THE CROWNING OF KING COTTON IN THE AMERICAN SOUTH: EVIDENCE FROM 1840 TO 1975

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**THE CROWNING OF KING COTTON IN THE AMERICAN SOUTH:
EVIDENCE FROM 1840 TO 1975**

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Cotton, the nineteenth century's chief global commodity, brought seeming opposites together; turn them almost by alchemy into wealth: slavery and free labor, states and markets, colonialism and free trade, industrialization and deindustrialization. The cotton empire depended on plantation and factory, slavery and wage labor, colonizers and colonized, railroads and steamship– in short, on a global network of land, labor, transport, manufacture, and sale.

Sven Beckert

This thesis work is dedicated to my husband, Zhichao Zhang, who has always supported and encouraged me during the challenges of graduate school and life. This work also dedicated to my parents, Shuwei Mao and Naiqiu He, and my daughters, Robin and Nami Zhang, who have always loved me. I am truly thankful for having all of you in my life.

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SUMMARY

The plantation system was the most prominent distinguishing character of the economy in the antebellum South. Enslaved people were used to produce cotton, sugar, and tobacco to be traded in international markets [38]. Especially from mid of the 1830s to the eve of the Civil War, cotton in the U.S. South accounted for more than half of the total export value of the United States. Cotton was the engine of Southern economic growth and shaped the political and social institutions in the antebellum South [88][33].

In the postbellum period, cotton was still economically, politically, and socially important in the South, but a new system was required. African American workers cultivated a specific land without daily supervision and then paid part of their harvested cotton to the landlords. Since then, tenants and family farmers have gradually become the primary cotton producers. Cotton also changed political and social status among tenants, family farmers, and planters in the South [11].

In this thesis, I studied two events to explore the importance of cotton during the antebellum and postbellum periods. I first use the repeal of the British Corn Laws in the antebellum period to causally estimate the relationship among overseas cotton demand, cotton production, slavery, and political affiliation on pro-slavery in the American South. The results suggest that a single episode of trade liberalization can explain slaves' growth in cotton suitable land in the South, as well as the realignment of the political affiliation of pro-slavery in the antebellum South. The outbreak of the American Civil War in 1861 appeared to be an internal conflict caused by slavery. In fact, it was an irreconcilable conflict between the North and South political affiliations in the resource distribution of cotton production. I estimate the causal relationship between cotton production and the polarization of landholding, using the magnitude of the Boll Weevil infestation in the agricultural South. The impact of the cotton economy lasted a long time after the Civil War in the South. The thesis evidence cotton significantly affected the land redistribution and land inequality in

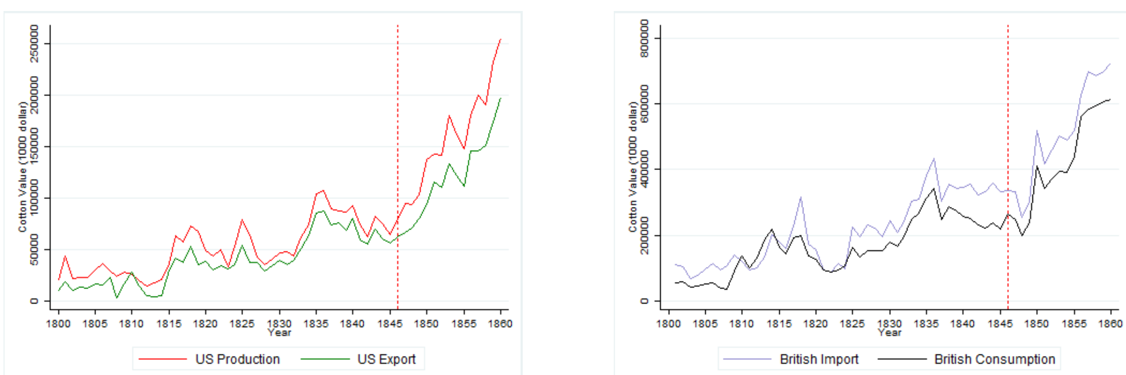
the South by the Boll Weevil infestation. Together, the repeal of the Corn Laws and the arrival of Boll Weevil allow us to causally explain the role of cotton in shaping the United States today.

CHAPTER 1

THE ROLE OF INTERNATIONAL TRADE ON SOUTHERN SLAVERY

1.1 Introduction

Slaves working in the Southern Plantations of the United States grew cotton that kept thousands of power looms humming in Lancashire during the First Industrial Revolution. Between 1800 and 1860, cotton production in the United States grew from under 160,000 bales to almost 5 million bales.[1] Meanwhile, the total amount of U.S. cotton exports increased from almost 80,000 bales to over 3.7 million bales. In 1800, around 28 percent of cotton in the UK was imported from the United States. By 1860, it was around 80 percent. Yet, despite abundant qualitative accounts about the importance of trade in slavery, direct empirical causal evidence remains elusive [14][60]. As we show in Figure 1.1, the value of cotton production in the US and cotton exports to the UK increased dramatically after the year 1846. This increase, we argue, is the direct result of a unilateral trade liberalization event in the United Kingdom: The Repeal of the Corn Laws.



