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Examining persistent effects of extractive institutions in the United States

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Abstract

This paper estimates the medium- to long-run effects of slavery in the United States in a spatial regression discontinuity design. Using the boundary between free and slave states immediately antebellum, we find that legal slavery decreased per capita manufacturing output by as much as 30% in the decades following the Civil War. Perhaps surprisingly, agricultural output and farm values were only briefly depressed in former slave states after the war. Although emancipation ended slavery, political forces kept the institution from being completely disintegrated, and we explore channels through which this was possible. We show that slavery affected the structure of the economy in a given region—specifically through agricultural production decisions—and that these structures persisted long after passage of the 13th Amendment. However, sharecropping played a relatively small role in this region. Our results support mounting evidence in recent literature of the significant and lasting effects of institutions on economic development.

KEYWORDS

economic development, economic organization, forced labor, institutions and growth

1 | INTRODUCTION

The analysis of Acemoglu et al., (2001), Acemoglu et al., (2002), Acemoglu and Robinson (2006) and Nunn (2008), among others, has given empirical support to the idea that historical institutions are the defining factor in long-run economic development performance. This theory posits that long-run growth can be traced back to the type of institutions a country or area have had historically. Inclusive institutions combine individual agency, secure property rights with unbiased rule of law, and inclusive

political participation to spur growth, while extractive institutions exclude the majority of people from political and economic affairs, hindering economic development. This body of work generally relies on exogenous variation in some other factor—European settler mortality being the most well-known—to implement an instrumental variables approach to estimate the causal effect of institutions on growth for a particular country. The analysis is generally on the country level, meaning naturally that these authors are forced to work with the small subset of countries for which historical data are satisfactory.

Other work has voiced concerns over this approach. These critiques address the sensitivity of the results (e.g., Pande & Udry, 2006) or challenge the validity of the historical data being used (e.g., Glaeser et al., 2004 and Albouy, 2012). It is unclear if the empirical specifications in these works are precise enough to definitively answer whether institutions matter, although Acemoglu, Johnson, and Robinson in particular have strongly defended their work (Acemoglu et al., 2012). What is clear, however, is that the identification problem is immensely challenging, and the questions they attempt to answer are of the upmost importance. In their 2012 book " Why Nations Fail," Acemoglu and Robinson take advantage of the more general publication medium to dive into short oral histories of particular cultures that support their arguments. While not presented empirically, these cases give a more micro-based picture of their overarching arguments. One such case was the Peruvian mita forced labor system, in which the Spanish government pressed a fraction of indigenous men into working in the local mines every year based on where they lived. The long-run effects of this system were examined extensively and rigorously by Dell (2010), who uses a spatial regression discontinuity framework. She finds a 25% decrease in household consumption for families within the mita boundaries nearly 200 years after the system was abolished. This lends support for the large impact of history on current economic outcomes by working through the channels by which this effect persists.

Since Dell's work on Peru, a number of other authors have followed her approach in the historical development literature. Cogneau and Moradi (2014) examine the division between French and British colonies in present-day Ghana and Togo, finding educational and religious differences that persist today; Michalopoulos and Papaioannou (2016) also find long-run effects in ethnic violence. Basten and Betz (2012) investigate attitudes toward work and leisure in the vein of the concept of the Protestant work ethic following a partition of Switzerland in the 15th century. Examining more medium-run outcomes, Grosfeld and Zhuravskaya (2014) look at the pre-WWI divisions of empires in Poland, Fontana et al., (2018) examine the Nazi occupation of Italy, and Testa (2020) studies the expulsion of Germans from Czechoslovakia during World War II.[1]

This paper builds on these works by examining an important and well-known case of a sharp geographic cutoff that determines the border of an extractive institution: the boundary between states that determined where slavery was legal in 19th century America. Like these authors, we take a spatial regression discontinuity approach. This approach focuses on a relatively narrow bandwidth, comprising primarily of the area close to the Mason-Dixon line and the Ohio River Valley. This allows us to abstract away from many of the extreme differences between Northern and Southern states that existed in the pre-Civil War U.S., focusing instead on areas that had similar climates and did not suffer from significant war-related damage. Using this, we examine how having been a slave state before the Civil War affected the relative structure of an area's economy, particularly as it pertained to industrialization in the United States in the late 19th and early 20th century.

We show that counties just inside the boundary where slavery was allowed had 30 to 40% less manufacturing output per capita in the decades after the Civil War. Further, we show that agricultural

[1]Other works have used location as a predictor for long-run effects without a spatial regression discontinuity, including Valencia Caicedo (2019) and Juhász (2018).

production decisions were affected by the availability of slavery and that these decisions persisted after emancipation with the assistance of political efforts to nominally continue the extractive institution. We limit our main results to the era between the Civil War and the turn of the 20th century, in large part due to the onset large-scale migration of black individuals during the Great Migration.

Some of the more obvious modern cases of this type of division—the border between North and South Korea and the former Berlin Wall, for example—have been documented by nighttime satellite imagery proxy (e.g., Henderson et al., 2012), although this measure may not be sufficiently precise in densely populated areas (Chen & Nordaus, 2010).[2] The results of these works are perhaps not surprising; the Berlin Wall fell 20 years ago, and South Korea has modernized only in the last 70 years. The work from Dell and others is striking in the fact that the boundaries became obsolete centuries ago, yet the effects are still markedly visible today. Our work adds to these results in several ways. First, while the United States is not assumed to be immune from lasting impacts of extractive institutions in expectation, examining the United States lends further support to the now-significant body of evidence. Second, major differences between slave and free states often make comparisons difficult, and while our approach has several important caveats, it does offer a more credible empirical solution. Finally, we can exploit the superior data from the United States to not only investigate the channels of this phenomenon, but the time path as well. While we are not able to estimate over centuries as authors examining other contexts have, long-standing differences in economic development between Northern and Southern states still exist today, and taken together, our results give further credence to the idea that historical institutional differences have been a defining reason.

Section 2 provides historical background on slavery in America, and readers with a working knowledge of the topic may wish to skip ahead. Section 3 describes our empirical approach, and we present and discuss the results in Section 4. Section 5 concludes.

2 | HISTORICAL BACKGROUND

It is important to note that the analysis presented here focuses on regions that divided the North and the South. As such, we largely ignore the 19th-century deep South, and this section provides a brief and non-comprehensive summary of the institution of slavery that focuses on these regions.

2.1 | Slavery in the United States

Slavery started slowly in the early days of the Virginia Colony, the first permanent English settlement in the Americas. The majority of laborers were brought to the New World as indentured servants and were typically freed after a predetermined spell—usually 7 years—was complete (Morgan, 2003). As such, the first Africans to arrive in Jamestown in 1619 were treated in this manner. However, these individuals were not English subjects by birth and were not considered subject to English common law. This was codified in a 1662 law declaring *Partus sequitur ventrem*, which stated that a child born of an enslaved woman inherited the status of the mother, regardless of the status of the father. In the later half of the 17th century, the British economy improved, making it harder to find willing indentured servants. This, combined with the worry about increasing numbers of poor, landless former servants,

[2]Michalopoulos and Papaioannou (2013) combine these techniques by using satellite imagery as a measure for long-term effects of pre-colonial ethnic boundaries in Africa.

led wealthy planters in Maryland and Virginia to begin to prefer slaves (Breen, 1973). However, the fundamental legal framework was not put in place until 1705 with the Virginia Slave Codes.

Maryland and Virginia both developed booming tobacco economies in the late 17th and early 18th centuries, greatly increasing the need for labor in the Chesapeake Bay area. During the 18th century, the slave population increased from about 100,000 to 1 million and constituted 40% of the population of the region (Kulikoff, 1986). However, tobacco farming in the Chesapeake took more skilled labor and was generally done on smaller plots when compared to the plantation cash crops further south, where slaves consisted of 65% of the population (Brandt, 2007).

Northeastern colonies also had sizable slave populations from the time of their establishment, although generally for less agrarian purposes. It is estimated the over 40% of white households owned slaves in New York City at the beginning of the 18th century (Harris, 2004). By the time of the Revolutionary War, about 300,000 slaves had been brought to the Colonies.

The international slave trade was significantly hindered in 1807, when Britain—whose powerful Royal Navy controlled most of the Atlantic slave trade—banned the practice (Kaufmann & Pape, 1999). The country had previously banned the institution in 1774, although this did not apply to its colonies. The English attempted to force other countries to accede to the ban by making slave trading equivalent to piracy, punishable by death. The United States followed suit beginning in 1808. However, internal slave trading continued in the United States, and the District of Columbia was the only jurisdiction to completely ban the slave trade while still allowing slavery. By the time of the 1860 census, there were over four million slaves in the United States, representing nearly 13% of the population. In Southern states, this figure was closer to 25 to 50% of the population of each state. Figure 1 shows slavery by county in deciles on the eve of the Civil War, with white counties in the first decile and deep red counties with the most slaves in the tenth decile. There were almost no slaves in the North, with several states enacting gradual abolition laws, several of which are discussed below. The notable exception is New Jersey, which did not grandfather in abolition when slavery was made illegal in 1846.

The Emancipation Proclamation was issued in 1863, although this only promised freedom for slaves in Confederate states upon the conclusion on the Civil War. It did not apply to slave states that stayed in the Union, and because the Confederacy did not recognize the edict, it only immediately applied to slaves from Confederate states that escaped across Union lines. The Proclamation was made universal in 1865 with the ratification of the 13th Amendment, ending slavery in the United States

2.2 | The North-South Divide

2.2.1 | *In the East*

Perhaps the most famous divide between the North and South in the United States is the Mason-Dixon line, which currently serves as part of the borders of Pennsylvania, Maryland, Delaware, and West Virginia. In 1760, the British monarchy stepped in to resolve a long-standing border dispute between the Pennsylvania and Maryland colonies, and English astronomers Charles Mason and Jeremiah Dixon were hired in 1763 after local surveyors failed to produce measurements that were adequately accurate. The pair completed their survey in 1767, having extended the line 40 miles west of Maryland's border. This territory west of Maryland was disputed by Virginia and Pennsylvania, and the Mason-Dixon line was accepted as the border and extended a further five degrees west in a 1774 agreement. As part of the deal, Pennsylvania's western border then ran due North from that point.

