort out the impacts of slavery from those of climate and soil. When they traveled to the Ohio River valley, they discovered a setting where the environment was the same on both sides of the river, but the institutions differed.[1] They observed that free state of Ohio was more dynamic, more industrious, and more attractive to immigrants, than the slave state of Kentucky. De Tocqueville wrote: "It is impossible to attribute those differences to any other cause than slavery. It brutalizes the black population and debilitates the white. One can see its deathly effects, yet it continues and will continue for a long time. […] Man is not made for servitude. (Pierson 1938, p. 569)."

Over the next century, historians largely echoed the conclusion that slavery harmed economic performance. They argued that slavery was unprofitable and was kept in place by an elite who sought to maintain their political and social hegemony (see Aitken 1971). In the mid-twentieth century, economic historians brought quantitative evidence that challenged this view. They argued that plantations were profit-maximizing businesses and that slavery was a dynamic economic form, far from dying out due of unprofitability (Conrad and Meyer 1958, Fogel and Engerman 1974). In the last two decades, economic historians and others have advanced a more nuanced position that slavery in the Americas had an economic rationale early on but created institutional impediments to subsequent growth (Engerman and Sokoloff 2011). Places with coercive labor in the 1800s start modern economic growth later and have worse development experiences today than places with free labor. This was becoming the standard view. But, more recently, the "1619 Project" of the *New York Times Magazine* (2019) has popularized the New History of Capitalism, which founds US economic success directly on slavery (Beckert 2014). The core issues remain contested.

In this paper, we return to an investigation of the impact of slavery on economic performance during its existence. To proceed in a controlled yet tractable way, we examine the effects of the peculiar institution at the border that divided the country in half, slave and free, circa 1860. Following in the

[1] See Yale Tocqueville Manuscripts. American Trip, Diary and Notes, Cashier E. De Tocqueville's words read: "Il est impossible d'attribuer ces differences a una autre cause qu'a l'esclavage. Il abrusit la population noire et inerve [sic] la population Blanche. On reconnait ses funestes effets et cependant on le conserve et le conservera encore long. […]l'homme n'est pas fait pour la servitude."

footsteps of de Tocqueville and de Beaumont, we seek a testing ground where the environmental differences do not confound the comparisons. Much of economics literature on slavery conducted tests for whether marginal benefits of something equal its marginal cost at the farm level: roughly speaking, tests of productive efficiency and profit maximization. We argue that these are the wrong questions for assessing the systematic economic effects of the institution. If a slave-based firm was unprofitable, one would expect it to go out of business, leaving fewer in operation. Instead, we propose a different perspective: the policy variable on either side of the free-slave border should affect how those free-to-choose could use their land. Local public economics teaches us that the inelastic factor bears such policies (Tiebout 1958). Physical capital is mobile, free labor is mobile, and slave labor is mobile, even if not by the will of the enslaved. Land, in contrast, is immobile. If we wish to measure the systemic productivity of a local or regional policy, we should therefore direct our attention to land use and price.[2]

On the one hand, the institution of slavery created different, arguably larger set of production possibilities. It allowed labor to be coerced, which should have lowered the cost of labor to the slave owner. The institution of slavery also facilitated the attainment of greater scale. The institution allowed the possibility of raising human beings for sale. And it facilitated the use of human as chattel to be pledged as collateral in credit transactions. More generally, the ability to enslave others generated profit opportunities for the enslavers; sites where profitable activities were legal should, all other things equal, be more valuable than sites where such activities are not legal.

On the other hand, the institution of slavery was a social system, not simply an added form of labor contracting. It oppressed and degraded the enslaved. In doing so, the system also levied taxes on and inhibited the activities of the non-slaveholders. Complicity with the violent system imposed costs that some free people might seek to avoid. Labor coercion, in its existence throughout most of human history, was often of such importance as to shape a society's institutional core. In the antebellum US South, this created not just a society with slaves, but what Moses Finley (1980) and Ira Berlin (1998) call a "slave society." In contrast, the US North prided itself on being a place where slavery was not permitted and "free labor" was celebrated (Foner 1970), indeed partly invented (Steinfeld, 1991). William Seward (1858) described the two regions as being two distinct systems locked in "Irrepressible Conflict."

Comparing the performance of these two systems, each as a whole, is the natural question, motivated by the centrality of the historical competition between the two in the antebellum period. On

[2] Factor densities and land prices also have the virtue of being comparable across regions. See Appendix A for model of the effect of labor scarcity on land values.

one side of the border was the system produced by a political economy dominated by planters. On the other side of the border was the system produced according to Free Soil ideology. It is the difference between the two systems in the United States that we study. These are the two systems that faced off in the first third of the country's existence. These are the two systems that contended for control of the continent. These are the two systems that fought a destructive war. We take differences between the two as a package: in this comparison, having slavery legal is equivalent to having the state government dominated by slaveholders and thus a very different orientation of society and laws. An insistence that we separately identify the scores of legal and political differences between free and slave states is a vacant exercise, one quite distant from the historically relevant question of comparing systemic performance. Most relevant policy variation was downstream of the motivating interests that organize the slave system (Tannenbaum, 1946). Slavery, as we shall see, was extraordinarily salient.[3]

This paper seeks to measure the relative strengths of these opposing forces affecting the use and value of land in areas with and without slavery. We take the testing ground of de Tocqueville and de Beaumont -- the upper Ohio River valley-- and extend the comparison east to cover the borders dividing Pennsylvania and New Jersey from Virginia, Maryland and Delaware and west to contrast free states of Illinois and Iowa with the slave state of Missouri (de Tocqueville 1838, Ayers and Rubin 2002, Barthart 1953, Berry 2001, Chase and Sanborn 1856, Salafia 2013, Thomas and Ayers 2003, Wright 2006). The border was the dividing line between slavery and free labor institutions within the same country, with a common language, national laws, and shared heritage.[4]

We use antebellum census data to test for statistical differences, as captured by a coefficient on the legality of slavery, at the 1860 free-slave border.[5] First, we examine, in Section IV, population differences at the border. There are almost 6 slaves per thousand acres on the southern side of the boundary and of course zero on the northern side. In contrast, there are forty fewer whites per thousand acres on the southern side, a gap far larger than would be expected if substituting one worker for another. This ratio is markedly different from any serious estimate of the relative productivity of

[3] Farnam (1938)'s Chapters in the History of Social Legislation in the United States to 1860 is a nearly 500-page volume compiled from many decades of research. The classic source catalogs social policies ranging from land tenure to market regulations, creditor-debtor relations, education, labor legislation, and slave and black codes. More than one-half of the total page count covers the latter codes. Farnam (1938, p. 167) observed: "It can be said without exaggeration that no single topic, either domestic or international, has played a greater part in the history of the United States, than slavery."

[4] The recent economic literature includes many studies making border comparisons (Dell 2010, Acemoglu and Robinson 2012). The border considered here lies at the heart of the main issue in early US history, the competition and co-existence of the slave and free labor systems within the same nation-state.

[5] The main data that we use were collected during the period of study under a common statistical authority; they are relatively abundant, but of course do not address every question of interest. Our tests are based on the legality of slavery circa 1860; they differ from tests in the existing literature of the relationship, within the slave region, between various outcomes and the slave share of the total population. We thank Gavin Wright for highlighting this contrast.

free versus slave labor, a ratio that is closer to parity. As a consequence, the population is lower on the side where slavery was legal, to the tune of almost 50 percent. Thus, in the border region, half of the land was half underutilized. Accordingly in Section V, we see less intensive land use and lower farm value on the slavery side of this border. In Section VI, we conduct a range of sensitivity analyses. We find similar results after controlling for a rich set of ecological variables, including topography, river access, climate, glacial coverage, and soil characteristics. Results are also not sensitive to accounting for several notable human constructs from prior to settlement: type of land demarcation (grid versus metes and bounds), natural versus geometric boundaries, and the timing of settlement itself. (For readers interested in the point, we summarize the evidence in Appendix L.) The results are not affected by several strategies to account for soil erosion. We then perform similar analysis with a series of pseudo-borders, including several sets of contiguous state boundaries where slavery is legal on either side. These can be thought of as falsification tests, and they indeed yield null results. We then show that our results are not sensitive to a variety of strategies to adjust for spatial correlation. Finally, in Section VII, we show that the farming patterns are consistent with what one might expect from the two systems: smaller farms and greater focus on cereal and dairy production on the side without slavery. Taken together, this does not support the view that abolition was a costly constraint for landowners.

Indeed, the lower use of land that was cheaper presents a prima facie puzzle: why wouldn't the yeomen farmers cross the border to fill up sparsely inhabited land in slave states, in the same ways they did in the free states of the Old Northwest? Adding to this puzzle is that we find evidence (in Section VIII) of higher wages on the slave side of the border. We then turn to interpret the results in a variant of the Rosen-Roback locational choice model (Roback 1982). The combination of lower land rents and higher wages would indicate that there was a large disamenity for free households to live and work in the slave region. This preference was widespread among migrants, as shown in Section VIII.C. Among the dozens of groups of migrants that we can identify in the census data, nearly all of them are overrepresented on the free-soil side. The greatest imbalance is among movers from New England, a hotbed of abolitionism, but there is also an imbalance among those born in slave states, who are presumably familiar with slavery.

In Section IX, we seek to account the farm-value difference. Farm improvements --relative levels on investment in farm buildings and land clearing-- explain a meaningful fraction of the gap. The differences in wages explain much or most of what remains. Differences in agricultural total factor productivity appears to explain only a small fraction of the gap, while differences in pecuniary taxes work in the opposite direction. Section X discusses the institutional artifice of the slave system. Section XI concludes.

We treat the two sides of the border as competing for settlement and economic activity. They are not separate testing grounds, but rather interact and compete. As our study has the clash of the two systems in the background, this is a feature, not a bug, of our analysis. A study of the effects of slavery in isolated, non-interacting pockets of spacetime would not yield conclusions applicable to the historical US context. (Some spillovers such as the prospect for the enslaved to escape make each side of the border less representative of the rest of their own region, and we seek to control for these effects by looking off the immediate border.) Note that, in addition to sharing similar climate and soils, the two sides of the river face similar product prices. There are no internal duties on physical commodities and transportation costs to global markets are the same. Many of the border segments were on navigable waterways, making differences in investments in internal improvements less important. Such differences, which deserve the attention that they have received in the literature (Majewski 2000), matter less in these border segments. An obvious concern is whether differences observed near the region extend to the broader regional comparison. Our analysis indicates that they do, and if anything, many differences become more pronounced as the geographic scope of our investigation widens.

II. The Legal Basis of the Free-Slave Boundary

Allowing for slavery was the default condition of Britain's North American colonies. Colonists petitioned at various points to ban further importation of slaves, but royal representatives denied them. Georgia restricted the institution at its founding in 1732 but by 1750 revised its laws to permit slave holding. Following the start of the War of Independence, the Northern states began to eliminate the slave system and emancipate those held in bondage. Pennsylvania was a leader, passing the "Act for the Gradual Abolution of Slavery" on 1 March 1780. The 1787 Northwest Ordinance, passed by the US Congress during the Articles of Confederation period, forbad slavery in the territory north of the Ohio River. The Sixth Article read "There shall be neither slavery nor involuntary servitude in the said territory, otherwise than in punishment of crimes whereof the party shall have been duly convicted." This law was contested at times and laborers in the region were sometimes bound under indentured servitude contracts. But the founding document of the Northwest Territory prohibited slavery. South of the river, in Kentucky, the legal system adopted Virginia practices; slavery was in place when Kentucky became a state in 1792. In 1820, Missouri was also admitted to the union as a slave state, as part of a compromise excluding slavery in the other parts of the territory of the Louisiana Purchase above the longitude 36 degrees 30 minutes (Wright 2006, pp. 44-46; Simeone 2000; Bleakley and Rhode 2023a).

Readers who question our framing might be persuaded by the words of Honest Abe Lincoln. On his speaking tour through Ohio and Indiana in September 1859, Lincoln repeatedly attributed that the absence of slavery in the states formed from the Northwest territory to 1787 Ordinance and to the refusal of Congress to allow early legislatures to backtrack on the provisions of Article VI. "There is no difference in soil nor in climate" along the border, Lincoln noted, but the different institutional choices at founding led to different outcomes.[6] Relatedly, Lincoln's argument against 'popular sovereignty' included a notion of path dependence: once slave owners were present in a territory, it created a constituency seeking to preserve and expand the peculiar institution.[7]

We compare the operation of slavery and free labor in a classic testing ground (de Tocqueville 1838, Wright 2006).[8] This region includes the core domain of slavery in the country's early history. Slave labor was commonly used to produce the region's staple crops. And there were repeated attempts, during crop booms, to introduce slavery into the places where it was legally prohibited in the founding period. These attempts failed, although many voters in the Free States were not convinced that nature alone would forever keep slavery out. The contest went the other way as well. By 1860, slavery had nearly disappeared in New Jersey; it was on the decline in Delaware, although slave-owners maintained significant representation in state government; other parts of the border South might be next. The border test has relevance for how US history played out and how the participants saw it playing out.[9]

[6] Speeches at Indianapolis, IN, 19 Sept. 1859 and at Cincinnati, OH, 17 Sept. 1859 in Basker (1953, pp. 456-57, 467).
[7] In his Peoria speech, Lincoln (1854) argued that slavery persisted because of path dependence and not a contemporary economic rationale: "the first few may get slavery IN, and the subsequent many cannot easily get it OUT. How common is the remark now in the slave States---'If we were only clear of our slaves, how much better it would be for us.' "
[8] An additional reason to examine the border region is its importance. It was hardly a marginal area. In 1860, over one half (52.1 percent) of the total population of the free states lived within the 150-mile band. Almost four-tenths (38.6 percent) of the population of the slave states did so. For the country as a whole, almost one-half (46.8) did so. The 300-mile band covered 91.4 percent of the population of the free states, 67.8 percent of the slave states, and 82.2 percent of the total. Nearly 900 (898k) thousand enslaved African-Americans, 23 percent of the total number of slaves, lived within the 150-mile band. Over 2 million (2098k), or 53 percent of the total, lived within the 300-mile band. The shares of slave-holding households were even higher; 34 percent lived within the 150 mile-band and 64 percent within the 300-mile band. See Appendix Figure A.2 for the median locations of selected outcomes, and also Smith (1927, pp. 2-3).
[9] The principal data that we are examining come from the 1850s. This is a period when the slave system is thriving. The price of an average slave rose from $377 in 1850 to $778 in 1860. (Ransom and Sutch 1988, Table A1.) The market for raw cotton is booming. In contrast to the first half of the nineteenth century, the tobacco market is doing well in the 1850s. That said, we find similar results for rural population density back to 1790. (See Section VI.B.)

III. The Free-Slave Boundary and Census Data

Figure 1, Panel A, maps the Free-Slave Boundary in the United States in 1860 and the surrounding regions (see Appendix B for details).[10] The thick line is the boundary and the thin lines are 1860 state borders, plus the subsequent border that split the two Virginias. We will investigate the effects of slavery using the abundant county-level data from the antebellum censuses: population, by demographic type, land value, land use, crop mix, farm size, and other variables of interest.

We offer two leading examples in the remaining panels of Figure 1: Panel B represents non-white population (mainly blacks) and Panel C represents the rural population. Each dot is placed at the county centroid and is proportional to the percentile of the respective outcome.[11] The propensity of nonwhites to be south of the boundary is noteworthy, while the rural population is far denser in free states. A few other features are evident in the maps: the relative emptiness of Appalachia and the settlement along the Missouri River, for example.

Table 1 provides summary statistics for some of the data in our sample. In Panels A and B, respectively, we consider two samples: counties with centroids within 300 miles of the border and counties on the border. The columns present numbers of observations, means, and standard deviations, for the entirety of each sample as well as for free-region and slave-region subsamples. There are three variables for population: nonwhite, white, and rural, all normalized by county area. There are 5.3 (4.2) nonwhites per thousand acres in the first (second) sample. However, there is a much greater density of nonwhites south of the boundary, with an additional 8.7 (5.0) per thousand acres on the slave side. In each of the subsamples, white population density is higher north of the border: there are 43.9 (21.3) more whites per thousand acres on the free side. A similar pattern holds for rural population: more nonwhites on the slave side; and more whites on the free side. The offset is not one-for-one; the combined population density is much higher on the free side.

There are four agricultural outcomes of immediate interest. About 60 percent of acres were in farms, on average, and these numbers are fairly similar across samples on both sides of the border. A large gap is seen in land improvement, however, across the free and slave counties. Finally, we present farm values per county and also per farm acre. At the border, farms are valued at about $24 per farm acre, but there is an over $8 difference across the border. Measured in logs, the farm acres on the slave side are approximately 37 percent less valuable.

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[10] The source for the spatial data is the National Historical Geographic Information System (NHGIS, Minnesota Population Center, 2011). Population data are from census counts compiled in ICPSR study No. 2896 (Haines 2010). The agricultural data are census statistics compiled in ICPSR study No. 35206 (Haines, Fishback, Rhode 2018).

[11] We use percentiles to make the graph legible. The statistical analysis below is based on levels and natural logarithms.

Moving to our more formal econometric tests, we employ the following estimation procedures. We focus on four samples: those counties that touch the border (the border sample), those that are near the border but do not touch it (the donut sample), those that are within 150 miles of the border, and those that are within 300 miles.[12] We run one of two specifications:

(1) $Y_i = \beta_1 * Slavery\_Legal_i + \gamma_1 * Longitude_i + \gamma_2 * Longitude_i^2 + \gamma_3 * Longitude_i^3 + \gamma_4 * Distance_i + \gamma_5 * Distance_i^2 + \gamma_6 * Distance_i^3 + \beta_0 + \varepsilon_i$

(2) $Y_i = \beta_1 * Slavery\_Legal_i + \gamma_1 * Longitude_i + \gamma_2 * Longitude_i^2 + \gamma_3 * Longitude_i^3 + \beta_0 + \varepsilon_i$

All of these specifications include controls for a cubic in longitude. For the 150- and 300-mile buffers, we run specification (1) which also includes controls for a cubic in distance to the boundary, which is defined as a positive to the North and as negative to the South. For the border county and donut samples, distance to the boundary is nearly collinear with free or slave. For these samples, we run specification (2) excluding the distance controls. This analysis is weighted by county area so as to not inflate the importance of states that subdivide more than others. To account for spatial correlation, we cluster by 15 bins of longitude.[13] The coefficient of interest is on an indicator for whether slavery is legal. Generally speaking, the slave region is south of the boundary.

Figure 2 provides evidence on environmental variables, e.g. weather and soil, which are--for the most part--pre-determined. This helps us assess the strength of our research design that compares area on either side of the border. Panel A contains results in the areas of weather, topography, river/water access, and seismology. Panel B represents tests for soil-related variables, including the glacial coverage (which are described in Appendices C and D). Some rows have numerous coefficients because the categories (listed on the y axis) are measured at various soil depths. We plot the p-value on the slavery coefficient for each variable and sample. A uniform distribution across [0,1] would imply no meaningful differences across the border. A departure from uniform indicates otherwise, with the disclaimer that the coefficients are not independent draws (e.g. sandy soil 10 inches down is correlated

[12] The distances are measured from the county centroid. See Appendix Figure B-1 for a map of the buffers and the border sample in 1860. The donut sample is not on the boundary directly, but within 55 miles of it. The 55-mile cutoff is approximately double the maximum average distance to the boundary in the border sample and it ensures that there is at least one county on either side. We created the donut sample to address two concerns about a comparison right at the border: (1) slave owners fear enslaved workers might escape, and (2) opportunities for trade, especially on navigable rivers, might mute the effects of institutions on land use.

[13] We select this clustering method based on an analysis of the spatial correlation across bins. Smaller bins of longitude (e.g. 30 evenly sized groups instead) show statistically significant residual correlation across adjacent bins. We use Moran's I statistic to diagnose spatial correlation, as suggested by Kelly (2020). We also implement Kelly's and Conley (1999) proposed estimators in sensitivity analysis below.

with sand fraction at 15 inches). Panel A has 10 of 52 (19 percent) coefficients significant at the 10 percent level. Outside of the climate variables, 4 of 36 p-values are below 10 percent, and none are below five percent. There are not significant differences in elevation on either side of the river. The climate should also be quite similar on either side of these borders. Much of the boundary line is defined by a river that runs through flat terrain, so there are not issues of rain shadows from mountains.[14] Our review of the river course indicates that the bends on the river are evenly distributed. There is local heterogeneity but this averages out over the river course. The rest of the boundary is defined by geometric constructs (east/west lines and the Twelve-Mile Circle) that were set well before much was known about land quality. Nevertheless, the story is bit more complicated in Panel B, where 29 percent of coefficients have p-values before 10 percent. A few outcomes look reasonably uniform, e.g. porosity or bulk density. Several look uniform for some samples, but not others: for example, soil pH, which looks uniform for the buffer sample, but bad for the donut sample. Glacial extent (meaning fraction of the county covered by ice at the previous glacial maximum) and depth to bedrock are most significantly related to the free-slave boundary.[15] All of the above controls will be used in the sensitivity analysis below.