(a) U.S. Production and Export Value

(b) British Import and Consumption Value

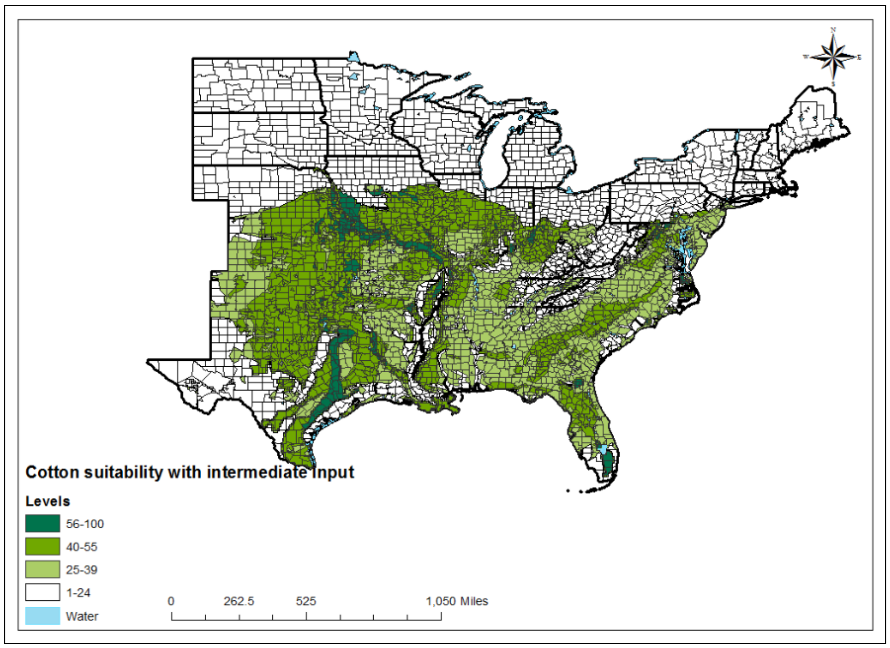
Figure 1.1: US-UK Cotton Trade

Corn Laws aimed at protecting grain production had been the standard policy in Eng-

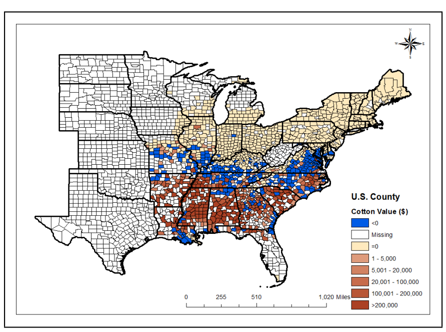
[1] 1 bale=478 pounds

land since at least the twelfth century. In the nineteenth century, a combination of food shortages caused by war increased population, and a sequence of devastating potato harvests, combined with pressure from the nascent manufacturing class, led to the Repeal. The Importation Act of Robert Peel was passed on June 25 of 1846 by the House of Lords. The Repeal, a hard-fought, and ultimately unexpected outcome reduced tariffs in all crops imported in the UK [9]. Cotton was among those crops; the tariff for cotton went from 2.6 shillings per pound of cotton in 1840 to zero in 1846 [58]. In response to the Repeal, cotton imports increased dramatically in the following decades. The vast majority of cotton came from the United States. We exploit this episode of trade liberalization to identify the causal relationship between growth in the slave population at the United States and the increase in demand for cotton caused by the expansion of the textile manufacturing industry in the United Kingdom.

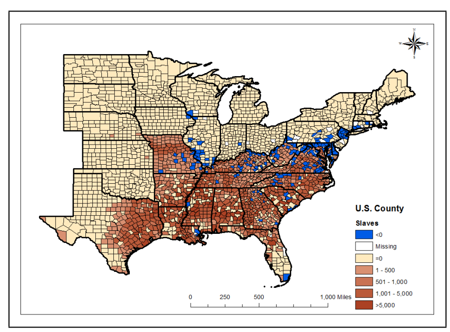
We present the motivation for our analysis and modeling approach using Figure 1.2. We begin with the observation that only cotton suitable counties would be able to respond to the increased demand for cotton coming from Lancashire, UK, in the years after the Repeal of the Corn Laws. That is, the level of exposure to the Repeal is directly related to plantation's capacity to grow cotton. We present in Panel 1.2(a) the cotton suitability of land across counties in the US. The panel shows counties in the Southeastern quadrant of the United States are prime for cotton cultivation. It also reveals a large variation across counties within the same state, an important characteristic given our empirical approach. Panel 1.2(b) shows changes in cotton production before and after the Repeal. We can see that increased cotton production came from counties in the South and that the change in cotton output was not uniform across all counties and states. Panel 1.2(c) shows fewer slaves in the American Northeast and more slaves in both sides of the Appalachian Mountains and downstream of the Mississippi River. Figure 1.2 shows circumstantial evidence that the Repeal caused an increase in cotton production and slavery in the United States. We attempt a causal analysis below.