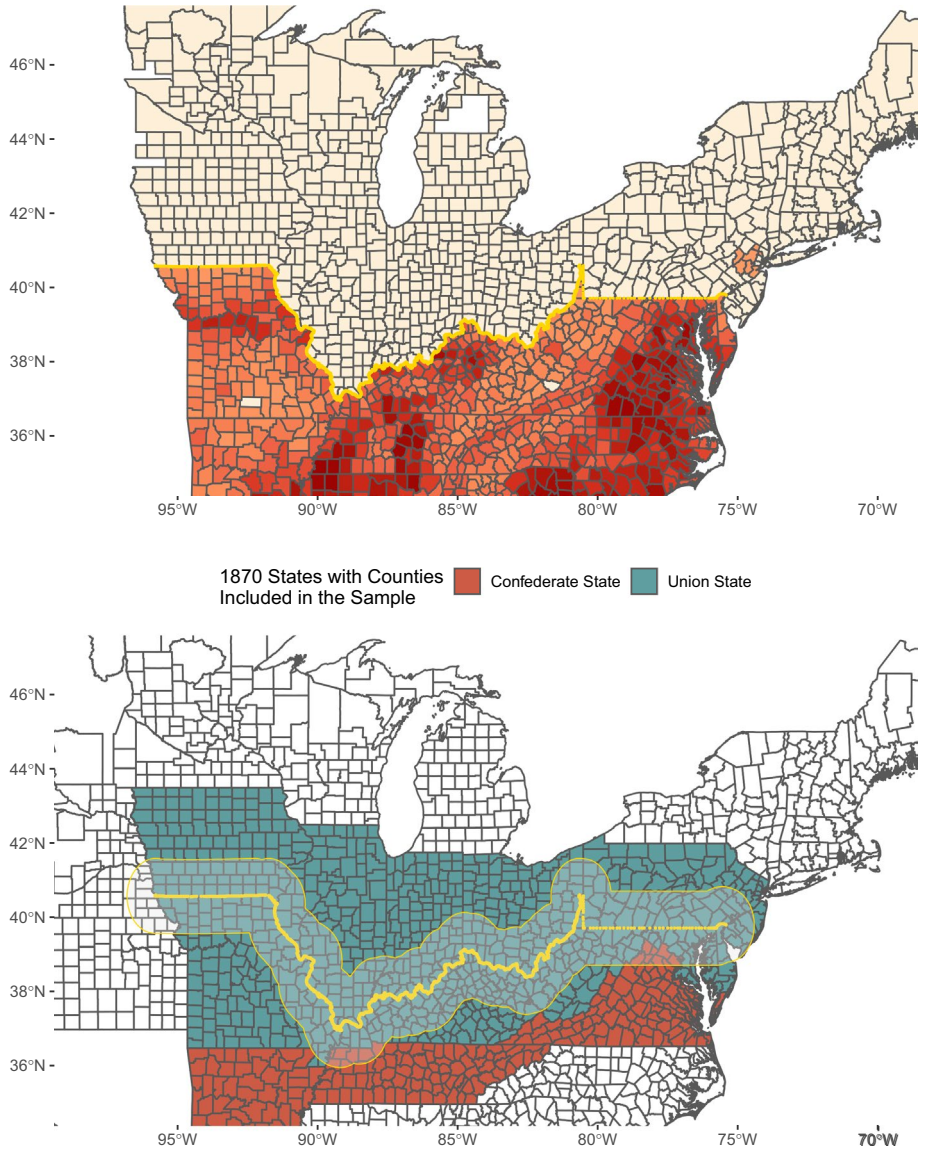


FIGURE 1 *Top*: Slavery totals by county in deciles, from 1860 U.S. Census records. *Bottom*: Counties by Union (blue) or Confederate (red) status. The yellow line shows the boundary between free and slave states in 1860, and the yellow shaded area gives 100 km bands on either side of the boundary. 1870 county/state boundaries are shown to differentiate West Virginia, which did not separate from Virginia until the onset of the Civil War

It is worth noting that at the time, the lower three counties of Pennsylvania around Delaware Bay each had their own General Assembly, although they shared a governor. It was not until 1776 that Delaware declared itself separate from both British and Pennsylvania rule. The newly drafted state constitution banned the importation of slaves. In the 1780 s, the state passed legislation banning the sale of slaves to the West Indies, Georgia, the Carolinas, Maryland, and Virginia. Slave ships were banned from Delaware ports in 1789. In 1790, the state population was 15% black, with just 30% of these persons free. Then in 1797, the state passed a law declaring that all Delaware slaves sold to

out-of-state owners were to be declared free. As such, 78% of the state's black population was free by the time of the 1820 census.

Slave numbers in Pennsylvania were generally low, primarily due to an agricultural economy that did not greatly benefit from slave labor (Wax, 1967). However, Quaker resistance to the practice also played a roll (Turner, 1911). Before the end of the Revolutionary War, the state passed the Gradual Abolition Act in 1780. This was far from instant emancipation; instead, individuals born after 1780 would be freed upon reaching the age of 28. However, the bill included several measures increasing the rights of free blacks, including making blacks equal under state laws, removing the ban on interracial marriage, and allowing blacks to testify against whites in court. Further, it created a mandatory annual registry to ensure no further slaves were imported.[3] This law is significant for its subsequent role as a model for other states' efforts of gradual abolition, with New Hampshire, Connecticut, Rhode Island, Vermont, New York, and New Jersey enacting similar legislation in the following 25 years.[4] Consequently, the bill is important for the purposes of this discussion as the beginning of the demarcation between slave-owning states south of the Mason-Dixon line and states with abolition in progress to the north.

The Missouri Compromise codified this notion. Passed in 1820, the statute restricted slavery to below the 36°30′ parallel except in the proposed state of Missouri and allowed Missouri and Maine to enter the union as slave and free states, respectively. The Congressional debate preceding the bill's passage aligned with the increasingly popular notion of states south of the Mason-Dixon line east of the Ohio River being slave states, and those in the north as free states (Ecenbarger, 2001).

2.2.2 | *In the West*

The Northwest Ordinance was passed in 1787 and created the first organized territory of the United States. The region had previously been ceded to Britain by the French as part of the 1763 Treaty of Paris that ended the French and Indian War. Virginia, Massachusetts, New York, and Connecticut gave up partial claims to this territory as concessions in order to ratify the Articles of Confederation in the late 1770 s. The region was bounded to the south by the Ohio River and to the west by the Mississippi River.

The statute also prohibited slavery in the federally administered territory, although slaves already in the territory were not emancipated. This set the Ohio River as the boundary between slave and free states in the region, with Ohio (1804), Indiana (1816), Illinois (1818), Michigan (1837), Wisconsin (1848), and Minnesota (1858) all joining the union as free states before the onset of the Civil War.

Ohio and Indiana abolished slavery in their state constitutions, and both entered the union as free states. However, enforcement was imperfect, and there were still 190 slaves in Indiana listed in the 1820 census. Both states also enacted "black codes" that severely limited black immigration into the state.

Illinois did not explicitly ban slavery in its constitution, and the state became a true free state by gradual abolition. A series of court decisions restricted the practice before it was banned outright when a new constitution was ratified in 1848.[5]

[3]Notably, members of Congress — who met in Philadelphia — were exempt from the law.

[4]Vermont banned slavery outright in its 1777 Constitution, and Massachusetts enacted instant abolition in 1783.

[5]The relevant court cases were *Cornelius v. Cohen* (1825), *Phoebe v. Jay* (1828), *Boon v. Juliet* (1836), and *Jarrot v. Jarrot* (1845).

As mentioned previously, the Missouri Compromise allowed a portion of the Missouri Territory to enter the union as a slave state. The new state was bounded by the Mississippi River in the east and the Sullivan Line in the north, which was surveyed and demarcated in 1816 to establish southern limits on Native American territory. The statute was weakened by the Compromise of 1850—with the new state of California not being broken into southern and northern sections with the 36°30′ bisecting the state—and completely repealed by the Kansas-Nebraska Act of 1854, which allowed for the possibility of slave states north of the 36°30′ parallel through popular sovereignty.

During the Civil War, the Upper South was particularly conflicted on whether to stay in the Union or join the Confederacy, and some states even had parallel governments for short periods (Crofts, 1993). Delegates from the state of Virginia successfully broke away from West Virginia shortly after Virginia succeeded from the Union in 1861. Kentucky, Missouri, Maryland, and Delaware all stayed in the Union despite being slave states.

2.3 | Escaping north & migration

As part of our identification strategy, it is important to establish that two phenomena were relatively modest in scope: slave escapes and postbellum migration.

The primary means by which slaves could escape was with the aid of the informal network known as the Underground Railroad. Very few records were kept about the number of escaped slaves for obvious reasons. However, estimates range from about 30,000 to 100,000 by the time of the Civil War in 1865, a relatively limited amount in comparison to the 4 million total slaves counted in the 1860 census.[6] However, there is evidence that escaped slaves were more likely to come from Upper South states, although most escapees settled further north than areas that bordered slaves states (Foner, 2015).

The primary reason for the latter was strong fugitive slave laws that allowed slave owners to recapture past slaves. The U.S. Constitution holds a fugitive slave clause to this day, specifying that a slave is not free if he escapes into a free state. The law was weakened by *Prigg v. Pennsylvania* in 1842, which stipulated that states did not have to assist in the efforts to recapture escaped slaves. However, 1850 saw the passage of the Fugitive Slave Act, which made it a crime for officers of the law to not arrest an alleged escaped slave, regardless of state. During the following 10 years, the black population of Canada increased from around 40,000 to 60,000 as escaped slaves needed to move further north to find safety (Campbell, 1970).

The largest movement of blacks out of the south occurred from WWI until the 1960 s, in what is known as the Great Migration. During this time period, about 6 million blacks moved out of former Confederate states. Immediately after the Civil War, however, migration was not widespread. The first significant movement of blacks out of the South was the Exoduster Movement in the late 1870 s, which saw roughly 25,000 blacks move to Kansas (Johnson & Campbell, 1981). While this greatly increased the black population of the state, mass migration out of the South would not occur until the end of the 19th century.