IV: Demographics

Figure 3 graphs the point estimates and 95-percent confidence intervals for key demographic attributes in 1860 for the four samples. The top set of results represents the non-white population. Both as a share of the population and per acre, there were more non-white people on the side where slavery was legal. At the border, the institution affected the composition of the labor force, which indicates that the systems were in some sense in contention in the borderlands. (In any case, the southern side had state governments run by planters.) In contrast, the white population density is lower on the slavery-legal side, by over one half.

If we examine regressions using natural units rather than logs, we observe the slave side is associated with, per thousand acres, 6 more nonwhites and with 40 fewer whites. This defies the simple story that enslaved laborers and artisans displaced free workers at specific tasks, for which one might

[14] For temperature and rainfall, the standard errors of the kriging (interpolation) exercise are somewhat more related to free-slave region than are the interpolated climate variables themselves. This indicates that these effects come in part from the endogenous placement of weather stations rather than real differences in climate. Note that the climate data come from the mid-nineteenth century and are described in Bleakley and Hong (2017). We eschewed modern climate raster data because (endogenous) urban heat islands are clearly visible.

[15] See Appendix Figures B.1 and E.1 for maps of the glacier extent and depth to bedrock. The area-weighted average depth to bedrock in the border counties is 132cm to the north and 129cm to the south. In these same counties, the fraction covered by the glacier was 36 percent and 28 percent, respectively. These are unlikely to induce differences in farm values and population density of the magnitude estimated below.

have expected estimates closer to parity. On the slave side, the mean densities are about 16 for nonwhites and 61 for whites per thousand acres, so these are large effects.[16] As a consequence, total population density is lower. This gap is not due solely to differences in urbanization. Total rural population per land area is substantially lower – by about one half– on the slave side.

For all the variables, the point estimates for border and 150-mile samples are very close to each other. Those for 300-mile sample shows larger gaps, a finding explored in Section IV: E below.[17] A parallel analysis of population attributes in 1850 would yield very similar results. The lower density speaks to land use; a given land area in the slave region was devoted to supporting far fewer people.

V. Land Use and Value

Figure 4 presents results on the effect of slavery on farmland use and values. As noted in the introduction, the local public finance literature considers such variables to be sufficient statistics for evaluating the economic effects of local institutions and policies affecting property rights. (Such a calculation does *not* account for equity issues, which are very significant in this case.)

We start with farmland use in 1860. The share of farmland in total land is smaller in the slave region, but just barely so. The differences are not statistically significant. The share of improved farm acreage in total land is lower, and, for both the donut and border samples, the differences are statistically significant. Parsing these two findings, we see the share of improved acres in farm acreage is lower in slave region. The differences are now all statistically significant at the 95-percent level. In summary, farmland was used far less intensively on the slave side.

Differences also appear in farm values. Farm values per capita are lower in the slave region, but the gaps are not so large as to be significantly different from zero. We then shift from dividing the value of farms by population to dividing by county land area. (The land owner would want a policy that yields higher land values per acre not necessarily per capita.) Here the gaps are large and statistically significantly different from zero. Then we divide instead by farm acres. Farm values per farm acre are also substantially lower in the slave region. The gaps are economically huge, a reduction

[16] See Table 2, Panel C. The use of levels instead of logs also facilitates the analysis of slave population, which is zero in many of the counties. If we put enslaved population density on the left-hand side, we obtain a coefficient of 5.5 more slaves per thousand acres. This is very close to the estimate for nonwhite population.

[17] Appendix Figures F-3 and F-4 extend the analysis to cover differences in the age composition of the 1860 population and in sex, race, and nativity, respectively. Appendix Figure F-3 shows the slave region had relatively more young people (10-14 years) and fewer older people (40-79 years). This pattern is in line with the characterization of the border South as an area where young slaves were raised to be sold "down the river." The magnitudes of the differences, however, were not great. Appendix Figure F-4 shows more non-whites in the slave region, more males and more females. But again, the gender differences were not great. There were fewer free people of color and, marginally, fewer foreign-born whites. The evidence of lower fraction of foreign-born is weaker that one might expect given the common narrative that immigrants strictly avoided slavery. There appears to be little difference from the behavior of native-born whites.

on the order of 55 percent.[18] In natural units, the reduction in farm value is about $8 per county acre or $11 per farm acre. (Furthermore, approximately 13 percentage points less of total farm acreage is improved on the slave side.) An analysis of farmland use and values in 1850 yields similar results.

In summary, farm values per farm acre were substantially lower – by over one-half–in the slave region. The ratio of improved land to farm acre was also lower.[19] These findings are puzzling for models in which coercion made labor cheaper, which would have raised land rents. The puzzle extends to models where the legal capacity to engage in activities of value (such as raising slaves for sale) increases land values. At the strictly micro-level, producers had access to more modes of production south of the border. Yet there was lower demand for that land.

VI: Sensitivity Analysis

Results, reported in Tables 2, 3, and 4, should assuage readers' concerns about omitted variables, endogeneity, geospatial correlation, and external validity. The estimates are qualitatively similar under a variety of alternate assumptions. Additional analysis shows the patterns observed extend far beyond the border comparison and well before 1860.

VI.A: Additional Variables

In Table 2, we present estimates of the effect being in the slave region on the main outcomes, in the full sample. In the first row of Panel A, we see the baseline results, which use land area as a weight in the regression. In the next two rows, we find broadly similar results if we weight by rural population or use no weights at all.[20] The final row of Panel A assigns the few observations with a zero or missing value for the outcome to the sample minimum value instead. This has its greatest effect on the sample size of the nonwhite population, as there were a comparatively large number of counties that were 100 percent white in the 1860 census. This adjustment, however, does not affect the estimates to a great degree.

Panel B of Table 2 presents estimates using a variety of spatial controls. In the first three rows, we include dummy variables based on splitting the sample into five, ten, and then fifteen bins of

[18] Appendix Figure F-2 performs a parallel analysis of the z-scores associated with farmland use and value in 1860. The finding that farm value per acre was lower in the slave region again is again apparent.
[19] One notable outcome comes from contrasting the third and sixth sets in Figure 4. The third set shows the fraction of farmland that was improved was lower in the slave region whereas the sixth set shows farmland values were lower. The point estimates in the third set of results are smaller than those in the sixth, so the farm value gaps are not explained mechanically by the gap in improved acreage in 1860. Similar results hold in 1850. See also Section IX:A below.
[20] Neither of these was the preferred specification because the former is endogenous to county land quality and institutions and the latter gives more weight to states, e.g. Kentucky, with greater proclivities to subdivide themselves.

longitude. The fourth row includes instead a cubic polynomial in latitude and longitude, which is distinct from the default specification based on longitude and distance from the free-slave border. Results including these purely spatial controls do not deviate substantially from the baseline. The next five rows show results controlling for the environmental factors. These variables were described already in reference to Figure 2, and most were not significant predictors of being on the free side of the boundary. The first row in this batch contains variables for topography, river access, groundwater, and climate. The second row controls for depth to bedrock, which is correlated in a statistically significant way with the institution of slavery, but whose inclusion in the model does not affect estimates associated with the free-slave boundary. The next row includes instead the remaining soil measurements described above. Results are generally similar, although there is now a statistically significant effect of slavery on farm acreage per county area and the estimated effect of slavery on farm value per county area is somewhat lower than the baseline. The next two rows control for the fraction of the county covered by the most recent glacier. The second row of this pair leaves out the Driftless region, mostly within southwest Wisconsin, and is therefore simply a measure of being north of the terminal moraine. These estimates are comparable to the baseline.

Panel C, Table 2 presents results for the standard outcomes, but defined in levels rather than in natural logarithms. These estimates differ because of the change of units, but the patterns of statistical significance are largely unchanged.

Panel D, Table 2 reports results for other boundaries. The first are the coefficients from samples analogous to the border sample but with pseudo-borders that are displaced by 50 miles north or 50 miles south of the actual boundary.[21] The magnitudes of the coefficients, which are strong at the actual boundary, become much smaller at the pseudo-borders. And in almost all cases, they are no longer statistically significantly different from zero. We add four more pseudo-borders, constructed these from actual state borders and from rivers. These four are displaced from the free-slave border and thus do not represent a change in slavery legality. They all run in a mostly east-west direction, like the free-slave border. The first three are strung together from state borders only, and are mostly rectilinear. The fourth is attempt to replicate the mix of riverine and rectilinear borders found on the free-slave border; it follows the Arkansas River to its end, up the Mississippi River to the Tennessee southern border, east to the Tennessee River, up that river (and its tributary, the middle fork of the Holston) to the Virginia southern east, and on to the Atlantic. There are 24 coefficients, of which only two are statistically

[21] We focus on a sample of adjacent counties because the 150- and 300-mile samples for proposed pseudo-boundaries would include the actual boundary.

significant, both for nonwhite density. Big jumps in outcomes are not apparently a generic feature of longitudinal (east-west) amalgamated state borders, but rather are specific to the free-slave boundary.

We next turn to two boundaries where we would expect changes: the limit of the cotton belt and the terminal moraine of the glacier.[22] For counties touching the northern extent of the cotton belt (see US Department of Agriculture 1922, p. 342), those just inside have 60 percent higher nonwhite population density. There is a small drop in the white population density and small increase in the total rural population density. The latter two effects are neither economically nor statistically significant. The results for land use and improvement are similarly insignificant. This is inconsistent with interpretations strongly emphasizing an aversion by whites to work alongside slaves or around plantations. But additional controls for land quality are required to assess this conclusion.

For counties adjacent to the terminal moraine, having been glaciated is beneficial. Such places have higher population density, more land farmed, more improvement per farmland, and higher farm values. Per county acre, farms have over 60 percent higher value, an amount comparable to what we estimate for being Free Soil. Controlling for glaciation in Panel B had little effect on our estimates and we can now see how. At the free-slave border, the difference in glaciation was a mere 8 percent of county area. Multiplying the glacier coefficient of 60 percent by 8 percent would leave a contribution that is a small fraction of the estimates for slavery legality.

We now consider the possible confounding influence of land surveys. Notably, most of the Old Northwest was brought into the Public Land Survey System (PLSS), while much of the rest of the sample used non-rectangular, mostly metes and bounds, surveys for the demarcation of property (see Appendix D). Attention to this issue is motivated by three factors. First, the PLSS may affect transaction costs: perhaps reducing them, as argued by Libecap and Leuck (2011), or perhaps increasing them if the grid is set too far away from the optimal farm size, as argued by Bleakley and Ferrie (2014). Second, the Northwest Ordinance's demarcation scheme was in part motivated by a 'Jeffersonian dream' of yeoman farming (Gates 1996). Third, the use of the PLSS has said to induce more orderly, compact settlement, in contrast to a squatter-led regime.

We account for any confound from the PLSS with two strategies. The final row of Table 2, Panel B reports results that directly control for the fraction of each county covered by the PLSS. Estimates are qualitatively similar to those with other specifications. We also split the sample based on whether the closest free-slave boundary is associated with the change in land demarcation system

[22] These, as for the riverine boundaries also used in Panel D, might cross through counties. We code the fraction of the county on either side of the border. Our variable is, thus, now continuous, although most of the observations are at or near either zero or one.

(specifically, PLSS versus something else). Most of the Ohio River, for example, is associated with a change, with the main exceptions near Cincinnati and Louisville. The Mason-Dixon Line is not associated with a change, nor is most of the Missouri border, with the exception of riverside land near St. Louis that is associated with colonial French land claims. The first two rows of Table 3, Panel A, display these subsample estimates. Coefficients are remarkably similar, with the exception that the effect size is almost halved for fraction improved of farm acreage if there is no change to the PLSS at the border.

Next, we consider whether urbanization in (northern) border counties generates our results. A city or town on one side of the border might increase the local demand for land, for example, to grow truck produce to feed urban workers. (Access to global or national markets should be similar from either side of the border, as they are adjacent, and in many cases situated on the same navigable river.) To investigate this, we classify each slavery-legal county based on whether there is urban population in the county or counties on the opposite side of the border. Free soil counties are classified according to their own urban population. We create subsamples in which there are no urbanizations on the northern side of the border. Therefore, the comparison is coming only from rural counties on both sides. (The census uses two definitions for urbanization: more than 25,000 or more than 2500 urban residents. We make subsamples using both.) Panel E of Table 2 contains these results. Estimates of the coefficient are generally similar to the baseline. The largest difference is for the nonwhite population, perhaps because urbanizations just north of the border attracted free people of color. That being said, results for land demand and land use remain quite strong.

VI.B: Subsamples

Table 3 presents results for select subsamples, an exercise which is informative for its own sake and sheds light on the possibility of certain alternative hypotheses and mechanisms. Panel A splits the sample based on characteristics at the closest segment of the free-slave boundary. The role of different land surveys, analyzed in the first two rows of Panel A, was discussed above. The next three rows split the sample into three, less heterogeneous chunks of boundary: the Mason-Dixon line (plus northern and eastern borders of Delaware), the Ohio River, and the state of Missouri. Estimates are qualitatively similar across segments.

Next, we stratify based on whether the boundary is defined by a natural feature (in our case, rivers) or an artificial, geometric construct --the Missouri/Iowa border, the Mason-Dixon line, and the

arc of the northern border of Delaware.[23] Both choices are arbitrary in some sense, and often selected historically based on imperfect knowledge of what is on either side. In any case, estimates across these two subsamples are broadly similar.

We next turn to heterogeneity of this effect by the timing of settlement along the boundary. We already have seen similar effects across three different, contiguous border segments, which were settled at different points in time. The last two rows of Panel A do something similar by splitting the sample by whether the closest boundary is east or west of the confluence between the Miami and Ohio Rivers (at the Indiana/Ohio state boundary). Then, in Panel B, we use the Newberry data on historical county boundaries, as reported in Siczewicz (2011), to approximate the timing of settlement. The first two rows discriminate by whether the county's FIPS code first appears before the median year in the sample; the second pair of rows split the sample based on the emergence of the current county boundaries.

Another important consideration is soil exhaustion. Planters, it was commonly asserted, were irresponsible stewards of the soil (Craven 1926, Majewski 2016). A number of reasons were given: plantation crops were hard on the soil, the planters' ability to coerce the migration of their slaves gave little incentive to conserve the soil on their existing farm, principal/agent problems on large farms, etc. If true, this could explain the lower farm values on the slave side. It might also explain lower land improvement, if previously tilled acreage was abandoned and reclaimed by nature. We should first note that this claim is not consistent with the evidence just presented. Generally, coefficient estimates are similar across the previous three sets of sample splits, even though the timing of settlement would have been quite different. Furthermore, in two of the three splits, the effects on farm value are weaker for counties settled earlier, even though those would have had more time to ruin their soil. We can also use a direct measure of the soil's susceptibility to erosion: the kf-factor, which measures the "susceptibility of soil particles to detachment and movement by water," and the k-factor, which is the same measure but adjusted for the presence of rocks. (Miller and White 1998). In Panel C, we display results for subsamples with larger or smaller values of these factors. The effect of being in the slave region on nonwhite population density is quite similar across the subsamples. However, we see discrepant results for most of the other outcomes. Nevertheless, these discrepancies do not favor the soil-exhaustion claim; for example, the effect on farm value is greater in places *less* susceptible to erosion. The skeptical reader might now observe that the soil variables are based on 20th-century

[23] The major rivers, the Ohio and Mississippi in their natural forms, provided ready transportation to both regions. Many of the smaller rivers saw active batteaux and flatboat traffic. Investments in other types of transportation improvements—river clearing, wing dams, sluices, roads, canals, railroads—are best viewed as endogenous outcomes in the development process.

surveys, and that the susceptibility measure might have been affected by earlier bad farming. But recall from Figure 2 that the free-slave boundary is not a significant predictor of erosion susceptibility.

As the data permit, we can see broadly similar patterns in earlier years. We focus on 1860 because it is the year of greatest data availability before the Civil War. However, all of the earlier censuses had population and a few subcomponents, if the county was organized. The 1850 census also reported farm values. Figure 5 plots the year-specific slave-region coefficients for nonwhite and rural population density 1790-1860 and farm value per farm acre for 1850-60. We use the full samples and the part for which Mason-Dixon line is the close border segment. The coefficients vary by year, especially in the whole sample, which is influenced by the emergent county boundaries in the western part. However, the general finding throughout the antebellum years is similar to what we report above. The patterns, for example, predate the enactment of the 1850 Fugitive Slave Act, passed on September 18. The collection of the 1850 US Census began on June 1, several months earlier. Similar results for population density hold in 1840 and before. The stability of the gap in the rural population density speaks as well to the potential role of soil erosion. If southern planters were more extensively engaged in soil mining, one would expect relative population density to decline over time. It does not. [24]

VI.C: Spatial Correlation

We now consider alternative strategies for assessing the precision of our estimates above, in light of the spatial correlation in the data. A county should not be considered independent of its immediate neighbors, because so many of their outcomes have determinants that are either common or highly correlated. The strategy above is to use 15 bins of longitude as clusters, which follows on the work of Bester, Conley, and Hansen (2011) as a computationally efficient procedure to account for spatial correlation, at least within the stated groups. The averages across these 15 groups themselves exhibit low spatial correlation, suggesting that the strategy is adequate to mop up the variation that is correlated across county observations. In Table 4, Panel A, we compare the estimated standard errors for a few clustering strategies. The first row contains the estimated coefficient, and the second row contains the baseline standard error. The next row uses instead 10 groups of longitude as clusters, which inflates the standard error to some degree. The following row uses only five groups of longitude, for still larger standard errors. The statistical significance would be judged essentially the same under all three of the strategies, with the exception of farm value per county area, whose coefficient becomes marginally significant when using only five bins of longitude. In the next row we use states as the

[24] We thank Edward Glaeser for bringing this interpretation to our attention.

clustering variable. There is some justification for this inasmuch the policy under analysis (among others) varies at the state level. The strategy yields still larger standard errors, and results for rural population and farm value per county area are rendered marginally significant. For comparison, we also report standard errors under the assumption of independence; these are considerably smaller than those using the large clusters.

We then turn to a parametric approach for dealing with space: the Conley (1999) estimator. This estimator uses a predetermined band of distance around each observation and estimates the correlation within it. The estimator, which is analogous to the Newey-West estimator for time series, uses a kernel that tapers off to zero, linearly with distance, within the band. We show results from the Conley estimator in Table 4, Panel B. The typical distance from the center of a county to that of its neighbor is 5-15 miles, so we start with a 20-mile band. This allows an observation to be correlated with its immediate neighbors which, in turn, can be correlated with their immediate neighbors. As seen in the second row, the estimated standard errors hardly budge, as compared to the plain-vanilla errors estimated in the final row of Panel A. Doubling the band to 40 miles increases the estimated standard error by perhaps 30 percent. We present, in the remainder of the panel, results for bands out to 150 miles.

Kelly (2020) introduces an alternative parametric adjustment for spatial correlation, which we employ here. This method uses for the spatial kernel a flexible function governed by three parameters: the fraction of idiosyncratic noise, the smoothness of the function, and the range of influence. The latter two parameters are difficult to identify separately, so we adopt Kelly's three suggested choices of smoothness (kappa) and then use maximum likelihood to estimate the other two parameters. Results are found in Panel C of Table 4. Kelly-type standard errors are comparable to the baseline estimates and also to Conley-type errors estimates with a 100-mile band. The standard errors are more than double those based on an assumption of independence. This does not change the conventional statistical significance of any of the coefficients. These robustness results offer important reassurance.

VI.D: Effects off the Border: Adding Changes-in-Slope Terms

How much is this effect local to the border? Above we argue that the northern edge of the slave region is highly suitable to be Free Soil. The climate and geology are similar to the southern edge of the free zone, where free labor was thriving.[25] But farther south, the environment might become so

[25] In related work (Bleakley and Rhode, 2023b), we use the ecological measures used above to construct indices of ecological suitability for settlement as Free Soil. We show that the endowments that favored higher rural population density in the North were found in ample measure in the Upper South. Indeed, the Upper South was more suitable.

unsuitable to free labor that the effects diminish or reverse in sign. In Table 4, we assess this claim in two ways: (i) expanding the buffer around the boundary and (ii) allowing for a 'kink' at the boundary in addition to the 'jump' already used. Ideally, there would be a free-soil zone randomly placed in the Deep South for comparison. But this is not possible. Instead, this analysis uses the spatial trends estimated within each region.[26] For Panels A through D, we use the default specifications, but for buffers of 300, 450, 600, and 900 miles from the boundary. As we zoom out, the effect on nonwhite population is somewhat smaller, but the effects on white population and on rural population double. There emerges a large negative effect of slavery on total farm acreage, and the negative effects on land improved and farm value intensify.