(a) Cotton Suitability



(b) Changes in Cotton Production



(c) Changes in Slave Population

Figure 1.2: Slavery and Cotton in the United States

While a single event will not possibly explain the totality of the slavery institution, here we attempt to explain but one channel in this intricate part of American history. The identification strategy in this paper exploits the fact that exposure to international trade varied across counties and across time after the Repeal of the Corn Laws. Variation in cotton production across counties was the result of, among other things, the exposure of a county to cotton trade. Therefore, the number of slaves in counties more exposed to the effects of the Repeal should be higher than the number of slaves in those counties before the Repeal, but the difference should be larger in counties that were more exposed to trade. The measure of exposure is determined by the natural suitability of the land to produce cotton. We use an instrumented difference-in-difference design where we exploit cross-sectional variation created by differences in cotton production across counties in the United States and temporal variation arising from the Repeal of the Corn Laws in 1846 to causally estimate the relation between slavery and Trans-Atlantic trade using cotton suitability as an instrument for cotton production.

The baseline results show that this single episode of trade liberalization was responsible for slave increase in the South. The estimates are robust to other alternative explanations such as declining transportation costs, other plantation and non-plantation crops, and the Mexican-American War effect, as well as excluding missing data because of the time of joining the statehood and other observable issues. The results show that, after the Repeal of the British Corn Laws, more slaves moved to the cotton suitable land in the South.

1.2 Conceptual Framework

In literature, many economists studied slave issues from different perspectives, such as the slave economy, slavery and industrialization, and slavery and subsequent development. Caitlin Rosenthal explores the development of quantitative management practices on West Indies and Southern plantations [72]. Robert and Stanley in *Time on the Cross* argued that slavery was generally a profitable investment and economically efficient in grew cash crops such as cotton. They also found that productivity in large plantation farms is higher than small plantation farms and other farms [35]. Later, Ronald Bailey mentioned that the slave trade and slavery in the American South made a great contribution to the British cotton textile industry [6]. And Eric William mentioned slavery helped finance the British Industrial Revolution [83]. Then scholars linked slavery and the subsequent economy. In 1997 and 2002 papers, Engerman and Sokoloff, found that slave labor was important for its subsequent economic development [31][30]. Nathan Nunn used New World Economies data tested that slave use is negatively correlated with subsequent economic development [63].

In this study, we continuously study the slave use in the American South using British trade liberalization policy as an exogenous shock for the Southern agricultural market and its further impact on the slave demand. The identification strategy exploits the international trade impact on cotton production varied by the amount of cotton suitable land in counties after the Repeal of the Corn Laws. Free trade exposure depends on the land suitability of cotton, which is given by the natural condition. Cotton production varied across counties was driven by the level of free trade exposure. Thus, high free trade-exposed counties should demand more slaves to produce cotton than low trade-exposed counties before the Repeal of the British Corn Laws, and the gap would be larger after the Repeal. Our empirical model was built on Costinot et al. study of comparative advantage in agricultural markets [21]. In the paper, they modeled a micro-level shock that affects comparative advantage across regions based on the land suitability of crops within and between countries. To adjust the effect brought by the external shock, the local production patterns on different crops changed. Followed by their model, we tested the change of the most critical input factor, slaves, for agricultural production before and after the external trade shock in Southern cotton suitable and non-suitable counties.

1.3 The Repeal of the Corn Laws

In Great Britain, protective tariffs were first introduced to address the problem of insufficient domestic grain supply caused by the war against France. As a result of temporal protective tariffs, grain prices rose, and land rent generally doubled [16]. After the war, imports resumed and led the domestic grain prices to fall. Because the rent was too high, the income of tenant farmers was insufficient to cover the production cost of grain. Landlords' pressures for a permanent protective tariff led to the so-called the Corn Law of 1815.

In 1822, the Corn Law stipulated that grain imports were prohibited when the price of grain in Great Britain was less than 80 shillings per quarter. Free entry of grain from abroad was permitted only if the real price reached or exceeded 80 shillings [84]. The bourgeoisie and the proletariat strongly opposed to this importation law. Then the British government made several modifications. In 1828, the government set two duties for corn when the domestic price reached 52 shillings per quarter and 73 shillings per quarter [75]. The revision was not sufficient because the unit price of grain was always low, and it never reached the permission level to import grain from abroad. The conflicts between landlords and other classes intensified. A few years later, several large factory owners in Manchester founded the Anti-Corn Law League. The league expanded rapidly in the suburbs of Manchester and other industrial areas. With increased opponents, Prime Minister Sir Robert Peel repealed the Corn Laws, the final push being the 1846 Irish potato famine [55].

After the Repeal of the Corn Laws, the British resumed the grain trade and gradually restored U.S. grain imports, especially cotton and wheat. U.S. cotton was an emerging import for Great Britain that the British initially imported cotton from the West Indies. However, the increase in British cotton demand and the Santo-Domingo Revolution caused the price of cotton in the West Indies raised sharply. British textile producers gradually gave up the West Indies suppliers and turned to the United States to find cheaper cotton and more stable supply channels [85]. Cotton in the United States mainly grew in the southern plantations. To meet the increase in overseas cotton demand, U.S. planters in the South actively purchased cotton suitable land and slaves. In addition to the widespread use of cotton gins, the need for slaves increased dramatically. Thus, slavery developed as cotton production increased in the American South.