2.4 | Slavery and economic history

The subject of the economic aspects of the institution of slavery has been extensively examined, with a peak in interest coming in the middle of the 20th century. Rudimentary empirical work was

[6]From Still (1871), Siebert (1898), and Foner (2015).

conducted in order to test controversial claims about the sustainability of slavery. For example, it was shown that slavery was profitable for southern planters and that slave prices were higher than the cost of raising a slave (Conrad & Meyer, 1958, Evans Jr, 1962, and Yasuba, 1961). Berlin (2009) documented that slavery was used successfully in the North in the Colonial Era. Several states in the former Northwest Territory were keen to have Congress overturn the proviso banning slavery in that area and only relented when it became apparent that they would only be admitted to the Union as free states to avoid disrupting the pre-Civil War balance (Harris, 1904).

The issue was examined famously by Robert Fogel and Stanley Engermen in their 1974 book *Time on the Cross*. The book was controversial for several racial implications that are not relevant to this work, and the book received mainstream attention far greater than most works of economic history.[7] However, according to their estimates, slave agriculture was more efficient than free agriculture, in that the South was more efficient in using its resources than the North. They speculate, but cannot prove, that this is due to highly efficient large-scale plantation-style agricultural operations. This is important to this study in that the 1850 and 1860 censuses list significantly more farms of 1000 acres or more in slave states in comparison to free states, even if only states close to the boundary are examined. If Fogel and Engermen are correct—and they were certainly exposed to a battery of criticism—the assumption is that Abolition would require a significant alteration of Southern farming techniques.[8] It is clear that slavery led to an intense concentration of wealth in the south for plantation owners, and it was only this relatively small number of plantations that produced such affluence. However, it has been shown that many of the farms in slave and free states were actually quite similar, and it can be argued that it is not necessarily the case that slavery crowded out free farmers, especially in areas where cotton growth was not omnipresent (Ransom, 1989).

The antebellum Southern economy is commonly characterized by a weak manufacturing sector, and the Confederacy was forced to go to great lengths to compete with the North in that area (Donald et al., 1962). However, this unlikely to be due to technological availability. Pessen (1980) argues that the regions were often complementary rather than competitive. In a more focused analysis, Salafia (2013) examines the Ohio River Valley and paints a picture of a region that did not explicitly divide economically over the issue of slavery. In an yet more specific account that is perhaps closest in spirit to our own analysis, Thomas III and Ayers (2003) dig into two counties close to the Mason-Dixon line just before the Civil War. They find extremely similar amounts of wealth and occupation, but find the slave county engaged in more "quasi-industrial work" with "slaves that worked in wheat fields also working in distilleries, forests, and mines."

3 | EMPIRICAL SPECIFICATION

3.1 | Data

We examine the impact of slavery by testing whether it affected economic development in the years after emancipation. The boundary between slave and free states is taken just before the onset of the Civil War in 1861. The majority of this boundary is described in the previous section; note that we

[7]The controversial aspects relate to claims about the extent of the suffering of enslaved individuals. See Sutch (1975) for a critique of these aspects of the work.

[8]See Wright (1979) for an example of the criticism.

exclude California and Oregon, which entered the union in 1850 and 1859, respectively. We also do not consider Kansas or Nebraska, which were territories at that date.

Our primary data are the U.S. historical census records, with many outcomes coming from the agricultural schedule that was first included in 185. As measures of economic development, we examine farm values and manufacturing output at the county level. These were first recorded by the U.S. Census for the 1850 census, where the former refers to the cash value of farms in the county while the latter is the value of manufacturing output in that county in the previous year. In order to increase power, we pool data from 1850 and 1860, 1870 and 1880, and 1890 and 1900. We also put these outcomes in per capita terms by dividing by the population listed in the respective census year for a given county. The population numbers are imputed, and as such slaves are included in this count in antebellum years.

Estimates for individual-level outcomes also use data from the U.S. Census. These data are curated by the Minnesota Population Center as part of the Integrated Public Use Microdata Series (IPUMS) (Ruggles et al., 2015). In ten-year intervals in line with census years, the 1-in-100 random samples of the population are used. In 1850 and 1860, this was only the free population. Note that much of the data was aggregated up to the county level and released in census reports. Also, most of the completed records for 1890 were lost in a fire.

Weather data come from the National Climactic Data Center's (NSDC) Climate Normals, administered by the National Oceanic and Atmospheric Administration. These are 30-year averages of climatological measures taken from over 9800 stations throughout the United States For more information on collection and measuring procedures, see Arguez et al., (2012). Note that we use climate normals from 1981–2010, and climate change renders these measures only a close proxy to 19th century climatological variables.

3.2 | Estimation Framework

The legality of slavery is a discontinuous function of longitude and latitude that lends itself to a spatial regression discontinuity approach. While typical RD applications feature a threshold for a single-dimensional running variable, the line between free and slave states antebellum is a multidimensional discontinuity in longitude-latitude space. The basic regression form is given by:

$$Y_{cb} = \alpha + \gamma slave_c + X_c'\beta + f\left(location_c\right) + \omega_b + \varepsilon_{cb} \tag{1}$$

where Y_{cb} is the outcome for county c along border segment b, *slave* is a dummy variable equal to 1 if the state was a slave state, and X is a vector of covariates that includes average temperature, average precipitation, and total population in the county. The border is divided into two segments for this analysis—indicated by ω_b—that roughly signifies whether the county is east or west of the Appalachian Mountains.[9] The RD polynomial is given by $f(location_c)$. Ideally, the RD setup could be applied non-parametrically, although that requires a large number of precisely geocoded observations around the treatment threshold (Imbens & Lemieux, 2008, as notably implemented in Black, 1999). The challenges associated with this approach are discussed extensively in Dell (2010) and more generally in Papay et al., (2011). Following these works, we implement a semiparametric RD approach. Further, we also report estimates in which the multidimensional latitude and longitude running variables are projected into a single dimension,

[9]The effect of including more or fewer fixed effects is explored in Table B1.

TABLE 1 Differences in means and RD estimates of climate variation across the boundary

	Distance to Boundary: <100 km ($N = 294$)	Difference in Means: <50 km ($N = 164$)	RD Estimate: ($N = 294$)
Average temp.	1.4947*** (0.305)	0.7634* (0.404)	0.402 (0.486)
Average min. temp.	1.9145*** (0.307)	1.0206** (0.408)	0.1467 (0.509)
Average max. temp.	1.0847*** (0.334)	0.5094 (0.441)	0.661 (0.513)
Average precipitation	16.8325*** (5.017)	6.2549 (6.383)	0.081 (8.082)
Total population (1860)	−10,552** (4209)	−12,816* (7404)	−8616 (6815)

Notes: Difference in means and RD estimates for climatological variables shown, with mean for counties in Northern states subtracted from the mean for counties in Southern states. Spatial HAC errors are shown in parentheses. Temperature variables are in Fahrenheit, and precipitation is in inches. Coefficients that are significantly different from zero are denoted by: *10%, **5%, and ***1%.

providing a setup akin to traditional RD designs. Optimal bandwidths are calculated by the methods outlined in Calonico et al., (2014) with the restriction that county centroids are within 500 km from the nearest point of the boundary. This procedure gives bandwidths that are generally between 50 and 125 km depending on the outcome variable. Generally, we restrict the sample in each model to counties within in that bandwidth, but standardize to 100 km if there is large inter-decade variation in bandwidths generated from the procedure. Figure 1 shows roughly which counties are included with these bandwidth calculations, giving 100 km bounds on either side of the boundary.

In specifications that look at simple Euclidean distance to the border, this will generally be a linear term unless otherwise specified. In specifications in longitude-latitude space, the polynomial is given by $x + y + xy$, where x is longitudinal distance and y is latitudinal distance to the boundary.[10] In both cases, the polynomial is fully interacted with the treatment dummy.

Like any RD design, the approach used here requires observable variables aside from treatment assignment to be continuous around the boundary. Specifically, letting c_1 and c_0 be characteristics of the treatment and controls groups, we require that $E[c_0 \mid x, y]$ and $E[c_1 \mid x, y]$ be continuous as we travel (roughly) north across the line that divides slave and free states. Unfortunately, this is a difficult assumption to test, given slavery's adoption from the beginnings of Colonial America. This, combined with the fact that no European settlers lived in the majority of the area being examined, leaves little window for pretreatment observation. As a substitute, we examine climatological measures to emphasize that agricultural production strategies and output cannot have been radically different as we get sufficiently close to the boundary. Evidence is shown in Table 1, which shows the difference in means between counties in Northern and Southern states, as well as RD estimates that determine sharp changes across the boundary. The first column restricts the sample to counties within 100 km of the slave/free state boundary, with sequentially smaller windows in the following columns. As with all county-level regressions, we use spatial heteroskedastic and autocorrelation correct (HAC) standard errors, as outlined by Conley (1999). These errors are similar to the generally favored cluster-robust standard errors, except for instead of an adjustment by a predetermined cluster, error weights are allowed to decay as the distance between units increases. In individual-level regressions, we cluster standard errors on the county level. All climatological variables show a significant difference across the boundary when comparing means, with Southern counties being about one degree Fahrenheit

[10]Larger order polynomials were also explored. Estimates were mostly similar, but quadratic and cubic polynomials lead to concerns of overfitting, particularly given the size of the datasets.

TABLE 2 Agricultural output, 1850–1890

	1850	1860	1870	1880	1890
Cotton output per acre	0.00004	−0.010	0.0002	0.002	0.002
	(0.225)	(0.261)	(0.382)	(0.515)	(0.526)
Mean	0.00004	0.00216	0.00042	0.001	0.0006
Tobacco output per acre	6.675**	8.571*	9.183**	12.900***	9.735**
	(3.394)	(4.842)	(4.050)	(4.418)	(4.307)
Mean	3.01700	5.293	3.999	4.557	4.439
Wheat output per acre	−0.126	−0.475*	−0.786	−0.786	−1.029*
	(0.225)	(0.261)	(0.515)	(0.515)	(0.526)
Mean	1.0480	1.325	1.597	1.888	1.558
Agricultural output	−0.283	−0.200	0.628	0.120	1.830
Per acre ($)	(3.394)	(4.842)	(4.050)	(4.418)	(4.307)
Mean	9.501	10.120	13.150	7.792	7.076
N	333	364	374	377	382

Notes: Estimates are from Equation (1) with the outcome variables listed in the first column: cotton output, tobacco output, wheat output, and agricultural output, all in per improved acre terms. The RD polynomial is quadratic in Euclidean distance, and the bandwidth is 100 km on either side of the boundary. Cotton output is measured in number of 400 lb. bales, tobacco output is measured in pounds, and wheat is measured in bushels. Spatial HAC errors are listed in parenthesis. Coefficients that are significantly different from zero are denoted by: *10%, **5%, and ***1%.