We next test for a kink at the boundary in the effect of slavery. Specifically, while there might be a jump at the boundary, there could also be a change in the slope that attenuates or amplifies the effect as one moves farther south. The remainder of Table 4 reports the results for regressions including an intercept term—slavery legal—and a change-in-slope term—slavery legal*(distance to boundary/100). The specification employed is:

$$(3)\ Y_i = \beta_{1*}\text{Slavery\_Legal}_i + \beta_{2*}\text{Slavery\_Legal*Distance}/100_i + \gamma_{1*}\text{Longitude}_i + \gamma_{2*}\text{Longitude}_i^2 + \gamma_{3*}\text{Longitude}_i^3 + \gamma_{4*}\text{Distance}_i + \gamma_{5*}\text{Distance}_i^2 + \gamma_{6*}\text{Distance}_i^3 + \beta_0 + \varepsilon_i$$

Note the change-in-slope term is in addition to the (smooth) spatial controls included in the baseline specifications. For the most part, the slope effects reinforce rather than counteract the change in the intercept.[27]

Figure 6 illustrates these geographic patterns using farm value per county area. Each dot represents a county in 1860. The marker size is proportional to county area, which is also used as a weight in the estimation of spatial trends. The various lines denote estimated spatial trends. The solid line is a quadratic fit, specific to each side of the boundary. The gap between these two curves is approximately 1.5, at the boundary. This is comparable to the estimates in Table 4 that use the widest buffer. The slopes at the boundary are positive for both curves, and their second derivatives imply maxima south of the border. The spatial trend for the slavery region peaks at roughly 125 miles south,

[26] This might be modeled as a set of underlying natural factors that move smoothly over space, but enter into productivity with differing weights by institution (free soil vs. slavery-legal). This would generate a jump and a kink at the boundary in the spatial pattern of land value. In Bleakley and Rhode (2023b), we do indeed find that the endowments conducive to free-soil agriculture received a lower return where slavery was legal, and vice versa. This indicates that institutions affected a different mapping between endowments and outcomes in each region.

[27] Note this is compatible with the Upper and Lower South having different land productivity, but this could be due to an underlying spatial trend, not the institutions.

which is largely within states that are themselves on the border. In contrast, the estimated quadratic for the free region peaks at around 550 miles south, which reaches into north Florida and east Texas. The dashed lines are extrapolations of said quadratics to the other region. The curve is uniformly higher if estimated with the free region versus with the slave region. The trend in the slave region peaks within the region. In contrast, the trend in the free region indicates higher land productivity as one moves south, with only a minimal indication that this trend is abating. These estimates do not support the view that free-soil institutions would only be suitable to the more temperate north. One complication is the border's direct effect, which might distort our estimates. To wit, we add dotted lines for extrapolations that only use counties more than 50 miles from the boundary. The patterns at the boundary are similar to those already described, and the extrapolation of the free-soil trend peaks even further south.

While the extrapolation south becomes more speculative as we move far away from the border, the majority of the activity in the slave region in fact takes place within our default samples. Consider how the median latitude and longitude change if we use different weighting variables: by county area, the median is just south of the confluence of the Arkansas and Mississippi rivers; by farm value, the median lies in the Boot-heel region of Missouri, some 150 miles north. The median distance to the boundary is approximately 180 miles, if we weight by farm value, population, or improved acreage. Even if the weight variable is slave or non-white population, the median distance to the boundary is less than 300 miles. The 300-mile buffer contains approximately 70 percent of the improved acreage and of the farm value in the slave region. If the estimated treatment effects on farm value were to drop to zero (in contradiction to the estimates above) after 300 miles, there would nevertheless be a large, negative effect of the institution. Even if the effect south of this buffer was equal, but of opposite sign, the net effect would remain substantially negative.[28]

VII. Farm Output and Scale

Delving deeper into the Census of Agriculture allows us to observe crucial differences in farming operations, in crop choices and farm sizes. (We will return to running specifications 1 and 2, without changes-in-slope terms. And, to avoid clutter, we drop displaying results for the donut sample.) Figure 7 graphs the point estimates and confidence intervals for key variables related to farm production activities in 1860. We examine the top 20 farm products in the 300-mile band around the

[28] The plantation regions of the Deep South, the so-called Black Belt, were noted for their slave majority populations. But the density of enslaved people per square mile in the Black Belt counties on Georgia, Alabama, Mississippi, Arkansas, and Louisiana was not higher than in the South-side of Virginia or the Blue Grass region of Kentucky. What differentiated the regions was the lower density of the white population in the Deep South.

border. We will refer to these as crops although four– butter, cheese, wool, and honey—are technically animal products. Note that the slave-free border was sufficiently far north that cotton, rice, and sugar cane are not among the top 20 farm products. The extent of the production activity in each county is normalized by total farm acreage (US Census Office 1864b).

Analysis of the crop data reveal that the small grains --wheat, rye, oats, barley, and buckwheat-- were less common in the slave region. Wheat was grown in both regions, indeed even on slave plantations (see Irwin 1988 and Wright 2006). But it was less common on the slave side. The gaps for rye and buckwheat were small, but that for barley very large. Animal products (and their inputs such as hay and clover seed) were also less common in the slave region. Corn showed no difference at the border and only small differences in the widest band (in line with the standard findings of economic history that southern farms and plantations in the antebellum period were generally self-sufficient in maize.) The crops that were more common in the slave region were tobacco and hemp. Indeed, the differences for tobacco are most apparent. Tobacco had year-round labor requirements with intensive activity levels in close proximity, which facilitated direct surveillance by supervisors (Gray 1933). In general, crops producing more revenue per acre were grown on the slave side (see US Census Office 1854, p. 176).

The patterns of specialization may be compared with the stated intentions of Thomas Jefferson. Jefferson authored a memo that was a model for the Northwest Ordinance and promoted the idea that the country would be better off if it were populated principally by free yeoman farmers. Small-scale operators might be expected to be engaged in producing grain, dairy, and other diversified outputs. The producers on slave side had access to a technology that those on non-slave side did not—they could coerce non-family labor to join their work-force and attain a larger scale of operations with greater ease (see Fleisig 1976, Naidu 2020).

The distribution of farm sizes also looks different on the two sides of the border. Figure 8 uses the Census of Agriculture data to provide a contrast of scale of farm operations. Operations of 500-999 acres were significantly (in both statistical and economic terms) more common in the slave region. There is a lower prevalence of farms at the yeoman's scale, in the 50-99 acreage range. The gap is nearly significant at conventional levels at the border but becomes statistically significant at the 95-percent level for the widest band considered, within 300 miles.

VIII: Measurement and Interpretation of County-Level Wage Rates

VIII.A: Wage Gaps at the Free-Slave Border

We add wage data to the analysis and find a gap at the border: labor had a higher price on the side with slavery. The 1860 Census of Social Statistics collected county-level data on wage rates for various occupations (Lebergott 1964, Margo 2000).[29] In addition to using the (relatively noisy) individual series, we estimate the principal component of the natural logs of the five series to create a single, convex measure.[30] (See Appendix G for details.)

Figure 9 presents results for the effect of slavery on returns to labor. The wage gaps reveal higher returns on the slave side. A key initial observation is that regional differences in board are not the driver. The point estimates and confidence intervals for the county-level data on weekly board reveal the differences are not statistically significant. Turning to the specific wage series, we see the point estimates for female domestics were generally higher in the slave region. Carpenter's wages were higher by statistically and economically significant magnitudes in the slave region. The results for day laborers show higher point estimates in the slave region, although the confidence interval covers zero. But we never see daily wages that were lower by statistically significant magnitudes in the slave region. The results for weekly farm wages show a gap that is positive and significant. The results without and with the Ohio supplementary data are not fundamentally different. Finally, we turn to the results for the estimated first principal component. Again, labor returns were higher by statistically and economically significant magnitudes in the slave region.[31]

[29] The manuscript records include monthly wages of farm hands, daily wages of day laborers and carpenters, weekly wages of female domestics, and the weekly price of board for laboring men. Unfortunately, the schedules for Ohio, apart from four counties, are lost. We supplement the sample with 1857 Ohio data for daily labor and farm hands (Ohio Board of Agriculture 1857, Ohio Commissioner of Statistics 1858). We convert the wages into daily equivalents by assuming a six-day week.

[30] To facilitate interpretation, we renormalize the principal component to be a convex combination. By convention, variable weights for principal components are vectors of unit length, meaning that their *squared* elements sum to one. This fails to produce a convex combination of what are, in this case, essentially similar objects: log wages. It instead implies a function that is homogeneous of some degree greater than one in the level of wages, analogous to a Cobb-Douglas with increasing returns to scale. To address these issues, we renormalize the variable weights to sum to one. We also wish all of the variables to have positive weights, so as to form a convex combination. This happens to be the case with these data, so there is no need to constrain the estimate further. As this weighting vector therefore points in the same direction as the conventional one for a first principal component, it yields the geometric mean of wages that best summarizes the variance in log wages.

[31] We also examined whether the gaps were due to differences in human capital. For free workers identified as common laborers, farm laborers, carpenters, and domestic servants in the 1860 population micro-sample, literacy rates were lower on the slave side of the border. Accounting for human capital widened the gaps, rather than narrow them.

The overall findings are striking: wages were about 10 percent higher on the slave side. Coercion might extract work from slaves at lower cost, but labor returns for workers on the slave side of the border were higher.[32]

VIII.B: Interpreting the Results within the Rosen/Roback model.

There is a puzzle. A yeoman farmer from the East or from Europe coming down the Ohio River could unload on the left or the right bank. The land is essentially the same on either side. But on the southern bank, the land is cheaper and wages higher. Yet the majority settle on the northern side. What does this tell us about the preferences of the settlers?

We can interpret the results using the Rosen/Roback spatial equilibrium model (Roback 1982 and Appendix H for details). Firms and (free) households pick their preferred locations. In the most general version of the model, both firms and households use land. In the variant that best fits our case, only firms (here farms) use land and households do not (as the land component of housing costs was negligible in rural areas). A free household's utility rises with wages and amenities. Farms' land rents (and values) rise with productivity and falls with wages. The summary interpretation is that the observed combination of lower land values and higher wages is consistent with a strong household-side disamenity that free people associated with living and working in the slave region.

The following text table summarizes the implications of the model:

		Land value of location: High	Land value of location: Low
Wages at location	High	productivity is higher (labor demand must have shifted out)	amenity is lower (labor supply must have shifted in)
	Low	amenity is higher (labor supply must have shifted out)	productivity is lower (labor demand must have shifted in)

The results place the slavery-legal counties in the upper right cell: low land value and high wages indicate that labor demand shifted in because of a lower consumption amenity for the mobile workers. Note that this implies nothing about the sign of fundamental productivity differences across the border,

[32] These labor markets were sizeable, and each category was represented on both sides of the border. The 1860 full count census of the free population shows that with 300 miles of the free-slave border, there were 1,270k farmers on the free side and 652k on the slave side; farm laborers, 561k and 177k; laborers (nec) 403k and 141k; carpenters 169k and 44k; and domestics, 61k and 19k.

other than they are dominated by a lower amenity (or higher disamenity) on the southern side. Migrants demand a higher return to their labor if they are to settle there. This could come as higher wages, as measured, or as cheaper land for a farmer to work.[33]

The vast literature on "Free Labor" offers numerous reasons for such a disamenity (see Ruffner 1847, Helper 1857, Foner 1970, Bleakley and Rhode 2023a). One thing we know about slave societies is that the institution of slavery permeated all aspects of the society. Things were structured to accommodate, support, and perpetuate slavery and the interests of slaveowners. Those external effects can distort many other choices. A landless white might have to serve in the militia, or just worry about slave rebellions. Free workers might not want to work alongside slaves or just be in a place where the slavery existed. It is hard to distinguish between the different motives, but narrative evidence suggests that many yeoman farmers felt that the slave system did not work for them (Merritt 2017). Under slavery, governments emphasized enforcing order rather than providing services such as public education. (See Section X for further discussion.)

VIII.C: Additional evidence on revealed preference: long-distance migrants

Migration (including from Southern states) drove faster population growth on free soil. Analyzing census microdata from 1850 and 1860, Bleakley and Rhode (2023a) found that adult males born in slave states left their native region at a rate 4-5 times higher than those born in free states. Indeed, nearly 1 in 4 adult male household heads born in the south lived in the north in 1860. (The comparison of place of birth and of residence is common in the study of migration. The focus on adults improves measurement here, as their children tend to be born where their parents migrated. We follow this approach below.)

We again use the border between free and slave states to assist in measurement, this time of the revealed preference of migrants for institutions. Consider someone born far from this border, but who chooses to move hundreds or possibly thousands of miles to the border region. If migration is a smooth process of diffusion, we would expect approximately equal numbers of migrants on either side of the border. If instead, there is an imbalance, we suspect an effect of institutions. We can also examine the imbalance by difference places of origin.

We construct an extract of long-distance migrants to the borderlands. From the 1860 Full Count Census File (Ruggles et al, 2021), we extract all male household heads, 25 years of age and over, that reside in a county that touches the border between the free-soil and slavery-legal regions. We exclude

[33] Bleakley and Rhode (2023b) show free farmers in Kentucky received a similar compensating differential to operate there.

all those born in the border states themselves, as we cannot be sure that they migrated at all. These filters yield birthplaces comprising 10 US states from each region, plus Canada, the West Indies, and 17 locations in Europe.

The imbalance in the borderlands, by place of birth, is shown in Figure 10. (Various tables in Appendix I gives the underlying numbers by place of birth and residence.) The bubbles are proportional to the natural log of the cell size in the extract and are located at the respective birthplaces, except for the aggregated categories seen in the ocean. (The bubbles for the Northeast had to be pulled apart a bit for legibility.) The pie charts denote as blue and gray the fraction of residents on free-soil and slavery-legal sides.

Migrants from outside the border states tend to favor the side without slavery. From three broad categories, migrants are more likely to be found north of the free-slave border: 58 percent of foreign born, 59 percent of southern born, and 69 percent of northern born. Of the ten southern states, only two are more likely to be found in a southern border county, and only one of the non-border northern states are overrepresented on the southern side. Similarly, only four of nineteen foreign birthplaces are overrepresented in a southern border county. These patterns are similar for 1850 and even stronger for free people of color in 1860. (See Appendix I, Tables 3 and 4.) If we drop urban residents from the border sample, the patterns are similar: now only one of nineteen foreign birthplaces are overrepresented on the slavery-legal side, so this is not a phenomenon of differences in urbanization.

Yeoman farmers followed Horace Greeley's command to "Go West, Young Man" in pursuit of cheaper and emptier land. But the movement west showed a northern bias, even though land was pricier and wages lower on Free Soil. Those free-to-choose disproportionately chose to avoid slavery.

Could these imbalances be driven by ignorance rather than distaste? We suggest not. The pattern of revealed preference is seen for whites born in the Deep South, where there was knowledge of both slave-based agriculture and yeoman farming. A migrant mistakenly going to the northern side of the border could quickly learn that land was cheaper and wages higher on the other side. He might not move himself, but he could inform his later-migrating compatriot or cousin about the opportunity across the river.

IX: Accounting for Slavery

The dominance of disamenity effects do not rule out negative effects of slavery on productivity as well. We examine here the role of several proximate determinants for farm values and then compare the magnitudes of slave wealth and of the gap in farm values. We find that farm improvements and higher wages explain much of the effect on farm values at the free-slave border. Differences in

measured Total Factor Productivity (TFP) do not appear to explain much of the gap. Nor do differences in pecuniary taxation. Looking at the border example brings the economic costs of the slave system into sharper light.

IX.A: Investments in Improvements

A sizeable proportion of the difference in farm values stems from more investment in land on the free side. We quantify two channels here. First, the higher rural population on the free side (about 50 percent more) would have required more housing. And there were likely more barns and other structures. The 1860 Census of Agriculture lumped land and buildings together in its farm value measure. Authorities report structures as being almost one-fifth of farm value. Subtracting the estimated value of buildings from the farm values yields an estimate of the value of land alone (see Gallman 1972, Primack 1975; Lindert 1988). Second, we observe the free side had more improved acres per total farm acre. The literature offers various ways to adjust for this difference. We report two methods, based on the ratio and subtraction approaches (see Appendix J for details).

Table 6 reports estimates of the effects of slavery on land values after attempting to adjust for differences in buildings and land clearing. The estimated effects are everywhere negative and typically statistically significant. Taking the 300-mile buffer as example, the results of farm land (excluding buildings) indicate a 46 percent reduction, or $7.74 per acre, on the slave side. The results for farm land adjusting for improvements (in the first method), show a 36 percent reduction, or $4.20 decline per acre. The effects are larger in magnitude for the second method, but the estimation is less precise.[34] Thus, a sizeable fraction of the difference in farm values per acre is explained by differences in building values and land clearing, but a large fraction remains. Note differences in building and improvements were outcomes of the institution of slavery.

IX.B: Total Factor Productivity in Agriculture

Slave labor, wage labor, and family labor (yeomanry) systems all had aspects that enhanced or impeded labor productivity: slavery was backed by coercion, although agency problems were commonplace; wage labor was plagued by agency problems as well, along with uncertain recruitment and retention; yeomanry solved an agency problem, but under capital constraints or with a limited span

[34] The land value estimates utilize state-level parameters which make comparisons in the border sample problematic. The changes may be artificially sharp at the points where the parameters shift as in the border counties. Comparisons in the 150-mile sample and 300-sample are not so greatly affected. The gaps in raw land values do have an east-west gradient. The slavery-related differential in higher in the settled east than in the frontier west. This is to be expected as the federal government sold the public domain in the west for the same price-- $1.25 per acre in cash—in both the free and slave regions.

of control. There is a vast literature on how the labor of coerced workers will be grudgingly given and how the ideas that generate long-run economic growth do not flow so readily in a slave economy.

But measured differences in agricultural TFP appear to explain only a small fraction of the differences in land values at the border. We can estimate TFP in 1859-60 agriculture at the county level using the approach developed by Fogel and Engerman (1971, 1974). In addition to our main approach, we consider a variant that alters the assumed labor force participation rate and another variant that alters the treatment of improved land. See Appendix K for details. The county-level estimates do largely replicate their North-South comparisons. Many of the critiques directed against their regional analysis are less relevant for comparisons at the border. Absent here are the large differences in latitude, affecting the length of the growing season, types of crops grown, or hours of labor worked per year. Nor are there large differences in soil quality. The Border South did not grow the plantation crops, such as sugar, rice, and cotton, thought to be characterized by substantial economies of scale. Special conditions in the cotton sector during the 1859 crop year—the coincidence of high demand with abnormally high yields per acre—do not cloud the border comparison (see Fogel and Engerman 1977, 1980; David and Temin, 1979; Fogel 1989; Wright 1978, 2006).

To calculate TFP, we use county-level agricultural labor force estimates developed by Lee Craig and Thomas Weiss (Craig and Weiss 1998). We report estimates based on Craig-Weiss's numbers directly as well as a variant created to reflect the higher agricultural labor force participation rates assumed by Lebergott (1966). We also derive results where the contribution of improved land is up-weighted in line with the considerations raised above.

Table 6 reports the effects of slavery of estimated TFP in the border sample. (National TFP is centered around unity.) In general, the slavery effect is negative, but small. In the 150-mile buffer sample, the measured effects are on the order of -2 to -5 percent, and not statistically significantly different from zero. In the 300-mile buffer, the effects are larger in magnitude, around -10 percent. As might be expected, the numbers calculated using the Lebergott method are less favorable to the slave side than those using Weiss's method for labor or using higher weights for improved land.[35] But the overall take-away message is the productivity gap at the border was small and can account for only a minor fraction of land value gap.

[35] A major effect of coercion was to increase labor force participation, especially of prime-age women, in market production. This represents an increase in inputs per capita and will not be reflected directly in TFP.

IX.C: The Price of Free Labor

Free labor's preference for free soil explains a substantial part of the differences in farm values. Recall that, on the slave side, farm values per acre were roughly 55 percent lower and wage rates about 9-10 percent higher. The higher wage rates would, other things being equal, result in lower land rents and land values. To a first approximation, the elasticity of one factor to the other would be the ratio of the labor share to the land share in net output. A given percentage increase in the price of a mobile factor affects total cost in proportion to its cost share; the increase in total cost is incident on land (the immobile factor) in inversely proportion to its own cost share.[36]

We focus on the free side of the border and ask what land rents/values would be if wages were at levels prevailing on the slave side. Estimates of the ratio of the labor share to the land share in nineteenth-century US agriculture vary greatly—from 2 to 4.2.[37] We use the average of 2.8. Using this number, the higher wages would reduce land rents by 25-28 percent. Given the similarities in regional interest rates, the effects on land values should be proportionate to the effects on rents.[38] The wage differences, then, explain virtually all of the land value gap remaining after the adjustments in IX.A and IX.B.