1.4 Data

To analyze the impact of the repeal of the British Corns Laws on cotton and slavery in the United States, we retrieved county-level data set from Census, Food and Agriculture Organization (FAO), and other sources. We first construct a county-level panel data set that includes county-level decennial cotton production value, crop production value, slave population, and cotton suitable land area. The census data and suitable land information are displayed in Table 1.1. A complementary set of data includes variables to control for confounding factors, which include 1) transportation cost from county to the major cotton exchange markets, 2) suitable land area to grow other plantation and non-plantation crops, plus 3) the distance from county to the Rio-Grande river as a proxy of the Mexican-American War effect. The summary statistics of confounding factors are described in the Data Appendix.

Table 1.1: Summary Statistics County Level, 1840-1860

	No. Observations	Mean	Std. Dev.	Min	Max
Cotton Value(1840 USD)	2251	215474.4	455431.3	0	7119145
Crop Value(1840 USD)	2251	539871.1	597480.8	0	7500293
Slave Population	3900	2217.7	3931.2	0	58539
Population	3900	5962.4	8895.9	0	190524
Cotton Land Area(km^2)	3900	1324.1	867.9	0	6039.63

1.4.1 Census data

Agriculture Census includes county-level plantation and non-plantation decennial crop value data from 1840 to 1860. In this study, we use the value of cotton, sugar, tobacco, wheat, and oats in the Southern cotton states.[2] We retrieved the Agriculture Census data from the ICPSR database [41]. There are 4,708 records from 1840 to 1860, and 2,251 records are from cotton states. According to the agriculture census, county cotton production in cotton states is 349,712.6 pounds on average over the three census years. And the averaged cotton production value was around 215,474.4 USD in 1840.[3] Prices in 1860 are 4.6 percent lower than average prices throughout 1840. Prices in 1850 are 10.34 percent lower than average prices throughout 1840. On average, the cotton production value is 40 percent of county crop production value (215,474.4/539,871.1=0.400) in the South. For comparison, on average, the sugar production value is 4 percent of crop value; the tobacco production value is 3 percent of crop value; the wheat production value is 6 percent of crop value; the oats production value is 3 percent of crop value.

The county-level slave population and population data in Table 3 were retrieved from 1840 to 1860 U.S. Decennial Censuses of Population and Housing [64]. According to the statistics, more than one-third of people are slaves in cotton states from 1840 to 1860. Also, the average county slave to population ratio slightly reduced over time. It was 0.379 in 1840, 0.376 in 1850, and 0.364 in 1860.

1.4.2 Cotton suitability data

The cotton-suitability data were retrieved from the Food and Agriculture Organization (FAO)'s Global Agro-Ecological Zone (GAEZ) 2012 database. GAEZ used soil, weather, and other factors to estimate the cotton land suitability. In each grid cell, the cotton suit-

[2]Cotton States were Missouri, Oklahoma, Arkansas, Louisiana, Texas, Mississippi, Tennessee, Alabama, Georgia, South Carolina, North Carolina, Virginia, and Florida [82].

[3]The 1840 and 1860 summary statistics data are listed in appendices.

ability is calculated by the percentage of the maximum yield.[4] The database compiles environmental data and identifies the high-, intermediate-, and low-input level for cultivating cotton on each unit of land.[5] Given the definition of input levels, we assign the intermediate-level of input based on the U.S. planting technique of cotton and other crops in the nineteenth century. We also choose the 1960 base map, which is the earliest suitability information. Thus, in our analysis, we assume that the suitability of land was constant from the mid-nineteenth century to the mid-twentieth century [51].

GAEZ divides crop into a 1 to 100 scale suitability index (SI) by eight classes[6] based on the percentage of the maximum yield. Land yield is mostly determined by natural exogenous factors such as climate, soil, water, and topography. According to GAEZ's cotton suitable land data, agriculture census's county-level cotton production, and the history of cotton growing areas, we define the land above 25 percent of maximum yield should as cotton suitable land.[7] Suitable land for cotton is widely spread on both sides of the Appalachian Mountains and the banks of the Mississippi River. Specifically, the cotton suitable land is among the states of Kansas, Missouri, Oklahoma, Arkansas, Louisiana, Texas, Mississippi, Tennessee, Kentucky, Georgia, South Carolina, North Carolina, Virginia, and Florida. We then summarize the area of suitable land for growing cotton and display the statistics in the last row of Table 3. The statistics show that the average area of cotton-suitable land in Southern counties is 1,324 square kilometers.

[4]For more explanation of how GAEZ estimates the suitability of the crop, please see appendix.