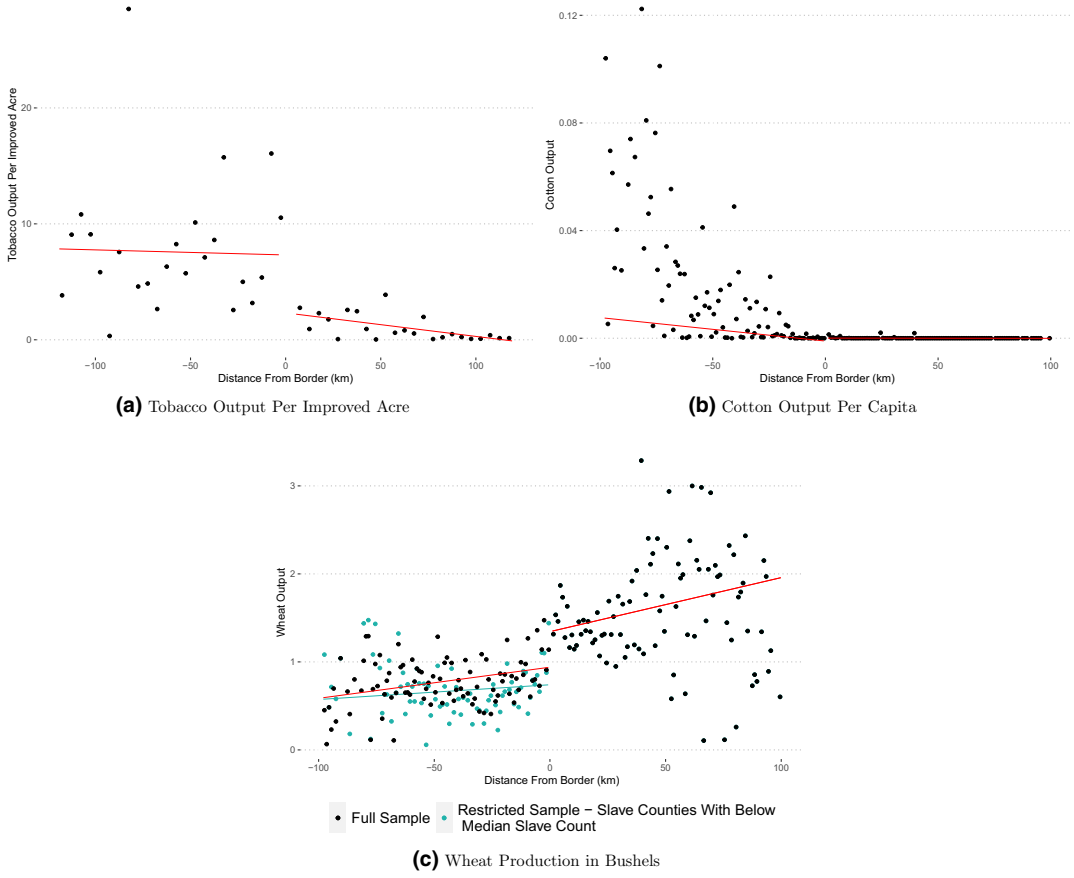
hotter on average. However, there is no statistically significant discrete change of any of these measures across the boundary, nor is there a significant discontinuity in county population in 1860.

An additional assumption common to all RD designs is that there is no selective sorting across the border. More specifically, it would reduce the effect of the institution if slaves were able to escape into northern states in large numbers, or if the enactment of the 13th Amendment caused a significant migration. Historical evidence suggests that this did not occur, as discussed briefly in the previous section. Unfortunately, empirical evidence on these phenomena is insubstantial, and we therefore defer to these accounts for the extent to which we are able to verify this assumption.

4 | RESULTS

We begin by investigating the effects of institutionalized slavery on the structure of economic activity. As mentioned previously, slavery was ended in most areas of the North due to political pressure rather than natural economic forces. As such, we might expect that the distorted labor market in the South would affect the farm structures and agricultural production decisions.

The first two sets of estimates in Table 2 show cotton and tobacco output across the boundary that defined where slavery was legal just before the onset of the Civil War. The estimates for cotton production indicate that there was no significant difference between Southern and Northern states. The incredibly lucrative cotton crop was grown overwhelmingly on slave farms, but the bulk of the output came from a very small number of large plantations (Wright, 1978). In the 1860 Census, the median county produced zero 400 lb. bales of cotton, well below the mean of 7831. Even among cotton-producing counties, the median county produced just 2677 bales, compared to a mean of 22,501. Neither the North nor Upper South had the proper climate for large-scale cotton production and instead the latter of these featured tobacco as its most profitable crop.



(a) Tobacco Output Per Improved Acre

(b) Cotton Output Per Capita

(c) Wheat Production in Bushels

FIGURE 2 Antebellum Tobacco, Cotton, and Wheat Production (1850 and 1860). *Note:* Each figure represents the relevant estimated discontinuity across the boundary, with values to the left representing the South and values to the right representing the North. Each dot represents the average output by 5 km blocks of distance to the boundary. Each line represents the fitted values of Equation 1 for each side of the boundary

Fittingly, we find a significant and persistent difference in tobacco production, with output much higher in the South. This can also be seen in Figure 2a, which is the traditional RD figure with distance to the boundary in the center of the plot. These estimates indicate a jump of two to three times the mean value for counties relatively close to the boundary. These figures will most likely not surprise historians, as tobacco was a key export for the Chesapeake area from the earliest days of the American colonies. Further, farmers pushed west into Kentucky as intensive farming lowered crop yields, and the rise in demand for the American cigarette was a huge boon to tobacco producers after the Civil War (Kerr-Ritchie, 1999 and Prince & Simpson, 2013).

It is not the case, however, that slave labor was used *exclusively* for tobacco or cotton farming, or for the sugar or rice production seen elsewhere in the Deep South. The Virginia Piedmont had very strong wheat production, as did areas of Kentucky and Missouri. Figure 2c gives the increase in wheat production North of the boundary.[11] Also shown, however, is the same jump if the sample of slave

[11]Note that the output is not in per capita terms here. In the case of wheat, some sparsely populated counties skew results if put in per capita terms.

TABLE 3 Farm values and manufacturing output

	1850–1860		1870–1880		1890–1900	
RD in Euclidean Distance to Boundary						
	Farm	**Mfg**	**Farm**	**Mfg**	**Farm**	**Mfg**
Former slave state	0.139	−0.233	0.027	−0.337***	−0.168*	−0.281**
	(0.108)	(0.143)	(0.103)	(0.111)	(0.089)	(0.126)
Constant	5.929	1.926	6.488	2.001	7.773	3.380
RD in Latitude and Longitude to Boundary						
Former slave state	0.062	−0.162	−0.188**	−0.374***	−0.200***	−0.392***
	(0.083)	(0.124)	(0.092)	(0.098)	(0.075)	(0.113)
Constant	5.872	1.807	6.877	2.167	7.982	3.656
N	478	638	409	851	643	969
Bandwidth (km)	63	87	45	105	72	118

Notes: Results from RD regressions with pooled U.S. Census data for the corresponding years in each column. The dependent variable is the log farm values per capita in the "Farm" columns and manufacturing output per capita in the "Mfg" columns. Regressions include controls for average temperature, average precipitation, and a fixed effect for location relative to the Appalachian Mountains. Spatial HAC standard errors are shown in parentheses. The constant represents the predicted value immediately on the former free side of the boundary. Coefficients that are significantly different from zero are denoted by *10%, **5%, and ***1%. The bandwidth for each column is in kilometers and is based on the optimal bandwidth calculation procedure created by Calonico et al., (2014).

states is limited to counties with below-median levels of slaves. Clearly, the magnitude of the discontinuity is increased, which is not what would be expected if wheat production was not reliant on slave labor. In these areas, Irwin (1988) shows that wheat production was associated with farms with large number of slaves and hypothesizes that the efficiency of wheat production increases with more slave labor. Our results support this argument, with the idea that slave owners kept slaves busy all year despite the strong seasonality of wheat production (Anderson & Gallman, 1977 and Thomas III & Ayers, 2003). It is also well-known that the reaper spread much faster in the Midwest rather the South, with Virginia-born inventor Cyrus McCormick leaving the area for Chicago by 1845. One hypothesis is that the "dovetailing" of activities on slave farms all year long made mechanization less attractive.[12]

The final row of Table 2 shows agricultural output per capita by year, in dollars. Here, there is no difference across the boundary, despite the differences in crop choice (Table 3).

We next examine manufacturing output and farm values, starting with antebellum estimates. Table 4 shows farm values per capita and manufacturing output per capita over three 20-year periods—1850–1860, 1870–1880, and 1890–1900. Each time span utilizes pooled Census data for the years included.

The top panel shows the specification with a polynomial in Euclidean distance from the geographic center of the county to the boundary. The bottom panel reports the specification with a polynomial in longitudinal and latitudinal distance to the boundary. For both specifications, the bandwidth for each estimate is based on the optimal bandwidth calculation procedure created by Calonico et al., (2014).

[12]See, for example, David (1975). The basic idea is that men, women, and children all contributed during the harvest on slave farms, while this was mostly a task for males on free farms. The lack of labor during harvest time made mechanization necessary and allowed quick adoption of the reaper.

TABLE 4 Farm values and manufacturing output in differences, 1880–1850

Distance to boundary: <100 km		
A. RD in Euclidean distance to boundary		
	(i)	**(ii)**
	Farm	**Mfg**
Former Slave State	−21.680	−24.835*
	(27.315)	(14.898)
N	330	330
Adj. R^2	0.398	0.144
B. RD in latitude and longitude to boundary		
Former slave state	−33.048	−36.730***
	(21.914)	(13.645)
N	330	330
Adj. R^2	0.388	0.155
Mean difference	132.20	29.09

Notes: Results from RD regressions with 1850 and 1880 U.S. Census data. The dependent variable is farm values per capita in the "Farm" columns and manufacturing output per capita in the "Mfg" columns. Both dependent variables are a within-county difference. Regressions include controls for average temperature, average precipitation, and a fixed effect for location relative to the Appalachian Mountains. Spatial HAC standard errors are shown in parentheses. Coefficients that are significantly different from zero are denoted by: *10%, **5%, and ***1%.