A standard model matches the results for population density and farm value per capita. For Cobb-Douglas production (unit elasticity of substitution), the wage premia would cause a large decrease in the labor input. The elasticity of labor demand, for the observed factor shares, is around four. So a 10 percent increase in the wage would yields a 40 percent decrease in the quantity of labor demanded. This is a large fraction of the observed 55 percent reduction in the population at the border. That same model has an elasticity of -1 of land value per capita with respect to the wages. (This does not depend on factor shares.) So the estimated 10 percent drop in land values per capita is consistent with the 10 percent higher wages. See Appendix C.6 and C.7 for derivations.

IX.D: Taxes and Spending

Differences in land values and wages cannot be easily explained by different rates of taxation across the border. One can compare tax revenues collected relative to wealth reported by state in the

[36] This is a first order approximation of the profit function. See Appendix C for a formal derivation. There we show that, at an interior solution, the second-order effect amplifies the impact on the land price. Therefore, this calculation is likely a lower bound.

[37] For the ratio of labor-to-land shares, Fogel and Engerman (1974, vol. 2, p. 132) used 2.32 (=0.58/0.25); this revised their earlier (1971, p. 358) ratio of 3 (=0.6/0.2). Gallman (1972, p. 205) put the ratio of labor to farm real estate at 3.13 (=0.704/0.225) and the ratio of labor to land excluding buildings at 4.17 (=0.704/0.169). Atack and Bateman (1987, p. 193) offer a ratio of 2 (=0.6/0.3) as a plausible conjecture.

[38] Bodenhorn (2000, ch. 4) shows antebellum regional capital markets were well integrated, with roughly equalized interest rates.

1860 federal census (US Census Office 1866, pp. 511-12). The revenue numbers include the taxes levied by different levels of state and local governments within each state.

We compare tax collections to reported real estate wealth or all reported wealth, which includes the value of slaves. For both measures, the ratio was lower in the states of the Border South (DE, DC, VA, KY, and MO) than those in the Border North (NJ, PA, OH, IN, IL, and IA). The ratio of taxes collected to all wealth was 0.0041 in the Border South and 0.0061 in the Border North, substantially lower in the slave areas. The ratio of taxes collected to real estate wealth was 0.0077 in the Border South and 0.0084 in the Border North, lower in the slave areas. Both the relative and absolute magnitudes of these numbers are inconsistent with a story that higher state and local tax rates in the South created the land value differences. Non-pecuniary taxes, such as militia service, remain possible explanations (and are captured, in part, in the household disamenity story). Spending on internal improvements, however, are an unlikely part of the story, because border counties, especially those on rivers, would have similar transport access.

The governments of southern states provided different bundles of restrictions and publicly provided services than in the northern states. The slave states lagged in public education for free residents.[39] The long-settled areas of the region often had lower attendance than frontier areas of the North, where schools had yet to be built. Planters, who paid the bulk of southern property taxes, were inclined to pay for private academies and tutors for their own children but disinclined to support public education for others.

While the southern region lagged in terms of school enrollment, resources *per pupil* were in fact higher to the south of the free-slave boundary (US Census Office 1866, pp. 505-06). There were 30 percent more teachers and 70 percent more dollars available per enrolled student on the side where slavery was legal. This is an appropriate comparison for free parents to make, and therefore there need not be a difference in wages to compensate for poorly resourced schools. Their children might have to walk farther, however, if the family chose the southern side; the density of schools was 50 percent lower, in line with the less dense population. That said, there were still 3.6 schools in the equivalent area of a standard PLSS township south of the border.[40]

[39] Go and Lindert (2010) and Bleakley and Hong (2021) document markedly lower rates of antebellum school enrollment and attendance, respectively, by whites in the South than in the North. Bleakley and Hong report that the fraction of white children in 1860 attending school in the south was approximately 40 percent, which compares to more than 60 percent in the north, and there was little overlap in the distribution of state averages. Go and Lindert further report a relationship between voting rates and school enrollment in the North, but not in the South.

[40] We extract the data for the states bordering the free-slave boundary separately for the free side (NJ, PA, OH, IN, IL, and IA) and slave side (DE, MD, VA, KY, and MO). The data on school resources are reported separately by public and private schools. We normalize the resource variables (teachers and school budget) by the number of pupils for each school type and

X. Slavery's Institutional Artifice

The burden of the slave system obviously fell most oppressively on the enslaved. It is well understood why the enslaved sought to escape from the territory of their bondage. But the slave system also affected the economic, political, and social opportunities of free persons. A naive observer might treat the institutional differences at the border as allowing free people N activities on the free side and N+1 on the side with slavery. But slavery did not bring just one more form of labor contracting.

Instead, slavery required a complex institutional and legal artifice to sustain itself. If planters controlled the government, this artifice was stronger. According the C. W. Wright (1949, p. 378), wealthy slaveholders constituted the ruling class," that "economically, socially, and politically [...] dominated the South." Genovese (1989) argues that the social system should not be interpreted as feudalism, but his vigorous denials suggest that many saw feudalistic features in his description. Engerman and Sokoloff (2011) argue that the slave south should be thought of as an intermediate case between social organization of the Free Soil area of North America and the highly unequal states of the Caribbean and Latin America. Elites in those latter places showed (i) greater concern for (possibly violent) expropriation because of the greater inequality and (ii) less concern for publicly provided services that would benefit the middle and lower classes.

The state was effectively captured by a particular interest, with policies and an ideology built up around its preservation, even if it brought the exclusion of other activities or was detrimental to free people not involved in the slave system. (As our analysis above is motivated by the ability of mobile factors to move across regions, we focus here on considerations for investment capital and free labor.) Cairnes (1862) argued that the interests of the slaveholding elite had diverged from the rest of the free population, and this impeded a transition to a more modern economy. Helper (1860, p. 42) put it more directly: the planter elite had "basely and unpatriotically neglected the interests of their poor white constituents," instead enacting "no legislation except for the benefit of slavery, and slaveholders." Genovese (1989, pp. 141, 183-84) argued that "bourgeois values" were "antithetical to plantation society", states that "instead of taxing the countryside to support manufacturing, the [slave] states tax

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for the total. We also compute the school density: the number per 36 square miles (the area of a standard township in the PLSS). The following are the means across states for each region and the ratio of the regional means.

	Teachers per 100 pupils			Budget ($) per pupil			Schools per 36 sq. miles		
States	Public	Private	Total	Public	Private	Total	Public	Private	Total
Free-Soil	2.4	3.2	2.5	4.1	12.4	4.6	6.9	0.3	7.2
Slavery-Legal	3.1	4.7	3.3	5.2	28.8	8.1	3.2	0.3	3.6
Ratio (S/F)	1.3	1.5	1.3	1.3	2.3	1.7	0.5	1.0	0.5

commerce and manufactures to support the staple-producing areas of the countryside", and cites James Henry Hammond (a South Carolina Governor) as saying that "the manufacturing interest would never be permitted to dominate the agricultural".[41]

In the South as compared to the North, infrastructure (e.g., canals and railroads) also lagged, and was different in character. U. B. Phillips (1918) described railroads in the North as a 'trade maker' but as a 'trade catcher' in the South. In other words, infrastructure in the slave states favored reducing the cost of exporting primary commodities, rather than promoting broad economic development. Slave-state governments responded to the rise of abolitionism by imposing restrictions on freedom of the press and even on the freedom of movement of itinerant salesmen, who might spread abolitionist ideas. Kenneth Stampp (1956, p. 6) said the region was "a social system wanting in flexibility".

Non-slaveholding whites might wish to avoid the violence associated with the slave system. This violence was bidirectional, with the risk of slave revolt on the one hand, and, on the other, the quotidian constraints on the enslaved. The risk of death from insurrection turned out to be low, but awareness of the risk was a recurring theme. (Deaths during the US Civil War were high, but very few of these came from slave insurrections. It is further unlikely that such a bloody conflict was generally expected.) Among Southern whites, the Haitian Revolution was common knowledge, including awareness that violence against whites was widespread and indiscriminate with respect to slaveholding status in that episode (Clavin, 2010). In the legislative debates following the Nat Turner rebellion, even defenders of slavery acknowledged that public safety considerations were sufficient to justify considering emancipation proposals (Freehling, 1974). Non-slaveholding whites sometimes took jobs on plantations, the main locus of coercion. Fogel and Engerman (1974) argue that corporal punishment of slaves was less frequent than commonly appreciated, but even infrequent violence would be in the background of social relations. Off the plantation, whites, even those who owned no slaves, were sometimes required to serve in slave patrols and militias.[42] In his travels through the South, Fredrick

[41] Continuing this thought, Genovese (1989, p. 246) stated that “Southern industrialization proceeded within the narrow limits set by the social milieu as well as by the market. The slaveholders controlled the state legislatures and the police power; they granted charters, set taxes, and ultimately controlled the lives of regional industries. So long as industry remained within the safe limits, the slaveholders offered no firm resistance, or at least no united front. Those limits included guarantees against the rise of a hostile and independent bourgeoisie and excessive concentrations of white workers of doubtful loyalty. [...] Industry made some progress; industrialization, understood as a self propelled process, did not.”

[42] For adult white men, service on slave patrols was mandatory, in a similar sense as for juries, militias, or road work. Hadden (2001) gives a book-length treatment of slave patrols and reports numbers drawn from the archives of select counties. Patrols ran almost entirely at night and members would be assigned to the patrol for 3-6 months (p. 82). For further detail on the time commitment, we consider the fragmentary evidence reproduced in her book. A piece of a 1799 log book from Chesterfield County, Virginia, shows a person would go on patrol for several nights a week, for 8-14 hours each night (p. 87). With this, we estimate that patrolling took perhaps 25-75 nights, per term of service. Tax and census records from Perquimans County, North Carolina, from 1810 implied an approximately four percent chance of serving on a slave patrol in that year (p. 273). Hinton Helper (1858, p. 375) reports what a correspondent wrote about slave patrols. "While

Law Olmsted also reports that white workers feared danger from transgressions of the honor culture or of the racial order.

The presence of an enslaved class of workers affected the status hierarchy and income distribution for the free workers as well. This could have multiple effects. Having a slave as a point of comparison might give the free worker a floor on his own status, below which he cannot fall. But it might also increase the cost of downward mobility, if lower income means falling to a near-enslaved lower status. Robert Steinfeld (1991) argues that antebellum workers came to see all coercive labor arrangements (e.g. apprenticeships or indentured servitude) as akin to slavery. Yet these arrangements persisted in the slave states, where, according to Keri Leigh Merritt (2017, p. 244), public whippings, debt peonage, and convict leasing of poor whites "blurred the lines between slavery and freedom, black and whites". A common observation is that planters and small farmers had clientelistic relationships, rather than one of equal citizenship.[43]

A wider dispersion of land wealth might make upward mobility seem impossible to those of humble backgrounds. Lincoln (1854), himself born to a poor family in a slave state and who moved with his family north as a boy, says in his Peoria speech, that "slave States are places for poor white people to remove FROM; not to remove TO. New free States are the places for poor people to go to and better their condition."

Another argument is that the slave system was corrosive to the character of free people. Merritt (2017, p. 62) summarized this view as "in a slave society, all laborers suffered degradation and humiliation." Helper (1858, p. 41) stated that "no kind of labor is either free or respectable" in the slave states, where white labor is "shunned with the utmost disdain." Olmsted's conclusion from his travels was that whites coming to the South "soon learnt to hate labor, [and] give as little of it for hire as [they] can" (quoted in Fogel and Engerman, 1974, p. 174).

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patrolling a few nights ago I was forcibly struck with the truthfulness of the remarks contained in your last letter. Here I am, a poor but sober and industrious man, with a family dependent on me for support, and after I finish my day‘s labor, I am compelled to walk the streets from nine in the evening till three in the morning, to restrain the roving propensities of other people's 'property'. [...] Why should I thus be deprived of sleep that the slaveholder may slumber? [...] I am becoming restless, and I have been debating within my own mind whether I had not better immigrate to a free state".

[43] Per Hinton Helper (1858, p. 43), "the lords of the lash are not only absolute masters of the blacks [...] But they are also the oracles and arbiters of all non-slave holding whites, whose freedom is merely nominal, and whose unparalleled illiteracy and degradation is purposely and fiendishly perpetuated". Not one to avoid self-contradiction, he then argues that poor whites are ignorant of their backward condition, but on the next page that they are keenly aware of their social standing as inferiors. Stephanie McCurry (1995, p. 104) gives a more nuanced view that "the tension between independence and inequality at the heart of those relations ensured that their basic character was a contested one. Planters may have understood their ties to local yeomen as constituting essentially a patron-client relationship. But yeomen themselves would never have conceded that. They struggled instead to shape something more befitting free men and masters, however unequal in wealth and social standing" .

In the background was a comparison to the states where slavery had been abolished and where the ideology of 'Free Soil' was predominant. What was Free Soil? It rejected labor coercion and sought to give public land to smallholders. Following Jefferson's vision, yeomen farmers would have economic agency, which itself would ready them for political agency. Historian Frederick Jackson Turner later advanced the 'Frontier Thesis', which argued that the pattern of land settlement on the frontier fostered a culture of independence and egalitarianism. This stood in contrast with the widespread patterns of social exclusion in the rest of the world and throughout history. Of course, no one in the present day could be unaware that some were excluded. There was definitely an in-group, but it was an in-group that was large by historical measure and was open to getting larger. This provided an option that free people might prefer over arrangements of a pre-modern and coercive nature. This ideology was central to the early Republican party, c.f. quotes from Lincoln above. In his "Irrepressible Conflict" or 'Two Systems" speech, William Seward (1858) stated that, in the slave states, "the masters, directly or indirectly, secure all political power, and constitute a ruling aristocracy. In states where the free-labor system prevails, universal suffrage necessarily obtains, and the state inevitably becomes, sooner or later, a republic or democracy." David Wilmot (1847), Congressman from Pennsylvania, "would preserve for free white labor a fair country, a rich inheritance, where the sons of toil, of my own race and own color, can live without the disgrace which association with negro slavery brings upon free labor."

A free worker would find much to differentiate between Free Soil and where slavery was legal. In Bleakley and Rhode (2023a), we summarized the treatment of the two regions in traveler's accounts and emigrant's guides. Both typically describe the unsuitability of the slavery region for settlement by free people. Prominent reasons included that work was dishonored, which was bad for the character of white settlers, and that free people there would be complicit in the injustice of slavery. There was also a wish to avoid the violence of the slave system, which took the form of frequent, mandatory participation in slave patrols, and the infrequent insurrections. In Bleakley and Rhode (2023b), we use hedonic regressions and find that the institution of slavery depressed the returns to endowments favored on Free Soil. It seems that institution of slavery overrode any technological comparative advantage to yeomen farming.

XI. Conclusion

In the mid-twentieth century, economists dropped into the historical debates about antebellum US slavery with systematic analyses of its profitability and productivity (Conrad and Meyer 1958; Fogel and Engerman 1971, *inter alia*). Earlier historians had argued that slavery was unprofitable and

therefore moribund as a mode of production. In that sense, it bore more resemblance to feudalism, with its attention to rigid social hierarchies, than to the industrial capitalism emergent elsewhere in the world. Economists reported a variety of evidence to the contrary: slave owners actively sought and achieved economic gains, agricultural operations using slave labor were competitive, and slave prices reflected underlying considerations of revenue and cost. Therefore, while slavery was, as Jefferson's first draft of the Declaration of Independence stated, an 'execrable commerce', it was not associated with unproductive misallocation of resources (or so went their argument).

Later, North (1981) brought to the fore the idea that 'institutions' are fundamental determinants of economic performance. This idea has proved useful in understanding the large disparity of incomes per capita across countries, for example. In this framework, there could be disparities across countries or regions even if locally markets and firms are behaving as in the textbook model of competition, maximization, etc. Instead, a place with weaker institutions suffers from a systemic reduction in productivity.

How do these two frameworks meet in this context? If landowners on the side where slavery was prohibited can do N things with their land, then those on the slavery-legal side can do N+1. This appears to relax a constraint, so one might expect higher land values (capitalized profits) where slavery was permitted. However, this '+1' activity required a whole set of institutions to sustain it. These institutions were in fact inimical to alternative uses of the land. Slavery endured not just by the coercion of the slaveowner, but by the force of the state, which had to become quite intrusive. Ira Berlin (1998, pp. 8-11) wrote that 'slave societies' were not just 'societies with slaves,' but rather societies in which every aspect was affected by protecting slaveholder's interests. Or as Frank Tannenbaum (1946, pp. 117-18), put it: "nothing escaped, nothing, and no one." The stark differences at the border highlight that the slave system depressed land productivity and repulsed potential settlers and migrants. Free labor demanded a wage premium to be on the slave side and those free-to-choose preferred (and improved) otherwise-comparable land on the free side. Half of the country's land went half under-utilized. There may have been economic advantages from the institution that appeared outside the region, but they would have to be large to offset this disadvantage.

This framing contrasts with the New History of Capitalism and the *New York Times*' 1619 Project, which are written as if coercion and exclusion of the sort seen in early US history were unusually American phenomena. Was this the true 'American exceptionalism?' Which set of institutions was the historical exception?

a. Yeoman farming (mass economic agency), voting (widespread political agency), public education, urbanization, and innovation.

b. Labor coercion, social exclusion, a rigid social structure, and limits to innovation.

Most of recorded history bears a greater resemblance to (b) than to (a). Indeed, (b) was an impediment to the growth of (a) in the United States, and (a) is what brings (b) to an end in that country. The region with slavery attracted migrants and investments from Europe, but region without it attracted more; the limited development in the South depended on the contrast with Free Soil. What is genuinely unusual about this period is the Free-Soil bundle of institutions; this is an area where the small guy has agency and where there is expanding inclusion, both economic and political.

References

Acemoglu, Daron, and James Robinson, 2012. Why Nations Fail: The Origins of Power, Prosperity, and Poverty. New York: Crown Publishing.

Aitken, Hugh G. J., 1971. Did Slavery Pay? Readings in the Economics of Black Slavery in the United States. New York: Houghton-Mifflin.

Atack, Jeremy, and Fred Bateman, 1987. To Their Own Soil: Agriculture in the Antebellum North. Ames: Iowa State Univ. Press.

Ayers, Edward L., and Anne S. Rubin, 2000. The Valley of the Shadow: Two Communities in the American Civil War. Charlottesville, VA: W.W. Norton.

Barnhart, John D., 1953. Valley of Democracy: The Frontier versus the Plantation in the Ohio Valley, 1775-1818. Bloomington: Indiana Univ. Press.

Basker, Roy P., 1953. Collected Works of Abraham Lincoln. Vo. III. Springfield, Il: Abraham Lincoln Association.

Beckert, Sven. 2014. Empire of Cotton: A Global History. New York: Knopf.

Berry, Jennie. 2001. “The Great Divide: A Comparison of Kentucky and Ohio along the Ohio River (1840-1860).” University Avenue Undergraduate Journal of Economics 5: 1 Article 1.

Berlin, Ira, 1998. Many Thousands Gone: The First Two Centuries of Slavery in North America. Cambridge, MA: Belknap Press for Harvard Univ. Press.

Bester, C. Alan, Timothy G. Conley, and Christian B. Hansen, 2011. “Inference with Dependent Data Using Cluster Covariance Estimators.” Journal of Econometrics 165:2 (Dec.): 137–51.

Bleakley, Hoyt and Sok Chul Hong, 2017. “Adapting to the Weather: Lessons from U.S. History.” Journal of Economic History 77: 3 (Sept.): 756-95.

Bleakley, Hoyt and Sok Chul Hong, 2021. "When the Race Between Education and Technology Goes Backward: The Postbellum Decline of White School Attendance in the Southern US." Research in Economic History 37, 1–40.

Bleakley, Hoyt and Joseph Ferrie, 2014. “Land Openings on the Georgia Frontier and the Coase Theorem in the Short and Long Runs” (Jan.)

Bleakley, Hoyt and Paul Rhode, 2023a. “De Tocqueville, Population Movements, and Revealed Institutional Preferences.” Journal of Historical Political Economy (July): 179-210.

Bleakley, Hoyt and Paul Rhode, 2023b. “Was Free Soil Magic Dirt? Endowments versus Institutions in the Antebellum United States.” Working paper (July).

Boderhorn, Howard, 2000. A History of Banking in Antebellum America: Financial Markets and Economic Development in an Era of Nation-Building. New York: Cambridge Univ. Press.

Cairnes, James E., 1862. Slave Power: Its Character, Career, and Probable Designs. New York: Carleton.