[5]The high-level input assumes "the farming system is mainly market-oriented. Commercial production is a management objective. Production is based on improved large yielding varieties, which is fully mechanized with low labor intensity and uses optimum applications of nutrients and chemical pest, disease, and weed control." The intermediate-level input assumes "the farming system is partly market-oriented. Production for subsistence plus commercial sale is a management objective. Production is based on improved varieties, on manual labor with hand tools and/or animal traction and some mechanization. It is medium labor-intensive, uses some fertilizer application and chemical pest, disease and weed control, adequate fallows, and some conservation measures." The low-level input assumes "the farming system is largely subsistence-based and not necessarily market-oriented. Production is based on the use of traditional cultivars if improved cultivars are used, they are treated in the same way as local cultivars, labor-intensive techniques, and no application of nutrients, no use of chemicals for pest and disease control and minimum conservation measures." [64]

[6]$SI > 85$ very high suitable; $SI > 70$ high suitable; $SI > 55$ good suitable; $SI > 40$ medium suitable; $SI > 25$ moderate suitable; $SI > 10$ marginal suitable; $SI > 0$ very marginal suitable; $SI = 0$ not suitable

[7]The correlation of 25 percent cotton suitable land and cotton value is 0.26 over three years. And the correlation of 40 percent cotton suitable land and cotton value is -0.01 over three years

1.4.3 Access to Market

The expansion of cotton and other crops was closely related to market accessibility associate with the development of transportation systems [26]. Waterways and railways were the two major transportation choices for planters to ship their crops. On the lower Mississippi River, cotton growers loaded cotton bales and other crops on steamboats and sent them to the New Orleans exchange markets. The water transportation system was underdeveloped in the southeast of the Appalachian Mountains due to the lack of natural rivers and compounded by the difficulties of building new canals. Therefore, to reduce transportation costs, entrepreneurs started to expand railways instead. For example, in 1833, entrepreneurs noticed the inefficient solution of building a new canal between South Carolina and Georgia. They then invested in the longest railroad at that time, a 136-mile railroad from Charleston, South Carolina, to Hamburg, Georgia. After a decade of construction, the total American railway mileages network more than double from about 3,000 miles at the end of 1839 to about 7,500 miles at the beginning of 1850. Meanwhile, the average transportation cost of freight decreased from seven-to-ten cents per ton-mile at the end of the 1830s to three-to-seven cents per ton-mile at the end of the 1840s — specifically, 4.5 cents per ton-mile in the South and 7 cents per ton-mile in the Southwest [34]. To control the market accessibility associated with the railway and waterway expansion, we use estimated shipping costs from counties to New Orleans, Charleston, and New York's crops exchange markets [26]. The average shipping cost from Southern counties to three crops exchange markets are very close. On average, the cheapest one was 18.0 cents per ton to New Orleans using the waterways. They were then shipped along the shoreline to upper North, New York [43] only needed 1.4 cents per ton. If crops must be sent to Charleston, the planters needed to rely on the railway by paying a little bit more, at 20.9 cents per ton on average.

1.4.4 Expansion

After the American Revolutionary War, the American Federal Government regarded the expansion to the west as an important political goal, especially the planters in the South. Planters served as pioneers in territorial expansion because the survival and development of the southern plantation economy depended on continuous land expansion [67][87]. The expansion could relocate plantations to avoid a decline in yields. After the 1820s, to accelerate the westward expansion, the United States coined the phrase "manifest destiny". They claimed that their destiny extended across to the entire mainland. Therefore, the number of immigrants soared in the west. In 1835, total immigrants reached 30,000 [13], and the farthest reached Mexican territories. At the same time, the migration created many disputes and conflicts between U.S.immigrants and the Mexican government.

Texas gained its independence from Mexico after the battle of the Alamo in 1836. After Mexico rejected the purchase agreement of the Oregon Territory, the Polk government instigated a fight by dispatching troops to the border of Texas, Rio-Grande River in 1844. The Mexican-American War started in 1846 and lasted two years. U.S. troops expelled 75,000 Mexican residents from their homeland to the newly annexed territories that are now California, Arizona, and New Mexico [81]. To control the expansionary changes and war effects, we use the distance from counties to Rio-Grande River.

1.5 Empirical Strategy

In this study, we examine the causal relation between U.S. slavery and unilateral Trans-Atlantic crops trade using an instrumented difference-in-difference (DDIV) research design. To establish the causal relationship in DDIV, we use the variable of cotton suitable land after the Repeal of the Corn Laws as an instrument for crop production value and then regress fitted crop value on the slave population. The instrumental variable captures cross-sectional variation created by differences in cotton production across counties in the

United States and temporal variation arising from the Repeal of the Corn Laws in 1846. They jointly determine a planter's exposure to the new cotton suitable land in response to the Repeal of the Corn Laws.

To meet the British cotton demand after the Repeal, the U.S. planters made every effort to expand their business. The only issue for cotton planters land productivity. If legumes were not planted for fallow or expensive bird droppings could not be used as fertilizer for several years, the same piece of land would be unable to grow cotton repeatedly. Planters realized this problem, so they would purchase more land to grow cotton in more western and southern places [11]. To maximize the profit, planters would first select the highest-yield land, the most suitable land, to grow cotton and then retreat to the next. At the same time, they would buy more slaves from the North and Upper South to farming, picking, and ginning cotton. Thus, the change of cotton suitable land area overtime could only affect slavery through the crop production value. Non-cotton suitable land was not exposed to the oversea demand shock. Thus the number of slaves before and after the Repeal of the Corn Laws should not differ systematically across non-suitable regions.