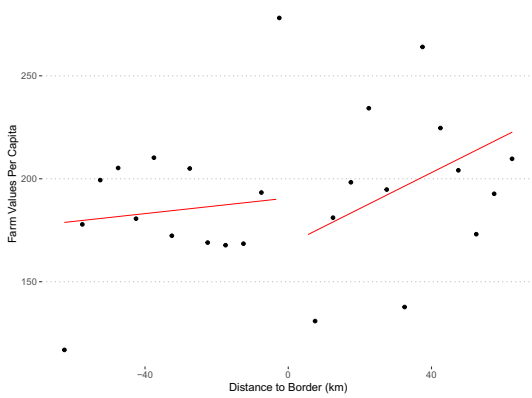
Corresponding RD figures are shown in Figure 3, with only the 100 km bandwidth shown.[13] Finally, Figure 4 summarizes the tables related to farm values and manufacturing output by showing the point estimates by year with 95% confidence intervals.

Table 4 shows no significant differences in either farm values or manufacturing output across the boundary in either specification between 1850 and 1860. Columns (ii), (iv), and (vi) show estimates for manufacturing output, with no significant difference found across the boundary in either specification. Farm values are also not estimated to be higher in slave states—as shown in columns (i), (iii), and (v)—although these estimates are very imprecise. We discuss possible reasons behind this in Appendix 1, including noise in measurement.

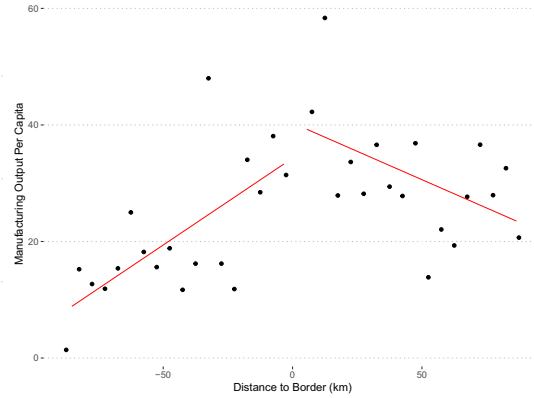
The next set of columns in Table 4 give estimates for the two decades following the Civil War, 1870 and 1880. Farm values are again not precisely estimated in either specification. Conversely, manufacturing output per capita is estimated to be significantly higher in the North, with estimates ranging from 33 to 37% depending on specification.

The final set of columns in Table 4 tell a similar story for the decades before the turn of the 20th century. Manufacturing output is again significantly higher in the North in both specifications, with the magnitude of the estimates similar. In short, our estimates suggest that manufacturing output per capita was significantly higher in Northern border states after the Civil War, with the difference persisting until at least 1900. We next examine these outcomes in differences to attempt to account for some of the variation in county urban structure. To do this, we take the as the outcome variable the difference between 1880 and 1850, which allows for some degree of removal from effects of the Civil

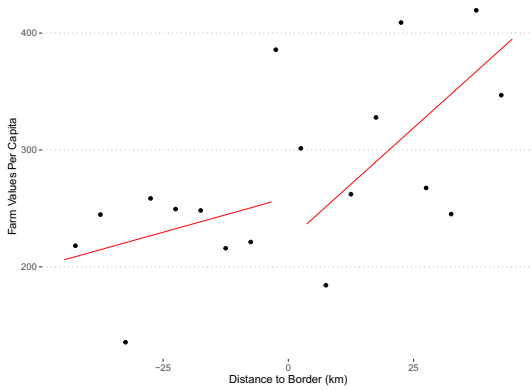
[13]Note that these figures are in levels instead of logs.



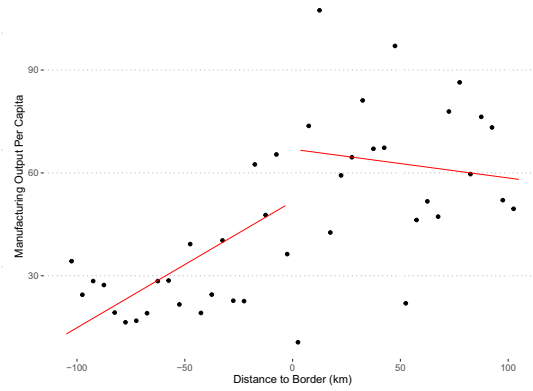
(a) Farm 1850-60



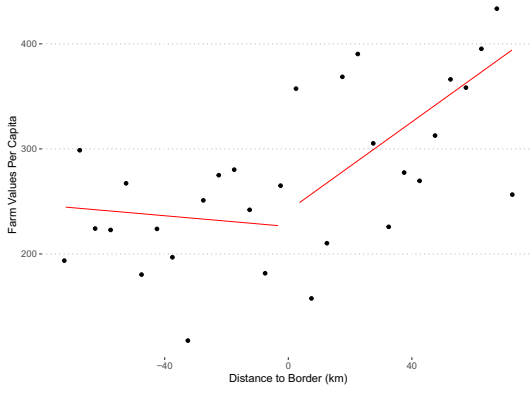
(b) Manufacturing 1850-60



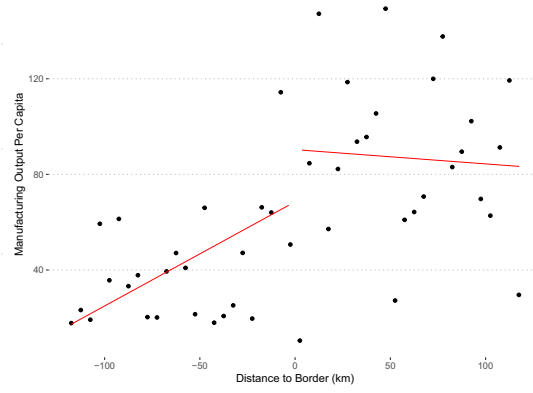
(c) Farm 1870-80



(d) Manufacturing 1870-80



(e) Farm 1890-1900



(f) Manufacturing 1890-1900

FIGURE 3 Farm Values and Manufacturing Output RD Figures, 1850–1900. *Note:* Each figure represents the relevant estimated discontinuity across the boundary, with values to the left representing the South and values to the right representing the North. Each dot represents the average output by 5 km blocks of distance to the boundary. Each line represents the fitted values of Equation 1 for each side of the boundary

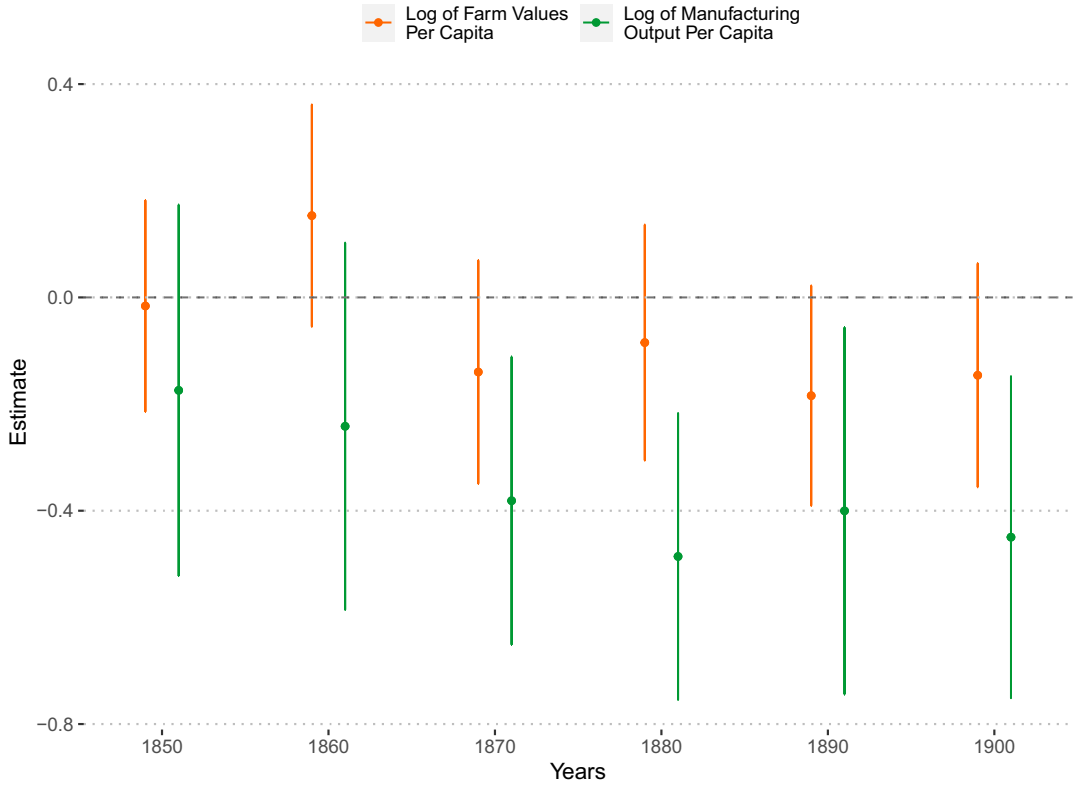
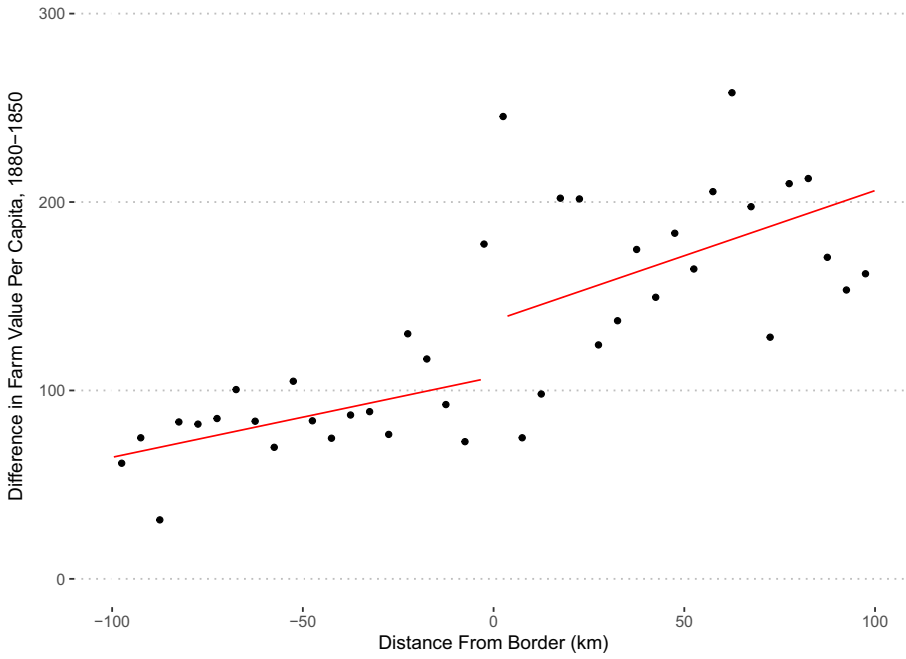