Carter, Susan B., Scott Sigmund Gartner, Michael R. Haines, Alan L. Olmstead, Richard Sutch and Gavin Wright, editors, 2006. Historical Statistics of the United States: Earliest Times to the Present. New York: Cambridge Univ. Press.

Clavin, Matthew J., 2010. Toussaint Louverture and the American Civil War : The Promise and Peril of a Second Haitian Revolution. Philadelphia: Univ. of Pennsylvania Press.

Chase, Henry, and Charles W. Sanborn, 1856. The North and the South: Being a Statistical View of the Condition of the Free and Slave States. Boston: John P. Jewett.

Conley, Timothy G., 1999. "GMM Estimation with Cross Sectional Dependence." Journal of Econometrics 92:1 (Sept.): 1–45.

Conrad, Alfred H., and John R. Meyer, 1958. "The Economics of Slavery in the Ante Bellum South." Journal of Political Economy 66: 2 (April): 95-130.

Craig, Lee, and Thomas Weiss, 1998. "Rural Agricultural Workforce by County, 1800 to 1900." eh.net.

Craven, Avery O., 1926. Soil Exhaustion as a Factor in the Agricultural History of Virginia and Maryland, 1606-1860. Urbana: Univ. of Illinois Press.

David, Paul A., and Peter Temin, 1979. "Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South: Comment." American Economic Review 69:1 (March): 213-18.

deTocqueville, Alexis, 1838. Democracy in America. [electronic resource]; translated by Henry Reeve; with an original preface and notes by John C. Spencer. New York: G. Dearborn.

Dell, Melissa, 2010. "The Persistent Effects of Peru's Mining Mita." Econometrica 78:6 (Sept.): 1863-1903

Engerman, Stanley and Kenneth Sokoloff, 2011. Economic Development in the Americas since 1500: Endowments and Institutions. New York: Cambridge Univ. Press.

Farnam, Henry W. 1938. Chapters in the History of Social Legislation in the United States to 1860. Washington, DC: Carnegie Institution.

Finley, Moses, 1980. Ancient Slavery and Modern Ideology. New York: Viking Press.

Fleisig, Heywood W., 1976. "Slavery, the Supply of Agricultural Labor, and the Industrialization of the South." Journal of Economic History 36:3 (Sept.): 572–97.

Fogel, Robert W., and Stanley L. Engerman, 1971. "The Relative Efficiency of Slavery: A Comparison of Northern and Southern Agriculture in 1860." Explorations in Economic History 8 (Spring): 353-67.

Fogel, Robert W., and Stanley L. Engerman, 1974. Time on the Cross: The Economics of American Negro Slavery. Vol. I and II. Boston: Little, Brown.

Fogel, Robert W., and Stanley L. Engerman, 1977. “Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South.” American Economic Review 67:3 (June): 275-96.

Fogel, Robert W., and Stanley L. Engerman, 1980. “Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South: Reply.” American Economic Review 70:4 (Sept.): 672-90.

Fogel, Robert W., 1989. Without Consent or Contract: The Rise and Fall of American Slavery. Vol. I. New York: Norton.

Foner, Eric, 1970. Free Soil, Free Labor, Free Men: The Ideology of the Republican Party Before the Civil War. New York: Oxford Univ. Press.

Freehling, Alison Goodyear, 1974. Drift toward Dissolution: The Virginia Slavery Debate of 1831-1832. Dissertation (Ph.D.) University of Michigan.

Gallman, Robert E., 1972. “Changes in Total U.S. Agricultural Factor Productivity in the Nineteenth Century.” Agricultural History 46:1 (Jan.): 191-210.

Gates, Paul W., et al., 1996. The Jeffersonian Dream: Studies in the History of American Land Policy and Development. Albuquerque: Univ. of New Mexico Press.

Genovese, Eugene D., 1967. The Political Economy of Slavery: Studies in the Economy and Society of the Slave South. New York: Vintage.

Go, Sun, and Peter H. Lindert, 2010. "The Uneven Rise of American Public Schools to 1850." Journal of Economic History 70:1 (March): 1-26.

Gray, Lewis Cecil, 1933. History of Agriculture in the Southern United States to 1860. Washington, DC: Carnegie Institution.

Hadden, Sally E., 2001. Slave Patrols : Law and Violence in Virginia and the Carolinas. Cambridge, MA: Harvard Univ. Press.

Haines, Michael R., and Inter-university Consortium for Political and Social Research, 2010. Historical, Demographic, Economic, and Social Data: The United States, 1790-2002 (ICPSR 2896). Inter-university Consortium for Political and Social Research.

Haines, Michael, Price Fishback, and Paul Rhode, 2018. United States Agriculture Data, 1840-2012 (ICPSR 35206). Inter-university Consortium for Political and Social Research.

Helper, Hilton, 1857. The Impending Crisis of the South: How to Meet It. New York: Burdick Brothers.

Irwin, James R., 1988. “Exploring the affinity of wheat and slavery in the Virginia Piedmont,” Explorations in Economic History 25:3 (July): 295-322.

Kelly, Morgan. 2020. "Understanding Persistence." CEPR Working paper, DP 15246.

Lebergott, Stanley, 1964. Manpower in Economic Growth. New York: McGraw-Hill.

Lebergott, Stanley, 1966. “Labor Force and Employment, 1800-1900.” In Output, Employment, and Productivity in the United States after 1800 117-204, ed. by Dorothy Brady. Princeton, NJ: Princeton Univ. Press.

Lincoln, Abraham, 1809-1865, John Hay, and John Nicolay. Abraham Lincoln: Complete Works. New York: Century Co., 1902.

Lindert, Peter H. 1988. “Long-run Trends in American Farmland Values.” Agricultural History 92:3 (Summer): 45-85.

Libecap, Gary D., and Dean Lueck, 2011. “The Demarcation of Land and the Role of Coordinating Property Institutions.” Journal of Political Economy 119:3 (June): 426-67.

Majewski, John, 2000. A House Dividing: Economic Development in Pennsylvania and Virginia before the Civil War. New York: Cambridge Univ. Press.

Majewski, John, 2016. “Why Did Northerners Oppose the Expansion of Slavery: Economic Development and Education in the Limestone South,” In Slavery’s Capitalism: A New History of American Economic Development, 277-98, 382-84, ed. by Sven Becket and Seth Rockman. Philadelphia: Univ. of Pennsylvania Press.

Margo, Robert A., 2000. Wages and Labor Markets in the United States, 1820-1860. Chicago: Univ. of Chicago Press.

McCurry, Stephanie. 1995. Masters of Small Worlds : Yeoman Households, Gender Relations, and the Political Culture of the Antebellum South Carolina Low Country. New York: Oxford Univ. Press.

Menard, Russell, Trent Alexander, Jason Digman, and J. David Hacker, 2004. Public Use Microdata Samples of the Slave Population of 1850-1860. Minnesota Population Center, University of Minnesota.

Merritt, Keri Leigh, 2017. Masterless Men: Poor Whites and Slavery in the Antebellum South. New York: Cambridge Univ. Press.

Miller, D.A. and R.A. White, 1998. “A Conterminous United States Multi-Layer Soil Characteristics Data Set for Regional Climate and Hydrology Modeling.” Earth Interactions 2. [Available online as CONUS-Soil, at http://www.soilinfo.psu.edu, accessed December 17, 2020.]

Naidu, Suresh, 2020. “American Slavery and Labour Market Power.” Economic History of Developing Regions 35:1, 3-22.

New York Times Magazine, 2019. “1619 Project.”

North, Douglass, 1981. Structure and Change in Economic History. New York: Cambridge Univ. Press.

Ohio Commissioner of Statistics, 1858. Annual Report for 1857. Public Doc. No. 8. Columbus, OH: Richard Bevins, State Printer.

Ohio Board of Agriculture, 1858. 1857 Annual Report. Columbus, OH: Richard Bevins, State Printer.

Phillips, Ulrich B., 1918. American Negro Slavery. Baton Rouge: Louisiana State Univ. Press, originally published 1918, reprinted 1966.

Pierson, George W., 1938. Tocqueville and Beaumont in America. New York: Oxford Univ. Press.

Primack, Martin L., 1975. Farm Formed Capital in American Agriculture, 1850 to 1910. Arno Press. Published version of 1962 Univ. of North Carolina Ph.D. dissertation.

Ransom, Roger and Richard Sutch, 1988. "Capitalists without Capital: The Burden of Slavery and the Impact of Emancipation." Agricultural History 62:3 (Summer): 133-60.

Roback, Jennifer, 1982. “Wages, Rents, and the Quality of Life.” Journal of Political Economy 90:6 (Dec.): 1257-78.

Ruggles, Steven, Sarah Flood, Sophia Foster, Ronald Goeken, Jose Pacas, Megan Schouweiler and Matthew Sobek. 2021. IPUMS USA: Version 11.0 [dataset]. Minneapolis, MN: IPUMS.

Ruffner, Henry. 1847. Address to the people of west Virginia: shewing that slavery is injurious to the public welfare, and that it may be gradually abolished without detriment to the rights and interests of slave holders by a slaveholder of west Virginia. Lexington, VA: R. C. Noel.

Salafia, Matthew, 2013. Slavery’s Borderland: Freedom and Bondage along the Ohio River. Philadelphia: Univ. of Pennsylvania Press.

Seward, William, 1858. “On the Irrepressible Conflict.” Rochester, NY Speech.

Siczewicz, Peter, 2011. U.S. Historical Counties (Generalized .05 deg). Dataset. Emily Kelley, digital comp. Atlas of Historical County Boundaries, ed. by John H. Long. Chicago: The Newberry Library, 2011. Available online from http://publications.newberry.org/ahcbp. Downloaded Oct. 29, 2013.

Simeone, James, 2000. Democracy and Slavery in Frontier Illinois: The Bottomland Republic. DeKalb, IL: Northern Illinois Univ. Press.

Smith, Edward C., 1927. The Borderland in the Civil War. New York: MacMillan.

Stampp, Kenneth M., 1956. The Peculiar Institution: Slavery in the Ante-Bellum South. New York: Knopf.

Steinfeld, Robert J., 1991. The Invention of Free Labor : The Employment Relation in English and American Law and Culture, 1350-1870. Chapel Hill: Univ. of North Carolina Press.

Tannenbaum, Frank, 1947. Slave and Citizen: The Negro in the Americas. New York: Knopf.

Thomas, William G. III, and Edward Ayers, 2003. “The Differences Slavery Made: A Close Analysis of Two American Communities.” American Historical Review 108:5 (Dec.): 1299-1307.

US Census Office, 1854. 1850 Census: Compendium of the Seventh Census. Washington, DC: GPO.

US Census Office, 1864a. Population of the United States in 1860, compiled from the original returns of the Eighth Census. Washington, DC: GPO.

US Census Office, 1864b. Agriculture of the United States in 1860. Washington, DC: GPO.

US Census Office, 1866. Statistics of the United States, (including mortality, property, &c.) in 1860. Washington, DC: GPO.

US Census Office. Social Statistics Manuscripts, 1860.

US Department of Agriculture, 1922. Yearbook of Agriculture, 1921. Washington, DC: GPO.

Wilmot, David, 1847. "A Congressman 'Pleads the Case of White Men'," SHEC: Resources for Teachers, accessed December 15, 2021, https://shec.ashp.cuny.edu/items/show/1247.

Wright, Chester W., 1949. Economic History of the United States. New York: McGraw-Hill.

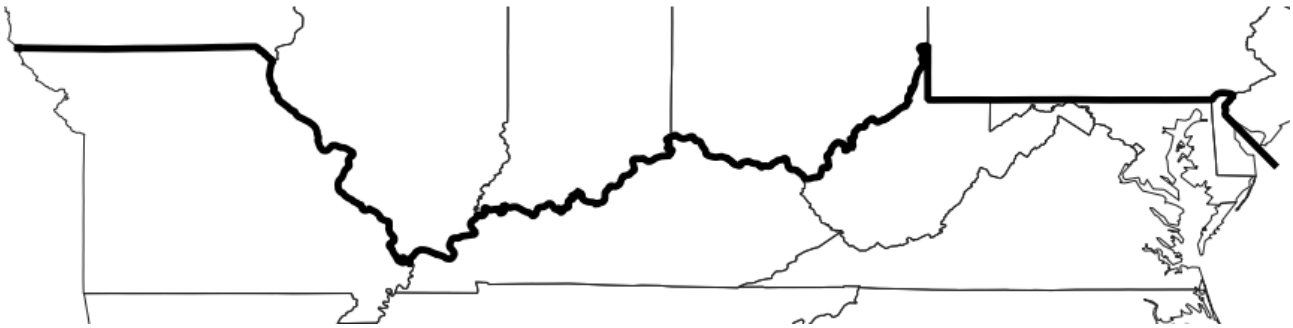
Wright, Gavin, 1978. The Political Economy of the Cotton South: Households, Markets, and Wealth in the Nineteenth Century. New York: Norton.

Wright, Gavin, 2006. Slavery and American Economic Development. Baton Rouge: Louisiana State Univ. Press.

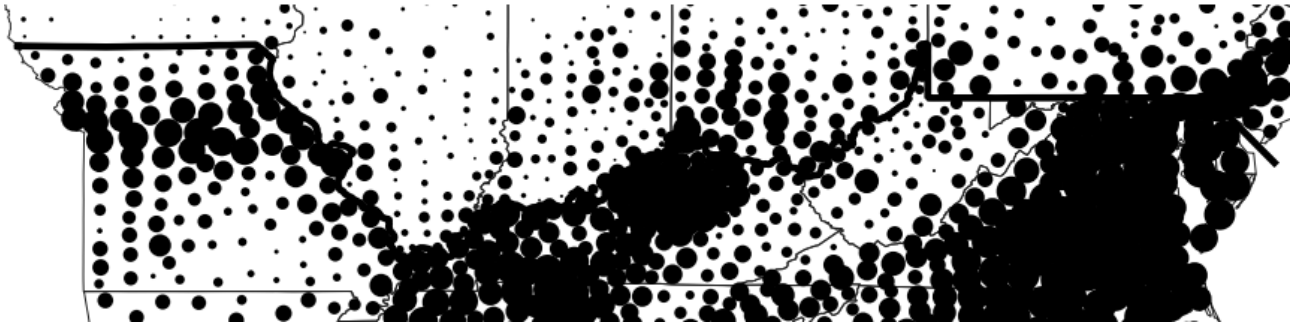
Yale Tocqueville Manuscripts. General Collection, Beinecke Rare Book and Manuscript Library, Yale University.

Figure 1: The Borderlands between Free and Slave Sections of the United States

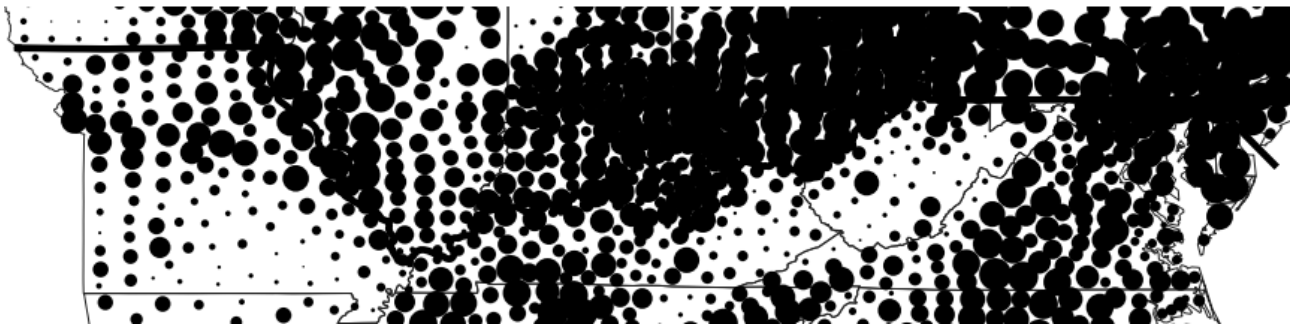
Panel A: The Free/Slave Boundary in 1860 in Relation to State Borders



Panel B: Nonwhite Population, by County, 1860



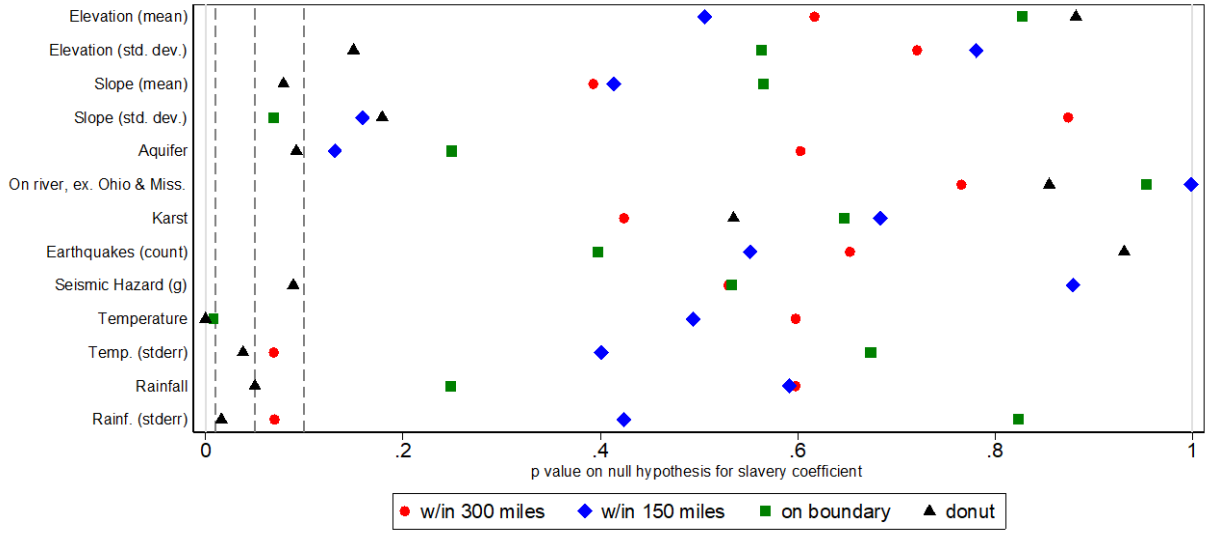
Panel C: Rural Population, by County, 1860



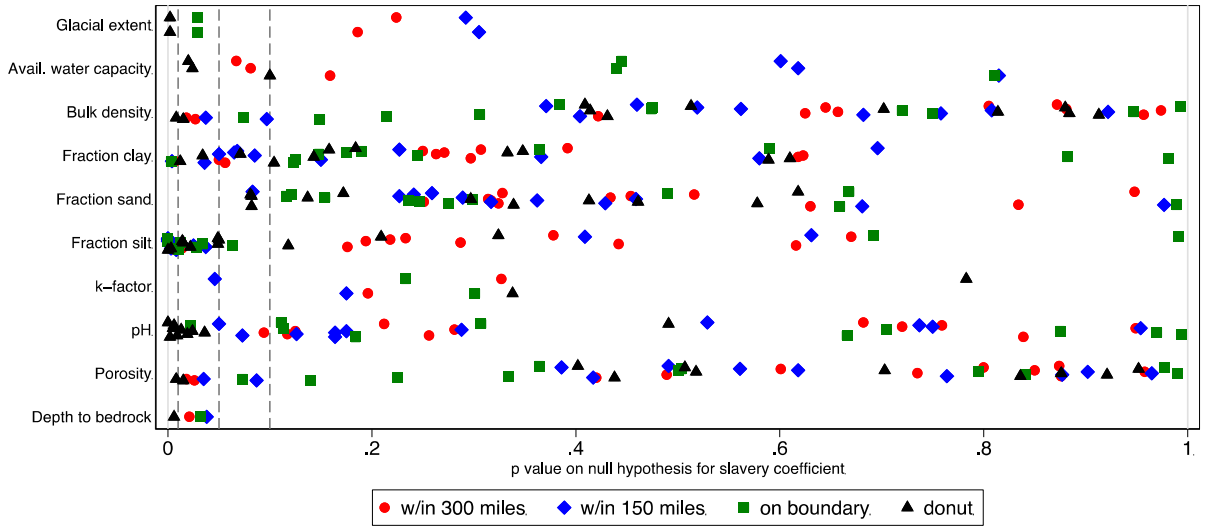
Notes: This figure uses as a base map the 1860 free/slave boundary, the 1860 state borders, and the later border of West Virginia for reference. These features are displayed by themselves in Panel A. (See Appendix A for details on the measurement of the free/slave boundary.) The remaining panels display 1860 county-level data using dots on top of the base map. The dots are proportional to the percentile of the indicated outcome. Each dot is placed at the respective county's centroid. The source for the spatial data is the National Historical Geographic Information System (NHGIS, Minnesota Population Center, 2011). The population data are based on census counts compiled in ICPSR study #2896 (Haines, 2010). Panel B presents the total non-white population, which principally consists of blacks in the displayed region. Panel C presents the total rural population, defined as total county population minus population in urban places with at least 2500 inhabitants.