We then quantify the causal relation between U.S. slavery and unilateral Trans-Atlantic crop trade in the Southern states using the instrumented Difference-in-Difference (DDIV) model, which is given by the following equations,

$$\ln Output_{it} = \alpha \ln Cotton\ Land_i * Post + \xi X_{it} + \lambda X_i + \delta_i + \delta_t + \varepsilon_{it} \tag{1.1}$$

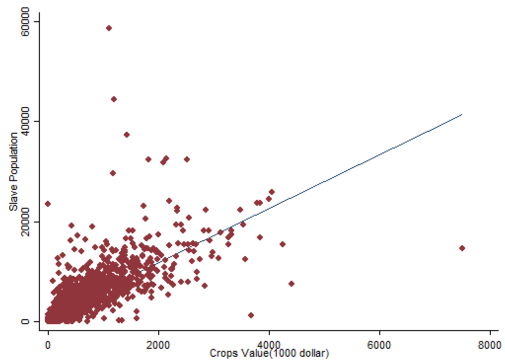
$$\ln Slave_{it} = \beta \ln \widehat{Output}_{it} + \eta X_{it} + \zeta X_i + \delta_i + \delta_t + \nu_{it} \tag{1.2}$$

In equation (1.1), $\ln Output_{it}$ denotes the logarithm of crop value in county i at year t. $\ln Cotton\ Land_i$ is the logarithm of the cotton-suitable land area in county i without time variation. The policy indicator $Post$ indicates whether if county i is subjected to the policy treatment, which is the Repeal of the Corn Laws. X_{it} is the time-variant transportation cost variables. X_i represents the time-invariant variables include other plantation and non-plantation crops suitable land, and distance from county to the Rio-Grande River. We separately add these county-specific control variables in a final regression. To control the observable county or state characteristics, we add the county fixed effects, δ_i. The county fixed effect variable can eliminate the bias generated by the fact that treated counties generally have higher cotton production and a larger number of slaves than controlled counties. δ_t is the time fixed effect to capture the common trends across counties. To identify α, we assume the unobserved county-specific effects are constant over time, and the trend in treated counties and control counties are the same over time, which can be expressed by $E[Post * \varepsilon_{it}; \delta_i] = 0$. In addition, ε_{it} is an unobserved disturbance with the identification assumption. We then add the fitted crop value $\ln(\widehat{Output_{it}})$ from equation (1.1) as an instrumental variable to equation (1.2). In equation (1.2), $\ln Slave_{it}$ is the log-transformed slave population. The rest of control variables are as same as equation (1.1). ν_{it} is an unobserved disturbance with the identification assumption. β relies on the identification assumption that there is no omitted time-varying and region-specific effects correlation. The "average causal response", β, is the primary interested parameter [3]. It captures the weighted average trade liberalization effect on the percentage change in slavery causally responses to one percent change in the crop value, for those crop value in cotton suitable land. If our prediction is correct, we expect β to be positive and significant.

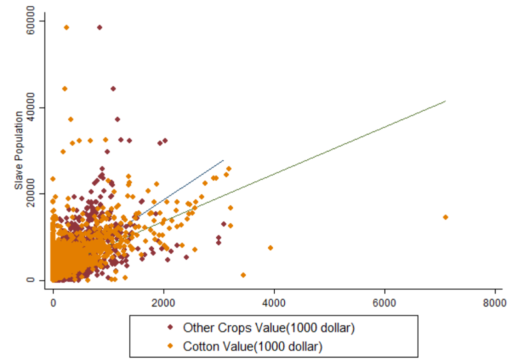
1.6 Results

1.6.1 Correlation

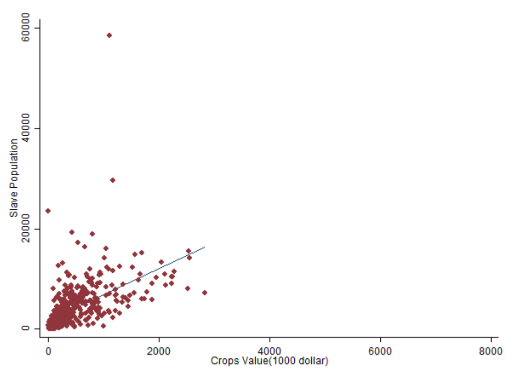
Figure 1.3 Panel (a) illustrates the correlation of the slavery and crop value. There is a positive relationship between slavery and crop value. We then decompose the crop value into cotton value and other crop value to see how they relate to slavery. In Panel (b), the results look very similar to the previous figure that both cotton and other crops positively