FIGURE 4 RD Estimate Over Time, 1850–1900. *Note:* Each point in this figure represents the estimated discontinuity at the threshold for the relevant category of output for the corresponding decade. Each line represents 95% confidence intervals

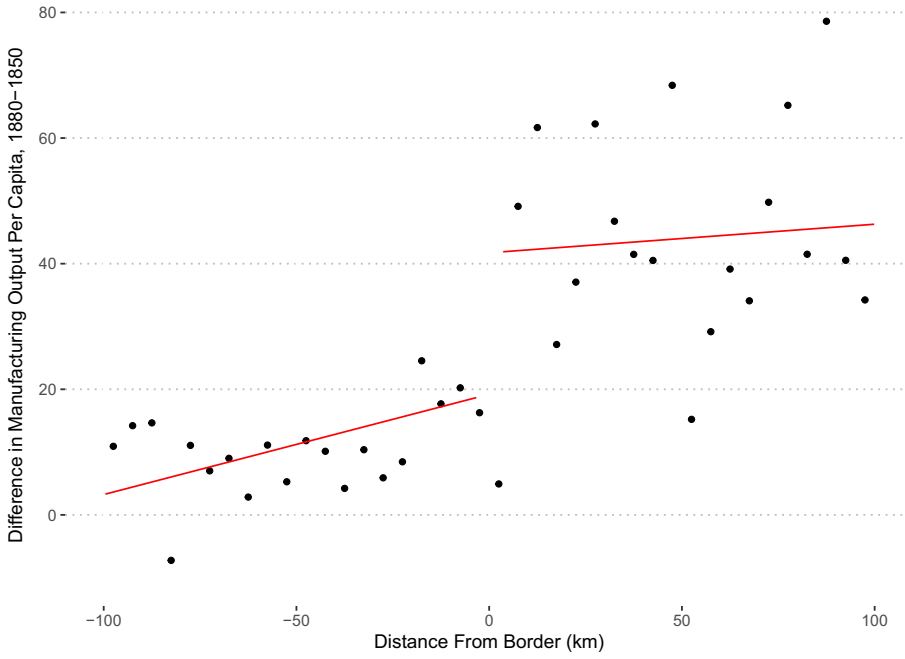
War. The results are shown in Figure 5 and Table 3. These illustrate a similar story to the previous results, with manufacturing significantly higher on the northern side of the boundary and farm values noisily estimated.[14]

To further investigate the differences in the manufacturing sector across the boundary, Table 5 gives estimates for log manufacturing labor employment per capita and log manufacturing wages per capita, again by county. Here we only report estimates from specifications with a 100 km bandwidth, but the estimates are robust to narrower ranges. The first two columns give estimates for 1850 and 1860 pooled census data, although manufacturing wage data were not collected until the 1860 census. From these measures, we derive the average wage rate in the county and report the estimate with the log of the wage rate as the dependent variable. For the antebellum years, we find no difference in either manufacturing employment or wages per capita, which aligns with the previous finding of no difference in manufacturing output per capita. After the Civil War, however, Table 5 shows large relative deficiencies for the South in both categories. Manufacturing wages per capita are estimated to be 60 to 80% lower, and about 40% fewer people per capita were working in the sector. In 1890–1900 estimates, however, the difference across the boundary is only significant in the specification in

[14]We also estimated main results without counties in the West Virginia panhandle and the modern day Pittsburgh metro area to ensure this region was not the primary driver of manufacturing differences, with only minor changes to point estimates. Similarly, we excluded counties in the Shenandoah Valley Area as a robustness check against differential damage from the Civil War, again with minimal changes to point estimates.



(a) Farm Values Per Capita



(b) Manufacturing Output Per Capita

FIGURE 5 Farm Values and Manufacturing Output in Differences, (1880) – (1850). *Note*: Each figure represents the difference between the relevant estimated discontinuity across the boundary between the years of 1850 and 1880, with values to the left representing the South and values to the right representing the North. Each dot represents the average output by 5 km blocks of distance to the boundary. Each line represents the fitted values of Equation 1 for each side of the boundary

TABLE 5 Manufacturing labor and wages

Years:	1850–60			1870–80			1890–1900		
RD in Euclidean Distance to Boundary									
	Labor	**Wages[a]**	**Wage Rate**	**Labor**	**Wages**	**Wage Rate**	**Labor**	**Wages**	**Wage Rate**
Former Slave State	−0.434	−0.252	0.020	−0.479*	−0.769**	0.051	−0.466	−0.612*	0.162
	(0.337)	(0.374)	(0.063)	(0.261)	(0.376)	(0.195)	(0.305)	(0.334)	(0.203)
N	563	282	282	529	529	529	533	533	533
Adj. R^2	0.151	0.237	0.231	0.296	0.249	0.179	0.296	0.315	0.252
RD in Latitude and Longitude to the boundary									
Former Slave State	−0.278	−0.242	0.031	−0.429**	−0.597**	0.230	−0.685***	−0.824***	0.277*
	(0.221)	(0.273)	(0.044)	(0.182)	(0.250)	(0.141)	(0.217)	(0.239)	(0.156)
N	563	282	282	529	529	529	533	533	533
Adj. R^2	0.186	0.254	0.231	0.329	0.282	0.200	0.327	0.344	0.272
Mean	0.019	5.35	280.9	0.025	7.51	244.9	0.28	13.17	425.3

Notes: Results from RD regressions from Equation (1) with pooled U.S. Census data as indicated. The dependent variable is the log of manufacturing labor per capita in the "Labor" columns, the log manufacturing wages per capita in the "Wages" columns, and the log of the wage rate in the "Wage Rate" columns. Regressions include controls for average temperature, average precipitation, and a fixed effect for location relative to the Appalachian Mountains. The bandwidth is 100 km on either side of the boundary. Spatial HAC standard errors are shown in parentheses. Coefficients that are significantly different from zero are denoted by: *10%, **5%, and ***1%.

[a]Manufacturing wage data were not added to the census until 1860.

latitude and longitude. The wage rate does *not* vary significantly across the boundary, with all estimates insignificant save for the estimate from the multidimensional polynomial in 1890–1900, which is only significant at the 10% level. While it may be too strong an assumption to say markets were full competitive, this suggests that the marginal products were equal across the boundary and that the manufacturing sector in the North was simply larger. We tentatively propose that this relates to the more widespread growth of commodity crops in the Upper South as discussed above.

We next turn to individual-level data to examine possible effects of the institution of slavery on wealth and occupational characteristics. Table 6 provides RD estimates for measures of wealth, occupation scores, and literacy. Note that wealth values, like farm values, are self-reported and are only available until 1870. Literacy is coded such that illiteracy is represented by a zero, semi-literacy (ability to read or write, but not both) is given a one, and literacy is denoted by two. Only respondents over the age of 20 were included in this measure. The two occupation indices used here are the Duncan Socioeconomic Index (SEI) and the Occupational Income Score, which both use 1950 as the basis year for cross-year comparability. The Duncan SEI used data from the 1950 census and a 1947 opinion poll to rank occupational prestige. The Occupational Income Score indicates the median total income of individuals in each occupation in 1950. As such, this is a way of scaling occupations and is not based on actual income levels. Both measures are clearly imperfect, and both are used here simply to empirically test the difference between occupations across the boundary. We do not favor one or the other, and we report both only to provide a robustness check on imperfect measures.

From Table 6, there is evidence that the antebellum value of real estate and personal property was higher in slave states. The difference between North and South is no longer significant in 1870, after the War. This is unsurprising for two reasons. First, personal property included slaves, and emancipation eradicated this channel of wealth, which was quite large if market prices of slaves before the war is considered. Second, newly emancipated slaves were most often given nothing to establish a life with freedom, and their sudden inclusion in census wealth records naturally decreased wealth levels in former slave states. However, Figure 6a reveals that the closure in the gap between North and South comes not just from a drop in wealth in the former slave states, but also an increase in wealth in areas north of the boundary.

Conversely, we find no significant difference across the boundary for occupational scores and literacy in any year. The former set of estimates—however crude the measure might be—suggest that individuals did not have radically different occupations across the boundary. While we have shown evidence that those in the North were more likely to be involved in manufacturing, this simply argues that Southerners did not have significantly harsher jobs.[15] The latter set of estimates along with Figure 6b suggest that the institution of slavery did not hinder educational investment, or at least that the Freedman's Bureau's extensive efforts in establishing schools during Reconstruction were not futile in this region.

A natural question is why agricultural structures persisted through the end of slavery. Possibly, the most obvious reason for this is the widespread adoption of "Black Codes." These were laws enacted by Southern states during the Reconstruction period and severely limited the rights of newly freed African Americans. While these were often adapted from slave codes, at their core black codes were vagrancy laws that allowed authorities to arrest unemployed persons and impress them into labor. Employment options for former slaves were extremely limited outside of the work they did while enslaved, and often the only ways to avoid the vagrancy laws were to sign annual labor contracts or become apprentices to former slaveholders (Daniel, 1979).

[15]For some frame of reference, farmers were given a score of 14 on the Duncan SEI score, while those in manufacturing can range widely. For example, a paper manufacturer receives a score of 68, while a shoemaker scores a 12.