Figure 2: Environmental Factors

Panel A: Miscellaneous

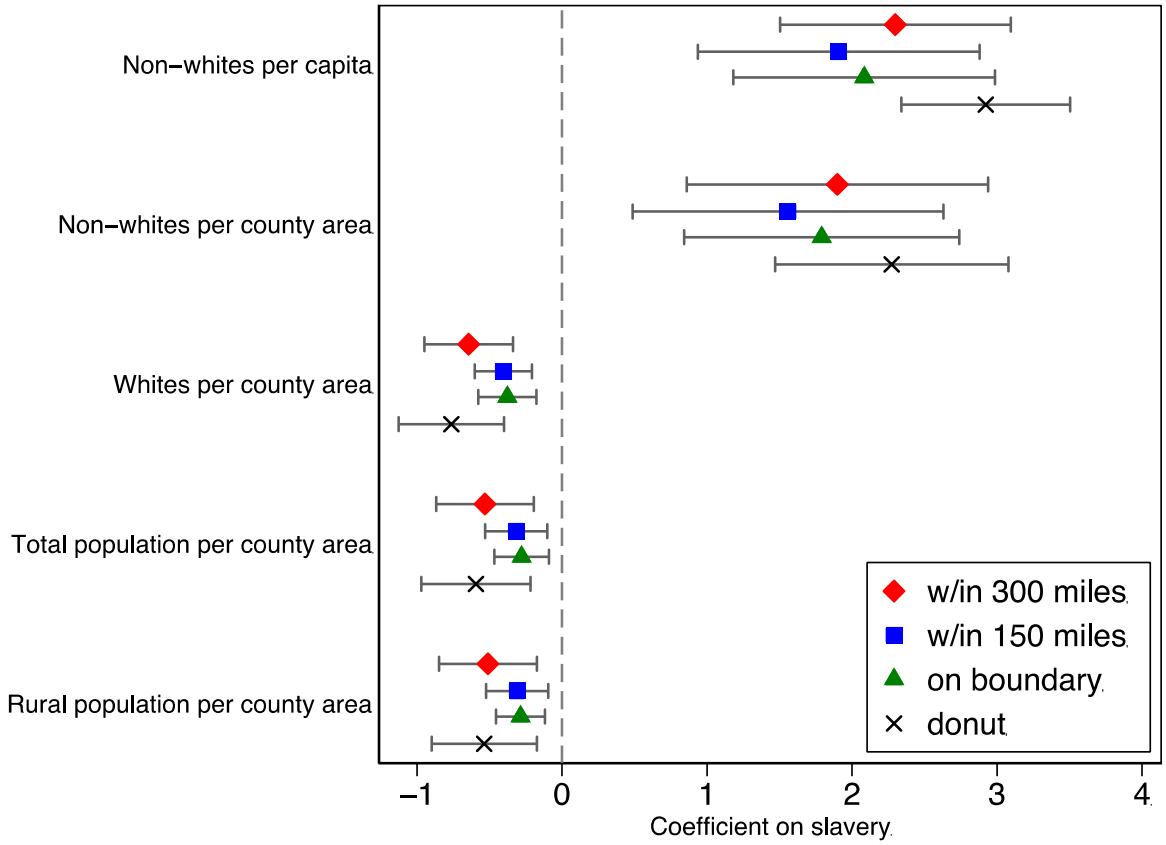


Panel B: Soil Variables (by group)



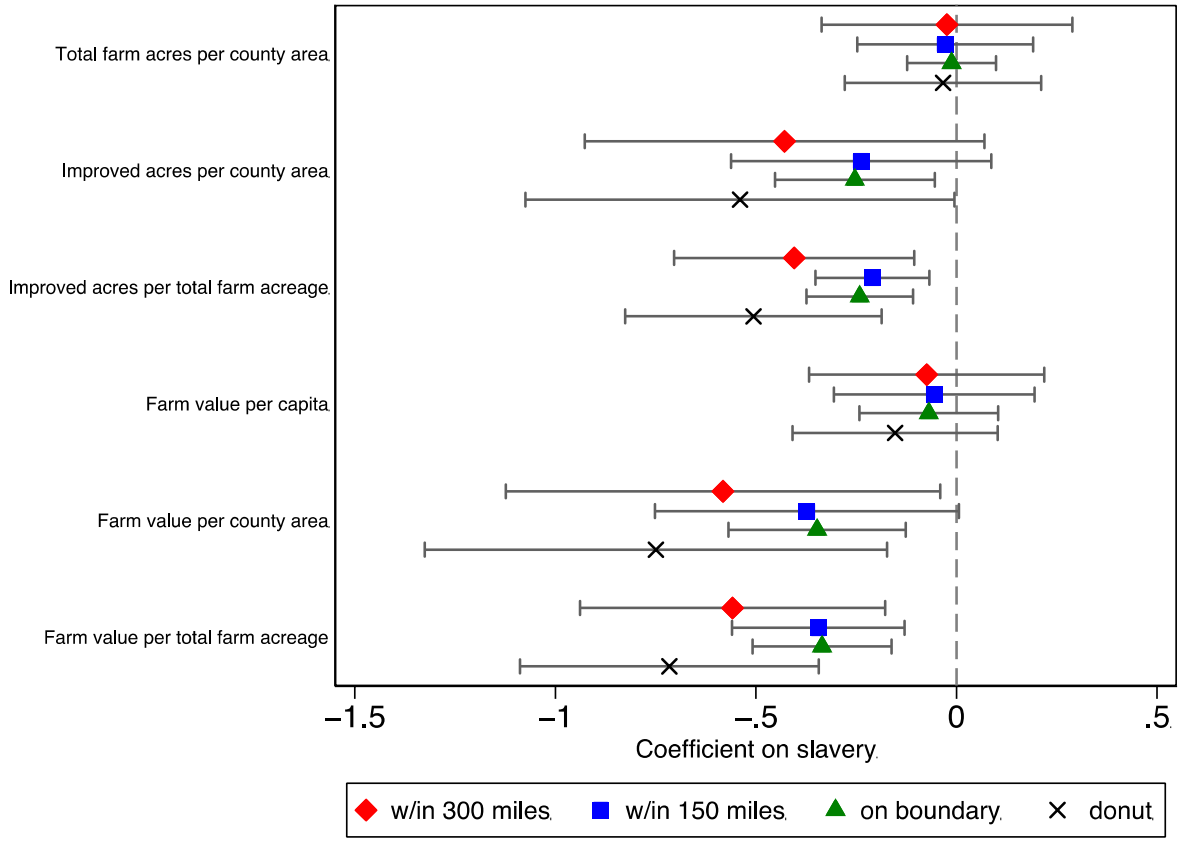
Notes: This figure presents probability values for the null hypotheses that the coefficient on slavery equals zero. Standard errors are estimated using 15 quantiles of longitude as clusters. Each symbol is associated with the test of the null hypothesis for the outcome indicated in the row label and for various samples of counties. Each symbol type the notes a distinct sample: red diamond for counties within 300 miles of the boundary, blue square for counties within 150 miles of the boundary, and green diamond for counties adjacent to the boundary. For buffer samples, estimates are of equation (1). For the border sample, estimates are of equation (2). The vertical, dashed lines denote standard cutoffs at 1%, 5%, and 10%. See the text for variable sources and definitions.

Figure 3: Population



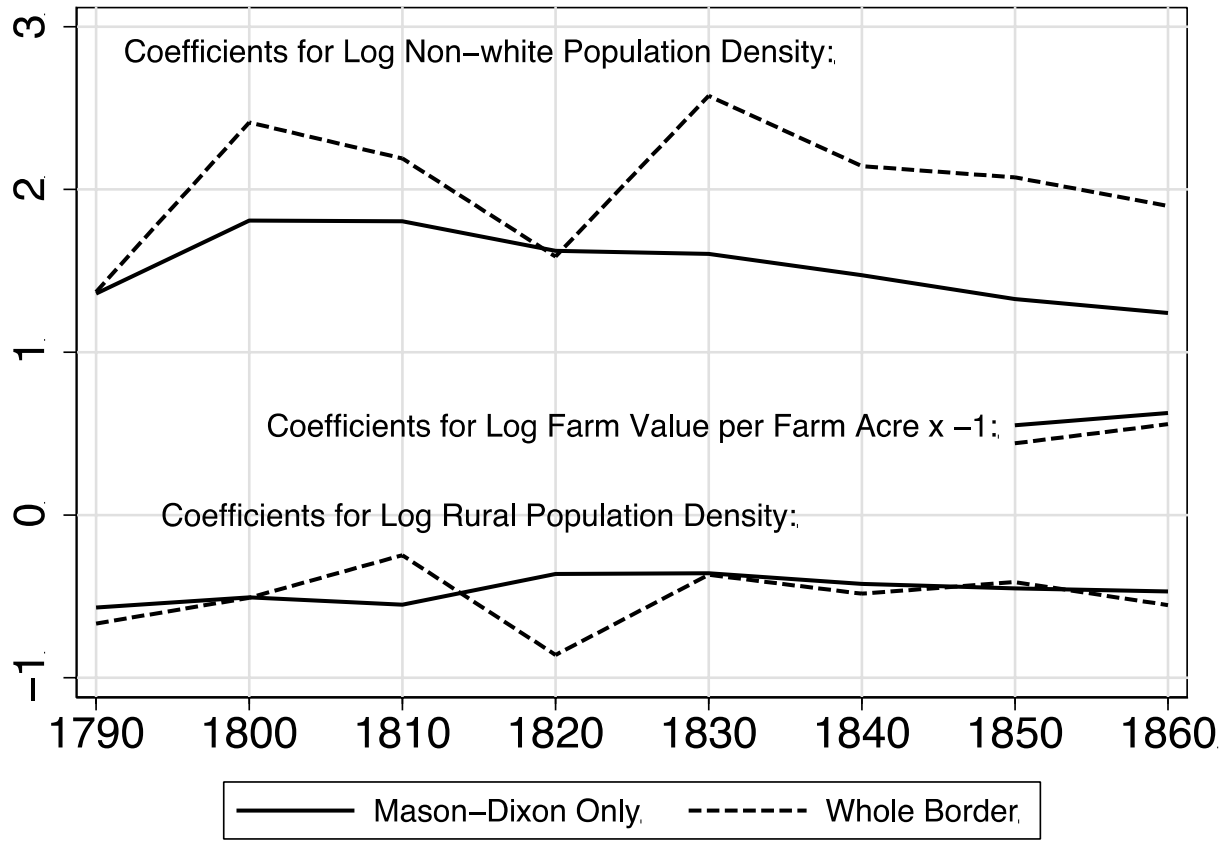
Notes: This figure presents point estimates and confidence intervals for the coefficient on slavery for the outcomes indicated in the row label and for various samples of counties. Point estimates are denoted with symbols within horizontal bands denoting 95-percent-confidence intervals. Standard errors are estimated using 15 quantiles of longitude as clusters. Each symbol type the notes a distinct sample: red diamond for counties within 300 miles of the boundary, blue square for counties within 150 miles of the boundary, and green diamond for counties adjacent to the boundary. For buffer samples, estimates are of equation (1), which also includes a third-order polynomial in longitude and in the distance to the border (with free-soil areas defined negatively). For the border and donut samples, estimates are of equation (2), which also includes a third-order polynomial in longitude. The vertical, dashed line denotes a null hypothesis of zero. The outcomes are transformed into natural logarithms.

Figure 4: Land Use and Land Value



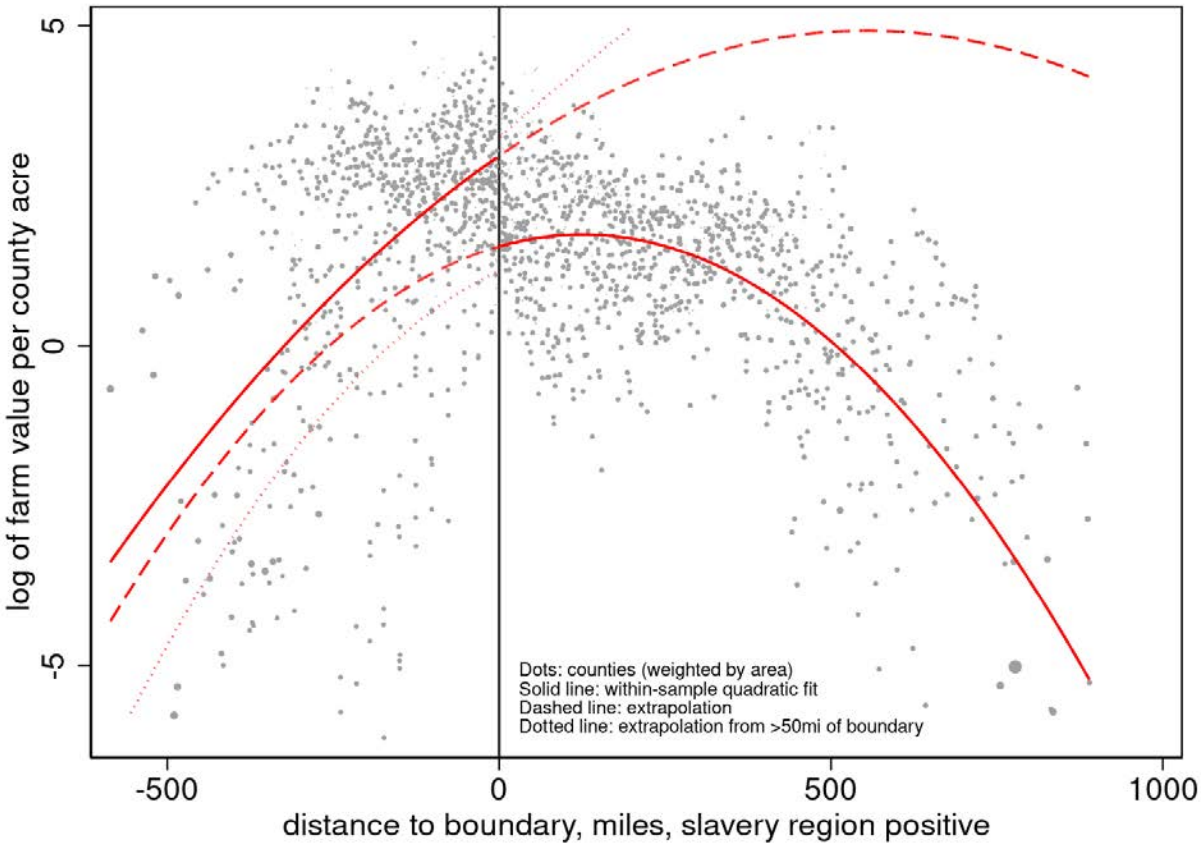
Notes: This figure presents point estimates and confidence intervals for the coefficient on slavery for the outcomes indicated in the row label and for various samples of counties. Point estimates are denoted with symbols within horizontal bands denoting 95-percent-confidence intervals. Standard errors are estimated using 15 quantiles of longitude as clusters. Each symbol type the notes a distinct sample: red diamond for counties within 300 miles of the boundary, blue square for counties within 150 miles of the boundary, and green diamond for counties adjacent to the boundary. For buffer samples, estimates are of equation (1), which also includes a third-order polynomial in longitude and in the distance to the border (with free-soil areas defined negatively). For the border and donut samples, estimates are of equation (2), which also includes a third-order polynomial in longitude. The vertical, dashed line denotes a null hypothesis of zero. The outcomes are transformed into natural logarithms.

Figure 5: Effects on Nonwhite and Rural Population, Various Years



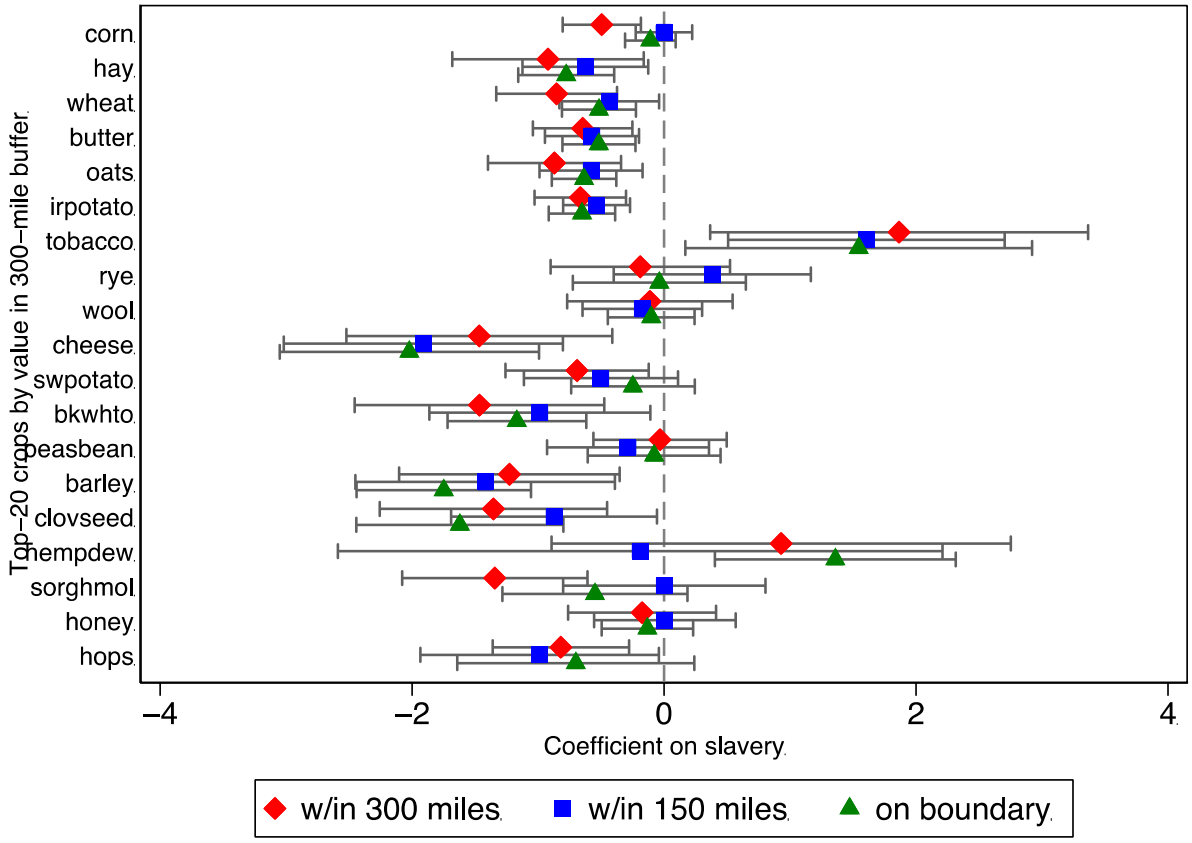
Notes: This figure presents point estimates for the coefficient on slavery for the outcomes indicated in the graph and for various samples of counties. The regression specification is the equation (1), clustered errors by 15 bins of longitude, and weights according to land area. The base sample consists of counties in the 300-mile buffer. The "whole border" sample uses all of the available counties in each year. The Mason-Dixon sample uses only those counties whose closest free-slave border abuts Pennsylvania or New Jersey. (All of the land in the 300-mile buffer is covered by a county by 1810. All of the land in the Mason-Dixon sample is covered by counties for 1790 forward.)