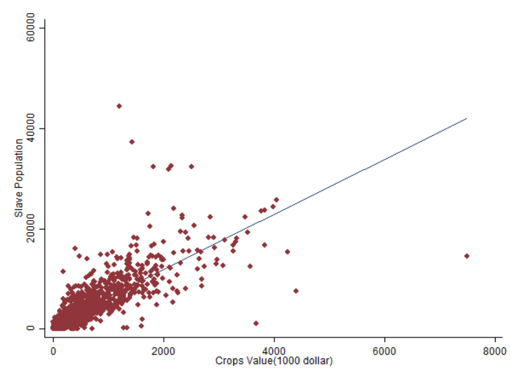
(a) Slavery and Crop Value



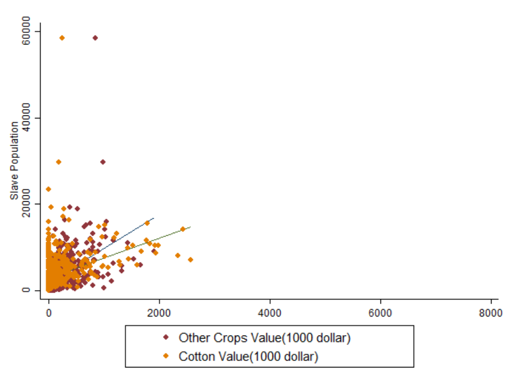
(b) Slavery, Cotton Value, and Other Crop Value



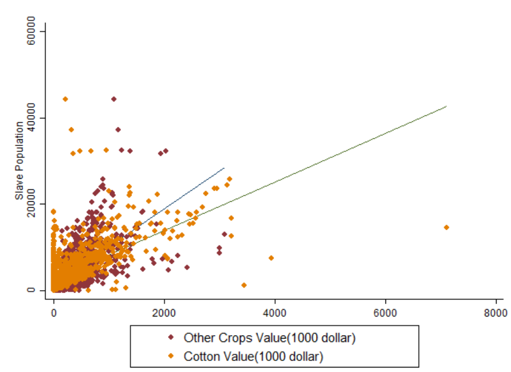
(c) Slavery and Crop Value (1840)



(d) Slavery and Crop Value (1850-1860)



(e) Slavery, Cotton Value, and Other Crop Value (1840)



(f) Slavery, Cotton Value, and Other Crop Value (1850-1860)

Figure 1.3: Second Stage Relationship between Slavery and Crop Value

related to slavery. To see the relationship before and after the Repeal of the Corn Laws, we split the data into two groups, the first group is 1840 data, and the second is 1850 to 1860 data. Comparing the slavery and crop value before and after the free trade policy in Panel (c) and Panel (d), we find that (1) the number of slaves increased, and (2) more slave-intensive crops grew in the South. Because cotton was the major labor-intensive crop that grew in Southern counties, we then separate the cotton value from the value of the crops. Panel (e) and (f) show correlations between the slave population and cotton/other crop value. Before the Repeal, the correlation between the slave population and other crop value is 0.46, and the correlation between the slave population and cotton value is 0.37. But after the Repeal, the correlation between the slave population and crop value increase to 0.63, and the correlation between the slave population and cotton value increase to 0.62. This suggests a diminishing return of slaves occurred in cotton production, possibly was caused by planters expanding their plantations to relatively lower suitable land. Comparing Panel (e) and (f) associated with the large correlation change between the slave population and cotton value, we find more slaves were employed to cultivate cotton.

Table 1.2 Panel A, reports ordinary least-squares (OLS) regression of log-transformed slave population on log-transformed crops production. Column (1) shows the slave population strongly correlates with crop production in the South by controlling the county and year fixed effect. We then add transportation costs from counties to New Orleans, New York, and Charleston cotton exchange markets in column (2). The coefficient of crop value is quite similar to the previous one. To control the alternative crops could grow in the cotton suitable land, we first add plantation and non-plantation crops separately in the regression and then add them all in the regression. This changes coefficients for the crop value a little. Column (3) shows coefficients of plantation crops suitable land area, sugar, and tobacco. Sugar suitable land positively correlates with the slave population in 1860 is a piece of evidence that 98 percent of sugar plantations in the Southwestern used slave labor at that time [74]. Interestingly, the correlation of tobacco suitable land, and slave population changed from positive to negative over time. Possibly because slaves in the Upper South gradually moved to Southern and Southwestern areas to grow cotton. Column (4) shows coefficients of non-plantation crops and the number of the slave. Since wheat and slave distribution areas are highly coincident in the two sides of the Appalachian mountain, wheat suitable land is positively related to the slave population. The oats' suitable land area is negatively related to slaves. Before 1850, oats production was almost exclusively found in the east of the Mississippi River. It expanded to the western area in the next two decades and centered in upper Mississippi Valley in 1869 [45].[8] In column (5), we add both plantation and non-plantation crops suitable land in the regression. The estimated coefficient is similar to the results in column (3) and (4).

[8]Upper Mississippi Valley refers to the banks of Mississippi River in Minnesota, Iowa, Wisconsin, and Illinois.