TABLE 6 Wealth and occupation, 1850–1900

	1850	1860	1870	1880	1900
Value of real estate	217.566**	208.689*	271.607		
	(92.922)	(124.98)	(169.994)		
Value of personal property		238.686***	41.620		
		(79.308)	(87.221)		
SEI score	0.964	0.409	2.870	0.470	3.945
	(3.090)	(2.615)	(3.650)	(3.638)	(3.204)
Occupational income score	1.261	1.775	2.396	0.442	2.504
	(2.583)	(2.069)	(2.489)	(2.298)	(1.840)
Literacy	0.114	0.104	−0.108	−0.104	−0.040
	(0.101)	(0.071)	(0.095)	(0.071)	(0.035)

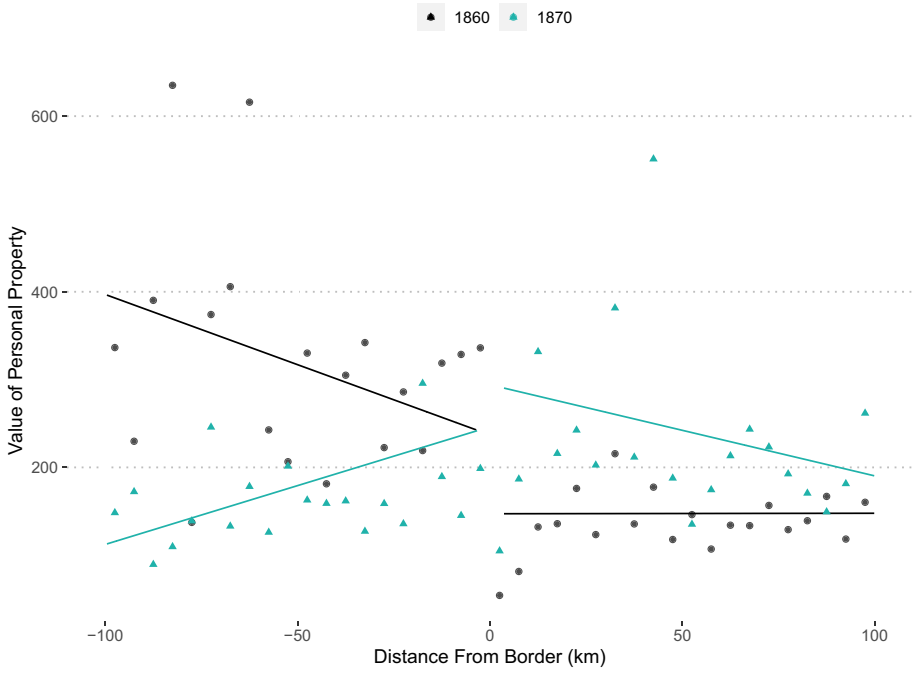
Notes: Estimates are from Equation (1) with the outcome variable listed in the left-most column. The RD polynomial is quadratic in Euclidean distance, and the bandwidth is 100 km on either side of the boundary. The "literacy" variable is defined as zero if the respondent is illiterate, one if she is able to read or write, but not both, and two is she is able to read and write. SEI and Occupational Income Scores range from 0–100 and 0–80, respectively. Robust standard errors clustered by county are listed in parenthesis. Coefficients that are significantly different from zero are denoted by: *10%, **5%, and ***1%.

Enforcement of Black Codes often took the form of sharecropping, in which a land owner would allow a tenant to work a portion of his land in exchange for a share of the output. This arrangement replaced the plantation system very quickly, such that sharecropping was the predominant institution in most agricultural areas by the 1880 s at the latest (Ransom & Sutch, 2001). Unfortunately, 19th century U.S. Census records only include data on sharecropping in 1870 and 1880. Table 7 gives estimates from these years, with the outcomes sharecrop farms per capita and sharecrop farms as a fraction of total farms in a given county. Both estimates show no difference across the boundary for both decades. We suggest two reasons for this. First, sharecropping was by no means only a black institutions, although freedman engaged in larger proportions. Figure 7 shows sharecropping counties by decile in 1880, revealing that the practice was popular in Indiana, Ohio, and Iowa, as well as in the Deep South.

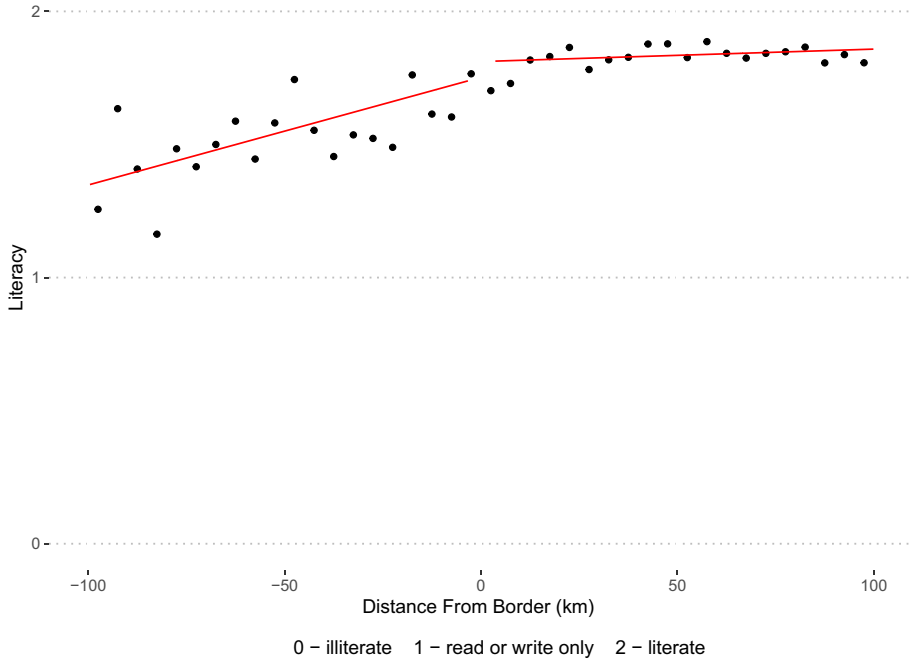
The second reason—partially revealed by Figure 7—is that sharecropping was less popular in the Upper South compared to the Deep South. McKenzie (1993) indicates that labor tended to be relatively more mobile in this area, and Irwin (1990) suggests that the transformation to single-family farms with sharecroppers is overstated. Instead, the majority of southern Black households were headed by agricultural laborers—that is, working for a wage. While the average size of farms fell postbellum, it seems that freedmen were not an integral part of this reorganization (Irwin, 1990). Evidence of this—and of the overall effectiveness of the black codes—is presented in the final rows of Table 7. Here, we see that more farm wages were paid out in former slave states, suggesting that agricultural laborers tended to be wage workers rather than share or tenant farmers in these areas.[16]

Finally, Jim Crow laws took the place of Black Codes in the postreconstruction era. Jones et al., (2017) do not find any explicit poll taxes or requirements in border states, but do show that lynchings and mobs serve to depress black voter turnout in the absence of explicit voter suppression laws. Using data on lynching from Hines and Steelwater (2020) and Seguin and Rigby (2019), the last rows of Table 7 show that lynchings increased significantly across the boundary into former slave states.

[16]Of course, this could also be interpreted as evidence that farm wages were simply higher in former slave states. We believe this is unlikely, as there is not historical evidence of this, and we showed earlier that agricultural output was similar.



(a) Value of Personal Property, 1860 and 1870



(b) Literacy in 1870

FIGURE 6 Wealth and Occupations RD Figures. Note: Each figure represents the relevant estimated discontinuity across the boundary, with values to the left representing the South and values to the right representing the North. Each dot represents the average output by 5 km blocks of distance to the boundary. Each line represents the fitted values of Equation 1 for each side of the boundary

TABLE 7 Postbellum mechanisms of continued extractive institutions

	1870	**1880**
Sharecrop farms per capita	0.0004	−0.002
	(0.003)	(0.004)
Mean	0.01722	0.01628
Sharecrop farms/total farms	−0.009	−0.030
	(0.028)	(0.033)
Mean	0.1702	0.17150
Log of farm wages per capita (total paid)	0.596**	
	(0.254)	
	1870–1889	**1890–1909**
Number of Lynchings	0.109***	0.1715***
	(0.045)	(0.068)
Mean	0.127	0.35

Notes: Estimates are from Equation (1) with the outcome variables sharecrop farms per capita, sharecrop farms as a fraction of total farms in a given county, log total farm wages including board per capita, and number of lynchings in the county. Spatial HAC errors are listed in parenthesis. Coefficients that are significantly different from zero are denoted by: *10%, **5%, and ***1%.

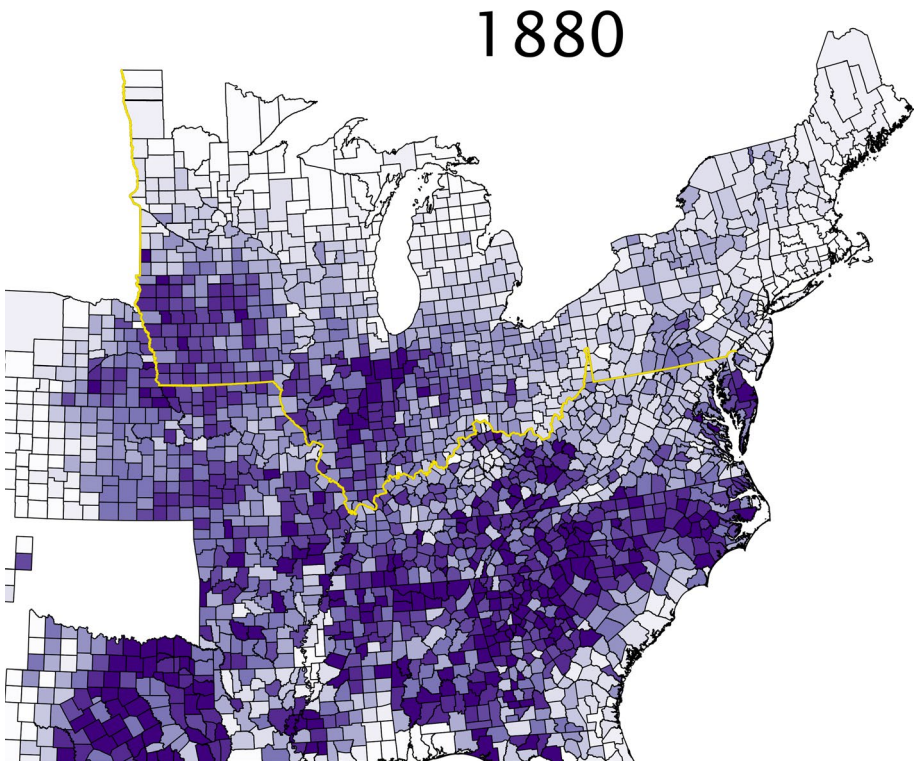


FIGURE 7 Sharecropping By County in Deciles, from U.S. Census Records

While not directly related to manufacturing and farm values, this likely represents another avenue of continuing the conditions created by slavery without the institution present.