Figure 6: Farm Value and the Boundary



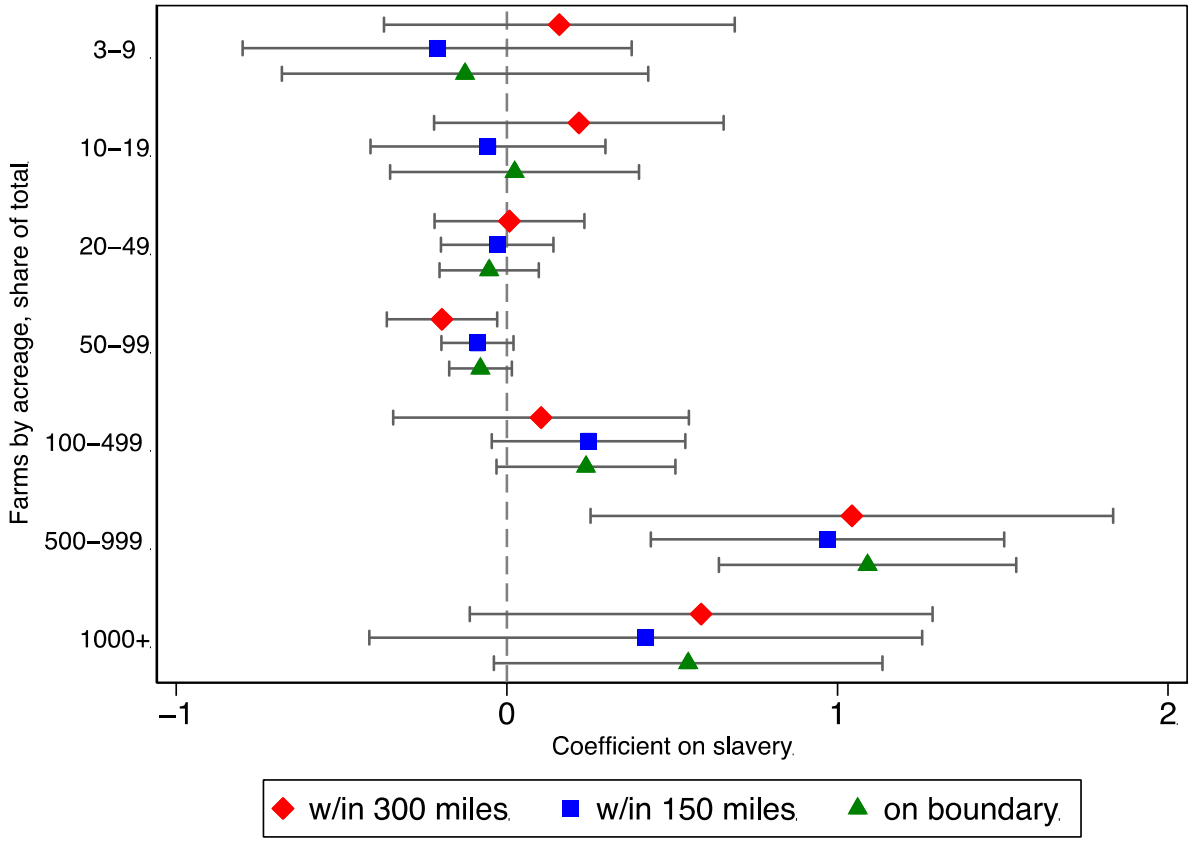
Notes: This figure compares the natural logarithm of farm value per county acre with the distance to the free-slave boundary. Dots, which denote 1860 values, are proportional to county area. The lines are estimated quadratic spatial trends: solid, within-sample fitted lines; dashed, extrapolations to the other region; dotted, extrapolations estimated with counties at least 50 miles away from the boundary. All estimates are weighted by county land area. See the text and appendices for data descriptions and sources.

Figure 7: Crops



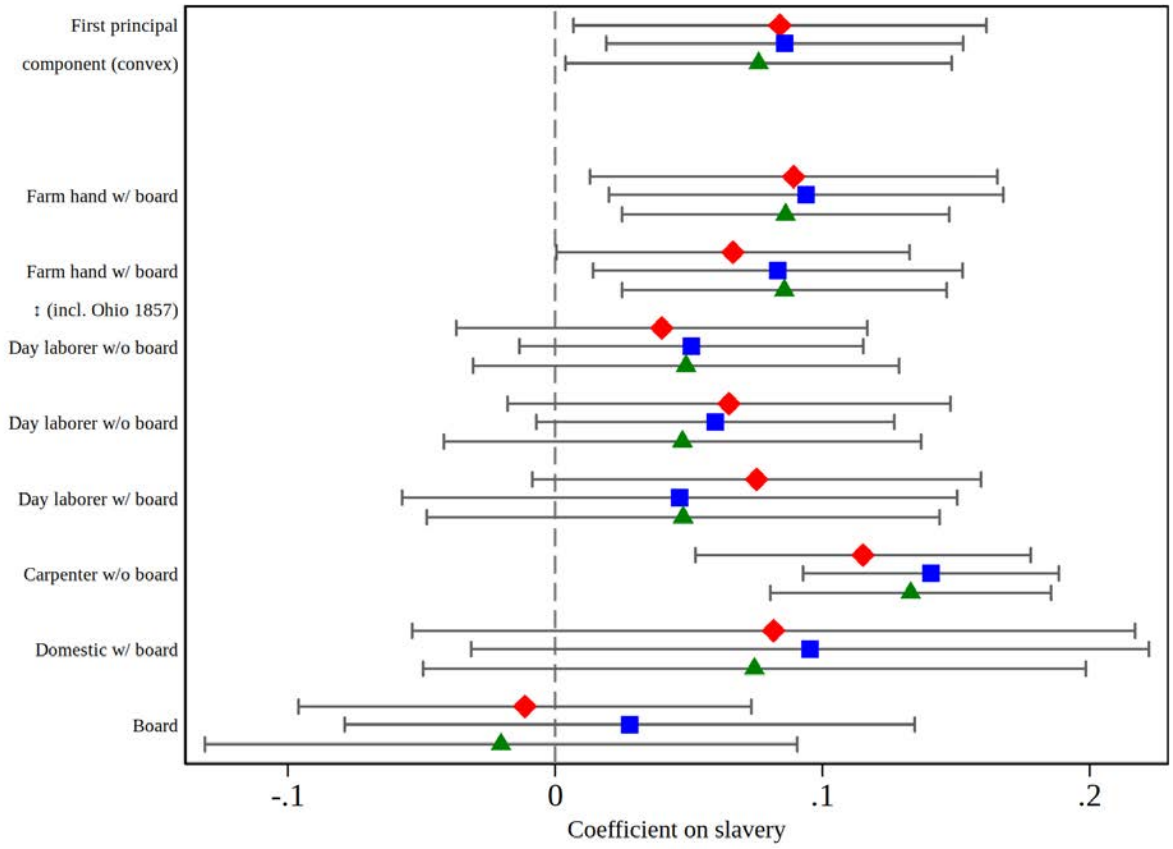
Notes: This figure presents point estimates and confidence intervals for the coefficient on slavery for the outcomes indicated in the row label and for various samples of counties. Point estimates are denoted with symbols within horizontal bands denoting 95-percent-confidence intervals. Standard errors are estimated using 15 quantiles of longitude as clusters. Each symbol type the notes a distinct sample: red diamond for counties within 300 miles of the boundary, blue square for counties within 150 miles of the boundary, and green diamond for counties adjacent to the boundary. For buffer samples, estimates are of equation (1), which also includes a third-order polynomial in longitude and in the distance to the border (with free-soil areas defined negatively). For the border and donut samples, estimates are of equation (2), which also includes a third-order polynomial in longitude. The vertical, dashed line denotes a null hypothesis of zero. The outcomes are transformed into natural logarithms.

Figure 8: Farm sizes



Notes: This figure presents point estimates and confidence intervals for the coefficient on slavery for the outcomes indicated in the row label and for various samples of counties. Point estimates are denoted with symbols within horizontal bands denoting 95-percent-confidence intervals. Standard errors are estimated using 15 quantiles of longitude as clusters. Each symbol type the notes a distinct sample: red diamond for counties within 300 miles of the boundary, blue square for counties within 150 miles of the boundary, and green diamond for counties adjacent to the boundary. For buffer samples, estimates are of equation (1), which also includes a third-order polynomial in longitude and in the distance to the border (with free-soil areas defined negatively). For the border and donut samples, estimates are of equation (2), which also includes a third-order polynomial in longitude. The vertical, dashed line denotes a null hypothesis of zero. The outcomes are transformed into natural logarithms.

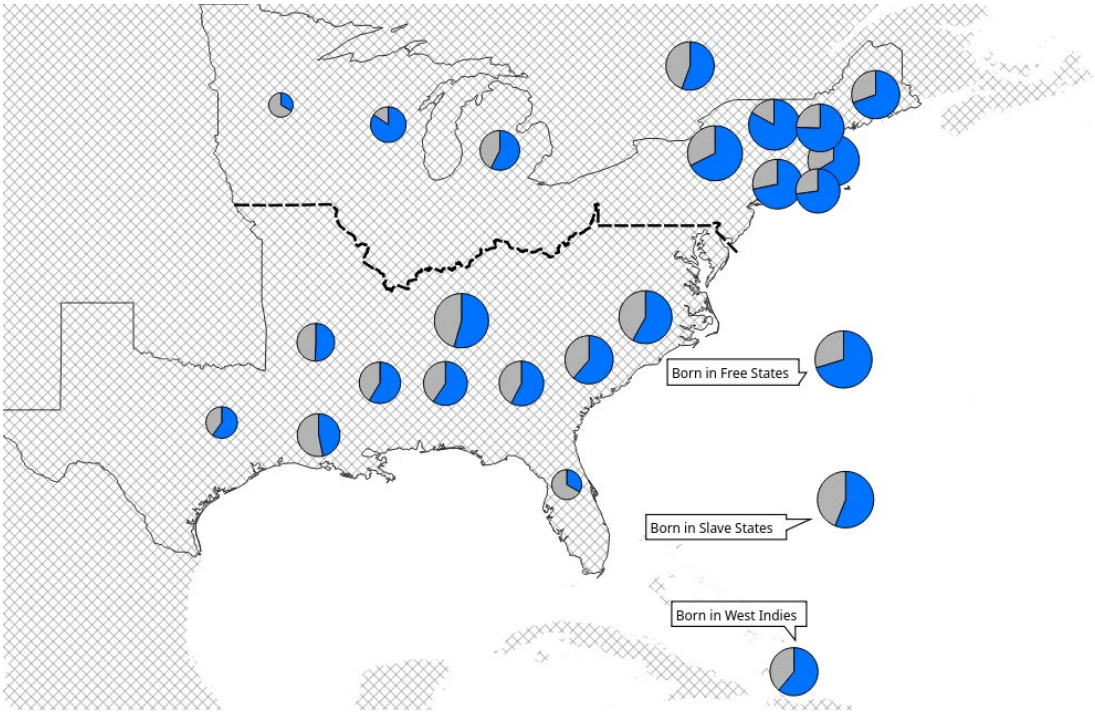
Figure 9 Wages (natural logs)



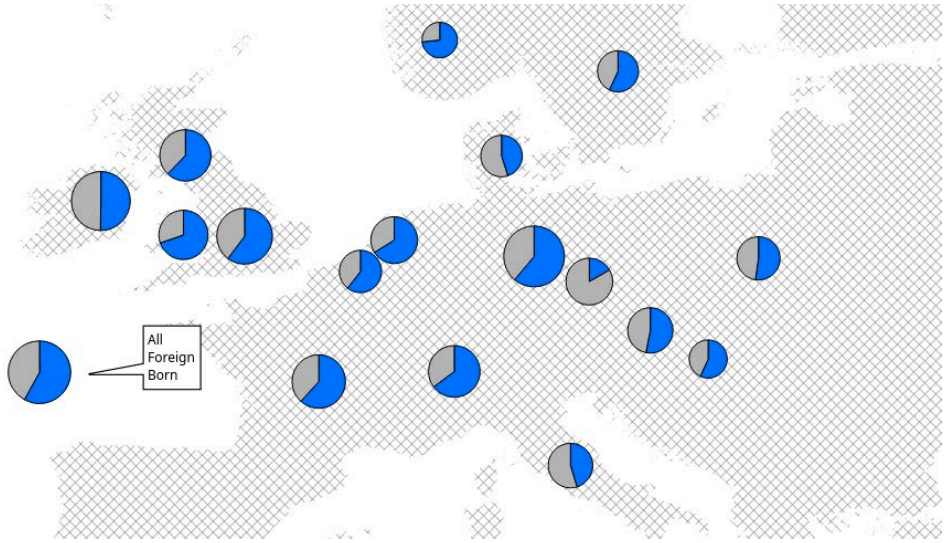
Notes: This figure presents point estimates and confidence intervals for the coefficient on slavery for the outcomes indicated in the row label and for various samples of counties. Point estimates are denoted with symbols within horizontal bands denoting 95-percent-confidence intervals. Standard errors are estimated using 15 quantiles of longitude as clusters. Each symbol type the notes a distinct sample: red diamond for counties within 300 miles of the boundary, blue square for counties within 150 miles of the boundary, and green diamond for counties adjacent to the boundary. For buffer samples, estimates are of equation (1), which also includes a third-order polynomial in longitude and in the distance to the border (with free-soil areas defined negatively). For the border and donut samples, estimates are of equation (2), which also includes a third-order polynomial in longitude. The vertical, dashed line denotes a null hypothesis of zero. The outcomes are transformed into natural logarithms.

Figure 10: Among Long-Distance Movers to Border Counties, Which Side Did They Choose?

Panel A: By Places of Birth in North America



Panel B: By Places of Birth in Europe



Notes: From the 1860 Full Count Census File, we extract all male household heads 25 years of age and over that reside in a county that touches the border between the free-soil and slavery-legal regions. We exclude all those born in the border states themselves. The pie charts (i) are proportional to the natural log of total cellsize, (ii) denote as blue and gray the fraction of such individuals resident on free-soil and slavery-legal sides, and (iii) are located at birthplaces, except for the aggregated categories.

Table 1. Summary statistics, select variables and samples.

Variable	Units	Whole			Free side			Slave side			Difference in mean
		Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	
Panel A: Counties within 300 miles of boundary											
Nonwhite Population,	Per Thous.	[1362]	5.3	(17.7)	[659]	0.9	(8.7)	[703]	9.6	(22.5)	-8.7
per County Acre	Logs	[1280]	-7.0	(2.4)	[579]	-8.6	(2.0)	[701]	-5.6	(1.7)	-3.0
White Population,	Per Thous.	[1362]	46.9	(342.1)	[659]	69.0	(467.0)	[703]	25.2	(130.3)	43.9
per County Acre	Logs	[1362]	-3.7	(1.2)	[659]	-3.4	(1.5)	[703]	-4.0	(0.7)	0.57
Rural Population,	Per Thous.	[1362]	41.1	(30.9)	[659]	51.1	(37.1)	[703]	31.2	(18.8)	19.8
per County Acre	Logs	[1357]	-3.6	(1.1)	[656]	-3.5	(1.5)	[701]	-3.7	(0.7)	0.18
Total Farm Acreage,	Levels	[1356]	0.59	(0.29)	[656]	0.55	(0.29)	[700]	0.63	(0.29)	-0.07
per County Acre	Logs	[1356]	-0.79	(1.00)	[656]	-0.97	(1.26)	[700]	-0.61	(0.61)	-0.36
Improved Acreage,	Levels	[1356]	0.41	(0.20)	[656]	0.51	(0.20)	[700]	0.32	(0.15)	0.19
per Farm Acre	Logs	[1356]	-1.03	(0.57)	[656]	-0.78	(0.51)	[700]	-1.27	(0.51)	0.49
Farm value ($),	Levels	[1356]	11.57	(14.01)	[656]	15.71	(17.19)	[700]	7.51	(8.12)	8.20
per County Acre	Logs	[1356]	1.75	(1.48)	[656]	1.95	(1.81)	[700]	1.54	(1.03)	0.41
Farm value ($),	Levels	[1356]	17.50	(37.36)	[656]	24.05	(51.43)	[700]	11.07	(9.27)	12.98
per Farm Acre	Logs	[1356]	2.53	(0.81)	[656]	2.92	(0.72)	[700]	2.15	(0.70)	0.77
Panel B: Counties on the boundary											
Nonwhite Population,	Per Thous.	[142]	4.2	(6.6)	[71]	1.9	(3.1)	[71]	6.8	(8.4)	-5.0
per County Acre	Logs	[140]	-6.9	(2.1)	[69]	-7.6	(2.1)	[71]	-6.0	(1.8)	-1.6
White Population,	Per Thous.	[142]	67.3	(83.4)	[71]	77.3	(88.3)	[71]	56.0	(76.4)	21.3
per County Acre	Logs	[142]	-3.0	(0.7)	[71]	-2.8	(0.7)	[71]	-3.2	(0.7)	0.42
Rural Population,	Per Thous.	[142]	55.8	(33.4)	[71]	64.4	(36.3)	[71]	45.9	(26.8)	18.6
per County Acre	Logs	[142]	-3.1	(0.6)	[71]	-2.9	(0.6)	[71]	-3.2	(0.6)	0.33
Total Farm Acreage,	Levels	[142]	0.65	(0.19)	[71]	0.66	(0.20)	[71]	0.64	(0.18)	0.02
per County Acre	Logs	[142]	-0.49	(0.39)	[71]	-0.48	(0.38)	[71]	-0.51	(0.40)	0.03
Improved Acreage,	Levels	[142]	0.47	(0.17)	[71]	0.52	(0.16)	[71]	0.41	(0.17)	0.11
per Farm Acre	Logs	[142]	-0.83	(0.39)	[71]	-0.70	(0.34)	[71]	-0.97	(0.40)	0.26
Farm value ($),	Levels	[142]	17.22	(18.02)	[71]	20.41	(20.76)	[71]	13.56	(13.52)	6.85
per County Acre	Logs	[142]	2.42	(0.93)	[71]	2.61	(0.93)	[71]	2.21	(0.88)	0.40
Farm value ($),	Levels	[142]	23.89	(20.38)	[71]	27.68	(22.41)	[71]	19.56	(16.95)	8.11
per Farm Acre	Logs	[142]	2.91	(0.69)	[71]	3.09	(0.66)	[71]	2.72	(0.67)	0.37

Notes: This table contains summary statistics for the main sample: 1860 counties selected by proximity to the free-slave border. The demographic and farm data are drawn from the 1860 Census, as compiled in ICPSR studies #2896 and #35206. County areas are taken from the NHGIS and are used as weights for constructing means and standard deviations. Outcomes are indicated in the leftmost column, and the normalizations are denoted in the second column. The 1860 free-slave boundary is as described in Section II and Appendix A.

Table 2: Sensitivity analysis, select variables

Outcomes (in natural logarithms):	(1) Nonwhites per county acre	(2) Whites per county acre	(3) Rural population per county acre	(4) Total farm acres per county area	(5) Improved acres per total farm acre	(6) Farm value per county acre	(7) Farm value per total farm acre
Panel A: Reweighting and recoding of zeros							
Baseline	1.899	-0.644	-0.511	-0.024	-0.405	-0.582	-0.558
	(0.485)	(0.142)	(0.157)	(0.146)	(0.140)	(0.252)	(0.177)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Weight by Rural Population	2.036	-0.580	-0.365	0.045	-0.212	-0.380	-0.425
	(0.362)	(0.100)	(0.0817)	(0.0593)	(0.0867)	(0.147)	(0.132)
	[1275]	[1357]	[1357]	[1352]	[1352]	[1352]	[1352]
Unweighted	1.993	-0.533	-0.431	-0.035	-0.278	-0.429	-0.394
	(0.459)	(0.145)	(0.132)	(0.122)	(0.133)	(0.220)	(0.168)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Assign zeros to minimum	1.927	-0.661	-0.513	-0.068	-0.428	-0.629	-0.586
	(0.521)	(0.150)	(0.168)	(0.179)	(0.135)	(0.265)	(0.171)
	[1364]	[1364]	[1364]	[1364]	[1364]	[1364]	[1364]
Panel B: Additional spatial controls							
Dummies for 5 quantiles of longitude	1.860	-0.641	-0.516	-0.023	-0.419	-0.600	-0.577
	(0.505)	(0.138)	(0.157)	(0.146)	(0.144)	(0.258)	(0.184)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Dummies for 10 quantiles of longitude	1.866	-0.640	-0.510	-0.023	-0.416	-0.598	-0.575
	(0.508)	(0.136)	(0.155)	(0.146)	(0.145)	(0.259)	(0.185)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Dummies for 15 quantiles of longitude	1.876	-0.653	-0.522	-0.034	-0.418	-0.607	-0.572
	(0.514)	(0.129)	(0.147)	(0.140)	(0.146)	(0.255)	(0.186)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Add cubic polynomial in latitude and longitude	1.873	-0.571	-0.455	0.003	-0.374	-0.506	-0.509
	(0.508)	(0.120)	(0.137)	(0.132)	(0.130)	(0.193)	(0.148)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Variables from Panel A of Figure 2	1.982	-0.533	-0.407	0.005	-0.327	-0.429	-0.434
	(0.508)	(0.130)	(0.137)	(0.136)	(0.121)	(0.243)	(0.171)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Depth to bedrock	2.109	-0.670	-0.471	0.011	-0.367	-0.498	-0.509
	(0.427)	(0.143)	(0.151)	(0.154)	(0.125)	(0.236)	(0.160)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Soil variables from Panel B of Figure 2	1.665	-0.520	-0.311	0.186	-0.315	-0.346	-0.532
	(0.389)	(0.137)	(0.126)	(0.0938)	(0.102)	(0.198)	(0.154)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Fraction glaciated	1.962	-0.514	-0.383	0.119	-0.346	-0.396	-0.515
	(0.488)	(0.179)	(0.179)	(0.142)	(0.140)	(0.258)	(0.181)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Fraction glaciated (excl. Driftless)	1.975	-0.525	-0.397	0.107	-0.343	-0.402	-0.509
	(0.488)	(0.160)	(0.163)	(0.131)	(0.138)	(0.248)	(0.179)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Fraction in Public Land Survey System (PLSS)	1.712	-0.682	-0.517	-0.059	-0.364	-0.561	-0.502
	(0.458)	(0.131)	(0.147)	(0.121)	(0.150)	(0.246)	(0.171)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]

Notes: table continue next page.