4.1 | Post 1900

The decades after the turn of the century saw further entrenchment and codification of discriminatory laws in Southern states. Nearly all former Confederate states instituted new Constitutions or amendments in their Constitutions that disenfranchised that vast majority of black voters through poll taxes, literacy tests, and residential record-keeping. North Carolina, for example, saw turnout for eligible black men go from 87% in 1896 to less than 50% in 1900, to a complete elimination of blacks from voter rolls in 1904 Perman (2003). State-sponsored segregation was normalized in the *Plessy vs. Ferguson* Supreme Court case in 1896, which allowed for "separate-but-equal" accommodations for blacks and whites in public transportation, schools, and drinking fountains. Further, the arrival of the boll weevil in the South before World War I caused increased economic hardship for Southern black tenant and sharecroppers, and W.E.B. Du Bois noted the economic chaos caused by the tiny insect as a key factor pushing rural blacks to look for opportunities outside of farming.

In addition to continued ostracization in the South, the North presented increased opportunities for rural blacks in the South. The outbreak of World War I saw labor shortages in the steel, rail, and coal industries with the sudden halt of inflows of European immigrants (Gregory, 2006). Labor agents from large companies recruited in the Deep South and were able to offer wages that were often double the going wage for blacks in a given area Arnesen (2003). African American newspapers from large Northern cities published job advertisements, train schedules, and editorials to encourage movement.

These "push" and "pull" factors combined to synthesize The Great Migration. From 1910–1960, 5–6 million blacks left the South for the North, concentrating in large, industrialized cities. New York, Philadelphia, and Chicago all saw their black populations increase by at least 200,000 people in the pre-World War II era (IPUMS Census Data). The movement saw a steep decline in the proportion of the population that was black in Southern states, with reductions of 20 or more percentage points in most Deep South states.

With this in mind, we examine the difference between the North and South in this era with the geographic discontinuity in Table 8. We find that the discontinuity in manufacturing output has vanished, although the estimate is noisy. Farm values are also noisily estimated, with the discontinuity significant and negative at the 90% level in the censuses bookending World War I and insignificant

TABLE 8 Farm values and manufacturing output in the era of the great migration

	Log of farm values per captia		Log of manufacturing output per capita	
	1910–1920	**1930–1940**	**1910–1920**	**1930–1940**
Former slave state	−0.558*	−0.497	0.298	0.553
	(0.328)	(0.310)	(0.437)	(0.360)
Observations	420	419	414	687
R-squared	0.237	0.204	0.255	0.217

Notes: Estimates are from Equation (1) with the outcome variables log farm values per capita and manufacturing output per capita. The RD polynomial is in Euclidean distance, and the bandwidth is 100 km on either side of the boundary. Spatial HAC errors are listed in parenthesis. Coefficients that are significantly different from zero are denoted by: *10%, **5%, and ***1%.

after. This points to weak evidence of convergence for border states along the line that enumerated slavery's legality 50–80 years prior.

5 | CONCLUSION

This paper uses a regression discontinuity setup on the sharp cutoff between slave and free states in the United States to identify persistent effects of slavery and the channels through which it impacted economic growth. We find that slavery reduced manufacturing output per capita in these areas by as much as 30% in the decades following the Civil War. We provide evidence that this was due to cash crop cultivation in the Upper South and that the end of slavery did not represent a seismic shift in agricultural production decisions nor agricultural output. We show that these effects last 40 or more years after the end of the Civil War and present evidence that there is convergence for states around the boundary after that time.

As mentioned previously, many previous works have compared the divergent paths of Northern and Southern states. Because this paper examines areas close to the boundary between former slave and free states, we sacrifice being able to compare the two regions broadly for a more credible identification strategy. This leaves questions about external validity unanswered. However, we believe estimates presented here are likely underestimates of the true effects of slavery on long-term growth. States such as Tennessee and Virginia were internally divided on the issue of joining the Confederacy, and slave states Kentucky and Maryland stayed in the Union. This demonstrates that these Upper South states had more commonalities with their neighbors than states in the Deep South did. It would be too simplistic to pin the cause entirely on a reliance on slavery, but states further in the South had more slaves per capita and were more likely to build a more substantial portion of their economy off slave labor. The Deep South remains the poorest region in the United States today, lagging behind in education, poverty rates, and output. This region was also the slowest to change politically, as states fought racial equality long after the exploitation of free labor could be relied upon as an extractive institution. While the evidence we have shown here gives a clearer picture than any previous literature effects in the Upper South, future research should search for strategies that would enable a more encompassing look at the lasting effects of slave labor in the United States.

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APPENDIX A.

Farm values

Our results related to farm values discussed above are quite imprecise. Measurement error is an obvious concern for these data. For farm values, U.S. Census Marshals were instructed to "obtain the value of real estate by inquiry of each individual who is supposed to own real estate, be the same located where it may, and insert the amount in dollars." However, the self-reported numbers could be checked and verified, to a degree. The U.S. Department of Agriculture released farm real estate land value per acre by state in census years, and Lindert (1988) provides a discussion of whether these official land values can be trusted as true market values. In short, measurement error will always be a concern, but using market prices may also give us pause, given that most farmland does not change hands in a given year. Lindert gives anecdotal evidence that sale prices may actually be less reliable than census and USDA values, and as such we rely on the official but self-reported measure.

But if we suppose that these imprecise zeros are in fact zero—or at least close to zero—and that measurement error is not the primary concern, the results would indicate that there was little difference in farm values per capita between slave and free states as we get close to the boundary both before and after the Civil War. This seems to contradict the generally accepted principal of the supremacy of antebellum Southern agriculture. That Southern farm values dip at best modestly in our estimates compared to their Northern counterparts runs also counter to the stylized fact that Southern wealth—much of it tied to agriculture and slavery—took a tremendous hit following the Civil War (Lindert, 1988).

As before, the most obvious answer would be the incomplete end of the institution of slavery. Many authors in several disciplines have documented the idea that Reconstruction and the Freedman's Bureau did not do nearly enough for former slaves.[17] Many had hoped for homesteads to call their own, and initially, the land seemed available. This was the principle behind Sherman's Special Field Orders, No. 15, better known as "40 acres and mule." The idea was that former slaves would receive 40 acres of land confiscated by the government from former slave owners. General William Tecumseh Sherman actually granted this to former slaves in a small area of Georgia, but President Andrew

[17]While not an academic source, Blackmon (2009) gives an excellent overview.

Johnson had most land controlled by the Freedman's Bureau—close to one million acres—returned to its former owners. However, rumors persisted among newly freed African Americans that they would receive land (Wilson, 1965). When it became clear that this would not happen, it seemed freedman had little choice to submit to newly enacted black codes and return to work for their former masters—who, as we suggest above, generally paid them in wages in the Upper South. When combined with the effectiveness of the black codes, it seems more intuitive for farm values to not be radically different despite a seemingly seismic shift in the labor structure.

APPENDIX B.

Robustness to fixed effects

TABLE B1 Agricultural output, 1850–1890, with different fixed effects

	1850	1860	1870	1880	1890
Cotton Output Per Capita	0.0002	−0.039	0.002	0.012	0.010
	(0.0003)	(0.038)	(0.003)	(0.017)	(0.012)
Long FE	0.0002	−0.031	0.003	0.017	0.010
	(0.0003)	(0.031)	(0.002)	(0.015)	(0.010)
No FE	0.0002	−0.033	0.001	0.010	0.007
	(0.0002)	(0.032)	(0.002)	(0.013)	(0.010)
Mean	0.0002	0.009	0.0025	0.0074	0.0035
Tobacco Output Per Capita	47.105**	53.095*	54.011**	87.541***	82.529**
	(22.595)	(29.227)	(24.974)	(32.341)	(37.306)
Long FE	37.883**	55.197**	54.567***	78.503***	63.345***
	(16.224)	(21.688)	(17.361)	(21.692)	(23.625)
No FE	45.853**	62.612**	59.182***	92.172***	75.633**
	(19.863)	(27.481)	(22.513)	(27.897)	(30.797)
Mean	17.61	33.32	27.44	34.45	35.29
Agricultural Output	7.456	12.145*	15.737	5.016	3.499
Per Capita ($)	(6.576)	(6.965)	(10.422)	(7.057)	(6.660)
Long FE	6.524	7.948	4.696	−3.329	−0.242
	(6.377)	(5.781)	(9.732)	(6.199)	(5.666)
No FE	8.926	9.432	7.392	−2.796	−4.267
	(6.639)	(6.716)	(10.491)	(7.168)	(7.179)
Mean	48.05	55.67	74.23	49.99	43.92
N	309	322	330	332	337

Notes: Estimates are from equation ((1))—except for the difference in the number of fixed effects included—with the outcome variables listed in the first column: cotton output per capita, tobacco output per capita, and agricultural output per capita. In the "Long FE" rows, there is a fixed effect for each degree of longitude. For the "No FE" rows, there are no fixed effects included. The RD polynomial is quadratic in Euclidean distance, and the bandwidth is 100 km on either side of the boundary. Cotton output is measured in number of 400 lb. bales, and tobacco output is measured in pounds. Spatial HAC errors are listed in parenthesis. Coefficients that are significantly different from zero are denoted by: *10%, **5%, and ***1%.

Table 8 explores the effect of adding more fixed effects or including none at all by replicating Table 2 save for estimates on wheat output. The first row in a set of estimates is from Equation (1) with one fixed effect for side of the Appalachian Mountains. The next row of estimates in a set includes fixed effects for every degree of longitude. The final row of estimates includes no fixed effects. The differences in the estimates are modest regardless of specification, and there does not seem to be a systematic difference in either the estimates or standard errors.