Table 2 (continued)

Outcomes (in natural logarithms):	(1) Nonwhites per county acre	(2) Whites per county acre	(3) Rural population per county acre	(4) Total farm acres per county area	(5) Improved acres per total farm acre	(6) Farm value per county acre	(7) Farm value per total farm acre
Panel C: Outcome variables in levels (per acre), various estimators							
Mean (OLS)	0.006	-0.040	-0.021	0.017	-0.133	-7.988	-11.050
	(0.00207)	(0.0182)	(0.00533)	(0.0502)	(0.0476)	(2.785)	(3.923)
	[1362]	[1362]	[1362]	[1356]	[1356]	[1356]	[1356]
Median (Quantile Reg.)	0.002	-0.028	-0.019	-0.030	-0.174	-5.132	-9.062
	(0.000643)	(0.00320)	(0.00329)	(0.0369)	(0.0309)	(1.229)	(1.613)
	[1362]	[1362]	[1362]	[1356]	[1356]	[1356]	[1356]
Panel D: Alternative Boundaries (Adjacent Counties Only)							
Boundary Displaced by -50 Miles	0.330	0.079	0.091	0.072	-0.004	0.126	0.054
	(0.213)	(0.0588)	(0.0472)	(0.0461)	(0.0532)	(0.129)	(0.0927)
	[133]	[140]	[140]	[140]	[140]	[140]	[140]
Boundary Displaced by 50 Miles	0.089	-0.136	-0.089	-0.001	-0.095	-0.034	-0.032
	(0.343)	(0.0844)	(0.108)	(0.0605)	(0.0990)	(0.177)	(0.138)
	[144]	[144]	[142]	[143]	[143]	[143]	[143]
Northern and eastern border of AR, to southern border of TN and NC	0.423	-0.046	0.061	0.114	0.005	0.257	0.143
	(0.189)	(0.148)	(0.135)	(0.136)	(0.102)	(0.151)	(0.119)
	[81]	[81]	[81]	[81]	[81]	[81]	[81]
Southern borders of MO KY VA	0.509	0.020	0.050	0.309	-0.271	0.275	-0.034
	(0.478)	(0.240)	(0.251)	(0.252)	(0.156)	(0.349)	(0.163)
	[92]	[92]	[92]	[92]	[92]	[92]	[92]
Southern borders of MN WI MI NY (land borders only)	-0.715	-0.184	-0.231	-0.080	-0.116	-0.136	-0.056
	(0.350)	(0.178)	(0.164)	(0.230)	(0.085)	(0.277)	(0.073)
	[65]	[83]	[82]	[81]	[81]	[81]	[81]
Arkansas River, up Mississippi River to southern border of TN, east to Tennessee River, up river (plus Middle Holston) to southern border of VA	0.167	-0.023	0.108	0.050	0.147	0.133	0.083
	(0.215)	(0.154)	(0.132)	(0.075)	(0.126)	(0.191)	(0.158)
	[97]	[97]	[97]	[97]	[97]	[97]	[97]
Northern extent of the cotton belt (within belt = 1)	0.612	-0.053	0.030	-0.141	0.055	-0.218	-0.077
	(0.252)	(0.320)	(0.321)	(0.171)	(0.148)	(0.282)	(0.198)
	[127]	[128]	[128]	[125]	[125]	[125]	[125]
Terminal moraine (glacial coverage = 1)	0.234	0.409	0.374	0.310	0.232	0.637	0.328
	(0.357)	(0.163)	(0.172)	(0.185)	(0.080)	(0.227)	(0.104)
	[121]	[122]	[121]	[122]	[122]	[122]	[122]
Panel E: Limit sample to border segments with no urban population on the free side (border counties only)							
Baseline (all border counties)	1.790	-0.377	-0.286	-0.012	-0.241	-0.348	-0.335
	(0.442)	(0.0932)	(0.0787)	(0.0517)	(0.0621)	(0.103)	(0.0807)
	[140]	[142]	[142]	[142]	[142]	[142]	[142]
Drop if urban to north (def'n 1: 25k urban pop.)	1.819	-0.369	-0.284	-0.013	-0.247	-0.350	-0.338
	(0.448)	(0.0930)	(0.0795)	(0.0527)	(0.0629)	(0.105)	(0.0825)
	[136]	[138]	[138]	[138]	[138]	[138]	[138]
Drop if urban to north (def'n 2: 2.5k urban pop.)	2.353	-0.327	-0.253	0.042	-0.217	-0.284	-0.326
	(0.523)	(0.102)	(0.0928)	(0.0846)	(0.0712)	(0.160)	(0.106)
	[80]	[82]	[82]	[82]	[82]	[82]	[82]

Notes: This table presents point estimates and confidence intervals for the coefficient on slavery for the outcomes indicated in the column heading and for various specifications. The sample for Panels A, B, and C consists of counties in 1860 within 300 miles of the free-slave boundary. Outcomes are in natural logarithms, unless noted otherwise. The default specification is equation (1), and modified as noted in the panel and row headings. Panel D compares results for the free-slave boundary to placebo borders displaced 50 miles off of the true boundary. (Counties less than fifty miles into the free-soil region are spuriously recoded as in the slavery region, for example.) Panels D uses only counties adjacent to the boundary (true or placebo) to avoid having the falsification test contaminated by the true boundary. Panel E uses border counties and drops border segments with urban populations on the northern side. (See the text for the two definitions.) Estimates for Panel D and E are of equation (2).

Table 3: Results for various subsamples

Outcomes (in natural logarithms):	(1) Nonwhites per county acre	(2) Whites per county acre	(3) Rural population per county acre	(4) Total farm acres per county area	(5) Improved acres per total farm acre	(6) Farm value per county acre	(7) Farm value per total farm acre
Panel A: Subsamples based on closest boundary segment							
Change to PLSS at Free/Slave Boundary	1.834	-0.697	-0.533	0.015	-0.535	-0.529	-0.544
	(0.725)	(0.224)	(0.235)	(0.126)	(0.238)	(0.378)	(0.275)
	[694]	[706]	[706]	[706]	[706]	[706]	[706]
No change to PLSS at Free/Slave Boundary	1.987	-0.573	-0.501	-0.054	-0.290	-0.635	-0.581
	(0.517)	(0.123)	(0.148)	(0.223)	(0.150)	(0.284)	(0.232)
	[586]	[656]	[651]	[650]	[650]	[650]	[650]
Mason-Dixon	1.241	-0.518	-0.427	0.226	-0.215	-0.402	-0.628
	(0.693)	(0.0208)	(0.188)	(0.185)	(0.232)	(0.198)	(0.217)
	[321]	[323]	[318]	[322]	[322]	[322]	[322]
Ohio (the river)	1.384	-0.836	-0.611	-0.069	-0.552	-0.725	-0.656
	(0.855)	(0.260)	(0.284)	(0.148)	(0.287)	(0.459)	(0.321)
	[582]	[590]	[590]	[590]	[590]	[590]	[590]
Missouri (the state)	3.000	-0.519	-0.480	-0.167	-0.425	-0.581	-0.415
	(0.638)	(0.186)	(0.213)	(0.333)	(0.205)	(0.437)	(0.301)
	[377]	[449]	[449]	[444]	[444]	[444]	[444]
Riverine boundaries	1.879	-0.665	-0.519	-0.023	-0.494	-0.646	-0.622
	(0.586)	(0.167)	(0.186)	(0.143)	(0.196)	(0.339)	(0.236)
	[895]	[906]	[905]	[904]	[904]	[904]	[904]
Geometric boundaries	1.910	-0.522	-0.435	-0.003	-0.224	-0.409	-0.407
	(0.658)	(0.188)	(0.245)	(0.288)	(0.134)	(0.234)	(0.188)
	[385]	[456]	[452]	[452]	[452]	[452]	[452]
Closest boundary east of Miami River	1.570	-0.772	-0.607	-0.027	-0.422	-0.640	-0.613
	(0.717)	(0.187)	(0.230)	(0.151)	(0.241)	(0.362)	(0.254)
	[724]	[733]	[728]	[732]	[732]	[732]	[732]
Closest boundary west of Miami River	2.338	-0.494	-0.404	-0.046	-0.410	-0.544	-0.498
	(0.653)	(0.160)	(0.173)	(0.242)	(0.146)	(0.332)	(0.238)
	[556]	[629]	[629]	[624]	[624]	[624]	[624]
Panel B: Subsamples based Newberry data on historical county borders							
FIPS code first appears in or after 1823	2.235	-0.637	-0.534	-0.079	-0.510	-0.595	-0.516
	(0.596)	(0.216)	(0.207)	(0.267)	(0.201)	(0.383)	(0.263)
	[606]	[685]	[684]	[679]	[679]	[679]	[679]
FIPS code first appears before 1823	1.944	-0.588	-0.435	-0.020	-0.314	-0.503	-0.483
	(0.468)	(0.115)	(0.140)	(0.0861)	(0.126)	(0.186)	(0.159)
	[674]	[677]	[673]	[677]	[677]	[677]	[677]
Current boundary first appears in or after 1845	1.352	-1.162	-1.027	-0.420	-0.777	-1.302	-0.882
	(0.666)	(0.244)	(0.263)	(0.317)	(0.176)	(0.380)	(0.247)
	[628]	[704]	[702]	[698]	[698]	[698]	[698]
Current boundary first appears before 1845	2.434	-0.420	-0.274	0.100	-0.112	-0.224	-0.324
	(0.450)	(0.139)	(0.119)	(0.0752)	(0.0856)	(0.173)	(0.147)
	[652]	[658]	[655]	[658]	[658]	[658]	[658]
Panel C: Subsamples based on susceptibility to soil erosion							
More susceptible to erosion (K-factor)	1.876	-0.455	-0.345	-0.004	-0.341	-0.497	-0.492
	(0.485)	(0.114)	(0.101)	(0.0694)	(0.108)	(0.204)	(0.173)
	[659]	[682]	[680]	[679]	[679]	[679]	[679]
Less susceptible to erosion (K-factor)	1.589	-1.127	-0.974	-0.043	-0.570	-0.925	-0.882
	(0.610)	(0.364)	(0.375)	(0.352)	(0.283)	(0.517)	(0.281)
	[621]	[680]	[677]	[677]	[677]	[677]	[677]
More susceptible to erosion (KF-factor)	1.951	-0.475	-0.332	0.061	-0.371	-0.435	-0.496
	(0.507)	(0.111)	(0.116)	(0.111)	(0.113)	(0.252)	(0.172)
	[674]	[682]	[682]	[680]	[680]	[680]	[680]
Less susceptible to erosion (KF-factor)	1.945	-1.131	-1.003	-0.176	-0.606	-1.044	-0.868
	(0.803)	(0.345)	(0.353)	(0.416)	(0.267)	(0.486)	(0.265)
	[606]	[680]	[675]	[676]	[676]	[676]	[676]

Notes: This table presents point estimates and confidence intervals for the coefficient on slavery for the outcomes indicated in the column heading and for various subsamples. The full sample consists of counties in 1860 within 300 miles of the free-slave boundary. Subsample is indicated in each row heading. Outcomes are in natural logarithms. The specification is equation (1).

Table 4: Alternative Approaches to Inference

Outcomes (in natural logarithms):	(1) Nonwhites per county acre	(2) Whites per county acre	(3) Rural population per county acre	(4) Total farm acres per county acre	(5) Improved acres per total farm acreage	(6) Farm value per county area	(7) Farm value per total farm acreage
Panel A: Various clusters							
Coefficient	1.899	-0.644	-0.511	-0.0239	-0.405	-0.582	-0.558
Cluster for 15 quantiles of latitude (baseline)	(0.485)	(0.142)	(0.157)	(0.146)	(0.140)	(0.252)	(0.177)
Cluster for 10 quantiles of latitude	(0.546)	(0.142)	(0.159)	(0.118)	(0.153)	(0.252)	(0.186)
Cluster for 5 quantiles of latitude	(0.750)	(0.189)	(0.195)	(0.121)	(0.198)	(0.336)	(0.237)
Cluster for state	(0.731)	(0.338)	(0.327)	(0.282)	(0.143)	(0.395)	(0.212)
No clustering	(0.203)	(0.104)	(0.0935)	(0.0806)	(0.0566)	(0.132)	(0.0831)
Panel B: Conley standard errors, various cutoff distances							
20 Miles	(0.210)	(0.105)	(0.095)	(0.081)	(0.059)	(0.135)	(0.086)
40 Miles	(0.282)	(0.137)	(0.128)	(0.107)	(0.082)	(0.184)	(0.117)
60 Miles	(0.355)	(0.167)	(0.159)	(0.132)	(0.105)	(0.230)	(0.145)
80 Miles	(0.419)	(0.191)	(0.183)	(0.150)	(0.124)	(0.264)	(0.166)
100 Miles	(0.476)	(0.208)	(0.202)	(0.162)	(0.138)	(0.287)	(0.180)
125 Miles	(0.538)	(0.224)	(0.218)	(0.172)	(0.151)	(0.307)	(0.193)
150 Miles	(0.589)	(0.235)	(0.230)	(0.177)	(0.159)	(0.320)	(0.202)
Panel C: Kelly standard errors, various degrees of smoothness (kappa)							
kappa=0.5	(0.432)	(0.150)	(0.112)	(0.082)	(0.143)	(0.214)	(0.197)
kappa=1.5	(0.450)	(0.228)	(0.195)	(0.142)	(0.150)	(0.304)	(0.210)
kappa=4	(0.471)	(0.241)	(0.206)	(0.160)	(0.119)	(0.323)	(0.170)

Notes: This table presents the baseline point estimates from Table 2, Panel A, row 1, but with alternative assumptions used to construct standard errors. Panel A uses different assumptions about clustering, Panel B uses Conley's (1999) estimator for different cut off distances in the construction of the weighting kernel, and Panel C uses Kelly's (2020) estimator for several values of the smoothing parameter (kappa).

Table 5: Effects at the Boundary: Jumps versus Kinks

Outcomes (in natural logarithms):	(1) Nonwhites per county acre	(2) Whites per county acre	(3) Rural population per county acre	(4) Total farm acres per county area	(5) Improved acres per total farm acre	(6) Farm value per county acre	(7) Farm value per total farm acre
Panel A: Within 300 miles of boundary (default sample)							
Slavery legal	1.899	-0.644	-0.511	-0.024	-0.405	-0.582	-0.558
	(0.485)	(0.142)	(0.157)	(0.146)	(0.140)	(0.252)	(0.177)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Panel B: Within 450 miles of boundary							
Slavery legal	1.624	-0.692	-0.658	-0.066	-0.588	-0.818	-0.752
	(0.483)	(0.211)	(0.226)	(0.214)	(0.162)	(0.383)	(0.205)
	[1560]	[1667]	[1662]	[1642]	[1642]	[1642]	[1642]
Panel C: Within 600 miles of boundary							
Slavery legal	1.550	-0.938	-0.907	-0.389	-0.613	-1.120	-0.731
	(0.495)	(0.221)	(0.236)	(0.276)	(0.163)	(0.440)	(0.195)
	[1700]	[1811]	[1805]	[1779]	[1779]	[1779]	[1779]
Panel D: Within 900 miles of boundary							
Slavery legal	1.503	-1.263	-1.123	-0.502	-0.568	-1.272	-0.770
	(0.460)	(0.205)	(0.267)	(0.407)	(0.146)	(0.419)	(0.157)
	[1771]	[1889]	[1883]	[1849]	[1849]	[1849]	[1849]
Panel E: Within 300 miles of boundary, intercept and slope shift							
Slavery legal	1.883	-0.641	-0.509	-0.023	-0.405	-0.580	-0.558
	(0.483)	(0.141)	(0.157)	(0.144)	(0.140)	(0.251)	(0.177)
Slavery legal x distance to boundary / 100	-1.024	-1.000	-0.835	-0.494	-0.027	-0.829	-0.336
	(0.661)	(0.511)	(0.524)	(0.509)	(0.203)	(0.673)	(0.298)
	[1280]	[1362]	[1357]	[1356]	[1356]	[1356]	[1356]
Panel F: Within 450 miles of boundary, intercept and slope shift							
Slavery legal	1.616	-0.694	-0.659	-0.060	-0.588	-0.818	-0.758
	(0.479)	(0.212)	(0.225)	(0.210)	(0.161)	(0.380)	(0.203)
Slavery legal x distance to boundary / 100	-0.342	-0.193	-0.081	0.315	0.020	-0.001	-0.316
	(0.478)	(0.386)	(0.425)	(0.532)	(0.167)	(0.677)	(0.200)
	[1560]	[1667]	[1662]	[1642]	[1642]	[1642]	[1642]
Panel G: Within 600 miles of boundary, intercept and slope shift							
Slavery legal	1.554	-0.953	-0.918	-0.396	-0.616	-1.138	-0.742
	(0.489)	(0.215)	(0.237)	(0.268)	(0.162)	(0.427)	(0.190)
Slavery legal x distance to boundary / 100	0.121	-0.792	-0.586	-0.203	-0.099	-0.479	-0.276
	(0.498)	(0.360)	(0.429)	(0.332)	(0.122)	(0.366)	(0.134)
	[1700]	[1811]	[1805]	[1779]	[1779]	[1779]	[1779]
Panel H: Within 900 miles of boundary, intercept and slope shift							
Slavery legal	1.522	-1.345	-1.182	-0.511	-0.597	-1.342	-0.831
	(0.411)	(0.176)	(0.207)	(0.348)	(0.138)	(0.369)	(0.149)
Slavery legal x distance to boundary / 100	0.090	-0.383	-0.271	-0.045	-0.147	-0.345	-0.301
	(0.552)	(0.281)	(0.382)	(0.401)	(0.0995)	(0.382)	(0.144)
	[1771]	[1889]	[1883]	[1849]	[1849]	[1849]	[1849]

Notes: This table contains results using an expanded sample (by including counties farther from the boundary) and modifies the specifications to include a change in slope at the boundary in addition to the change in levels estimated above. Variables and controls are otherwise the same as the baseline (as in Table 2, Panel A, row 1). The change in slope is estimated as an interaction with a dummy variable for slavery being legal times distance to the boundary. This distance variable is defined negatively on the free-soil side and positively in the region where slavery is legal. This allows for a 'kink' at the boundary, as opposed to the default specifications which allows for only a 'jump.'

Table 6. Land Improvement and Total Factor Productivity

	(1)	(2)	(3)	(4)	(5)	(6)
	Farmland value per farm acre			Total Factor Productivity, Agriculture		
	Land excluding buildings	Improved Land 2x Method	Subtraction Method	Weiss Labor	Lebergott Labor	Improved Land 2x
Panel A: Outcome in Natural Logs						
300-mile buffer	-0.46	-0.36	-0.48	-0.10	-0.12	-0.08
	(0.174)	(0.147)	(0.346)	(0.0360)	(0.0358)	(0.0375)
	[1355]	[1355]	[1286]	[1351]	[1351]	[1351]
150-mile buffer	-0.26	-0.19	-0.21	-0.03	-0.05	-0.02
	(0.101)	(0.0897)	(0.162)	(0.0470)	(0.0463)	(0.0462)
	[820]	[820]	[795]	[817]	[817]	[817]
Border counties	-0.25	-0.181	-0.21	-0.07	-0.09	-0.06
	(0.0860)	(0.0793)	(0.134)	(0.0367)	(0.0348)	(0.0363)
	[142]	[142]	[141]	[142]	[142]	[142]
Panel B: Outcome in Levels						
300-mile buffer	-7.74	-4.20	-6.11	-0.09	-0.12	-0.07
	(3.214)	(1.844)	(3.352)	(0.0415)	(0.0446)	(0.0449)
	[1355]	[1355]	[1354]	[1351]	[1351]	[1351]
150-mile buffer	-5.03	-2.46	-3.52	-0.03	-0.05	-0.02
	(2.210)	(1.246)	(1.957)	(0.0526)	(0.0537)	(0.0533)
	[820]	[820]	[819]	[817]	[817]	[817]
Border counties	-4.90	-2.28	-3.33	-0.06	-0.08	-0.04
	(2.36)	(1.388)	(2.328)	(0.0322)	(0.0313)	(0.0314)
	[142]	[142]	[141]	[142]	[142]	[142]

Notes: This table presents estimates of the effect of slavery for the indicated outcomes and samples. The regression specification is as in equation (1). Estimation of farmland value and total factor productivity are described in Appendices J and K, respectively.