Table 1.2: OLS Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Panel A: OLS: [slavery=crops production]					
Crop Value	0.267^{a}	0.257^{a}	0.251^{a}	0.261^{a}	0.244^{a}	0.216^{a}	0.198^{a}
	(0.075)	(0.073)	(0.072)	(0.075)	(0.071)	(0.065)	(0.062)
New Orleans Cost		0.614^{a}					0.404^{a}
		(0.167)					(0.140)
New York Cost		0.089					0.080
		(0.128)					(0.120)
Charleston Cost		-0.463^{a}					-0.382^{a}
		(0.084)					(0.082)
Sugar × 1850			0.001		-0.001		0.012^{a}
			(0.005)		(0.005)		(0.005)
Sugar × 1860			0.017^{a}		0.015^{a}		0.011^{b}
			(0.006)		(0.006)		(0.005)
Tobacco × 1850			0.069^{a}		0.069^{b}		0.002
			(0.027)		(0.027)		(0.013)
Tobacco × 1860			-0.065^{a}		-0.067^{a}		-0.033
			(0.025)		(0.024)		(0.022)
Wheat × 1850				0.509^{a}	0.492^{a}		0.486^{a}
				(0.152)	(0.140)		(0.135)
Wheat × 1860				0.526^{a}	0.506^{a}		0.487^{a}
				(0.160)	(0.150)		(0.139)
Oats × 1850				-0.379^{a}	-0.376^{a}		-0.390^{a}
				(0.121)	(0.112)		(0.111)
Oats × 1860				-0.399^{a}	-0.375^{a}		-0.358^{a}
				(0.119)	(0.111)		(0.111)
Rio-Grande × 1850						0.071	0.098^{b}
						(0.044)	(0.042)
Rio-grande × 1860						-0.286^{a}	-0.231^{a}
						(0.070)	(0.063)
Observations	2251	2198	2251	2251	2251	2251	2251
Adjusted R^2	0.483	0.531	0.516	0.488	0.520	0.554	0.582

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All regressions control county fixed effect and robust standard error. Column (1) is the baseline result without control variables. Column (2) controls the transportation cost from counties to New Orleans, New York, and Charleston. Column (3) controls sugar and tobacco suitable land area as instrument variables. Column (4) controls wheat and oat suitable land area as instrument variables. Column (5) controls the sugar, tobacco, wheat, and oat suitable land area as instrument variables. Column (6) controls the distance from counties to Rio-Grande River as instrument variables. Column (7) controls all variables listed in Column (2), (5), and (6).

In column (6), we also add the distance from each county to the Rio-Grade River to control the territory expansion effect of the Mexican-American War. Comparing coefficients of the crop value between column (1) and (6), we found the estimates are not different at a significant level. In the last OLS regression, we controlled all variables listed from column (2) to (6). The result in column (7) indicates that over 20 percent of the variation in the slave population is associated with variation in crop value. The estimate of New Orleans and Charleston transportation cost in this column is significantly lower than the estimate in column (2) because these two factors highly correlated to the distance to Rio-Grande River variable.[9] To get the magnitude of the effect of crop value, we compared two counties, such as Cumberland, TN, and Marion, GA. Cumberland, TN has approximately 25th percentile of the log-transformed county crop value on average, which is 11.1 and Marion, GA has around 75th percentile of the logarithm county crop value on average, which is 13.2. The coefficient 0.198 indicates that there should be on the average 0.43-log-point difference between the log slave population of the corresponding counties.[10] In practice, the gap of the slave population is 3-log-point[11] This result implies a fairly large effect of log-transformed crop value, but still much less than the actual slave gap between Cumberland, TN, and Marion, GA.

To check the correlation of the slave population and cotton value, we decompose crop value to cotton and other crops and regress the slave population on them. The result shows that cotton value is positively associated with the slave population. The coefficient of cotton value with all control variables implies that approximately 4 percent of slave population growth associated with the increase in 1 percent of cotton value. The results are displayed in the appendix.

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[9]The correlation between New Orleans transportation cost and distance to Rio-Grande River in the year 1850 is 0.97 and significant at 1 percent. The correlation between Charleston transportation cost and distance to Rio-Grande River in the year 1850 is 0.95 and significant at 1 percent.

[10]It is about a 1-fold difference that $e^{0.43} - 1 = 0.54$.

[11]It is about a 19-fold difference that $e^{3} - 1 = 19$

1.6.2 Baseline Results

Table 1.3: Baseline Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel A: Second Stage of IV Regression						
Crop Value	1.123^a	1.134^a	1.053^a	1.759^a	1.670^a	1.068^a	1.552^a
(No Cluster)	(0.140)	(0.119)	(0.131)	(0.430)	(0.403)	(0.121)	(0.341)
(Cluster County)	(0.169)	(0.157)	(0.161)	(0.354)	(0.341)	(0.148)	(0.327)
(Cluster State)	(0.288)	(0.248)	(0.283)	(0.654)	(0.605)	(0.253)	(0.470)
Observations	2155	2103	2155	2155	2155	2155	2103
	Panel B: First Stage of IV Regression						
Cotton Land × Post	0.139^a	0.161^a	0.141^a	0.083^a	0.083^a	0.158^a	0.091^a
(No Cluster)	(0.022)	(0.023)	(0.022)	(0.027)	(0.027)	(0.022)	(0.027)
(Cluster County)	(0.027)	(0.027)	(0.027)	(0.023)	(0.023)	(0.026)	(0.024)
(Cluster State)	(0.034)	(0.037)	(0.034)	(0.036)	(0.035)	(0.036)	(0.034)
F-test	16.79	19.11	17.41	5.37	5.62	19.23	7.08
AR-F-test	8.63	10.05	7.97	4.96	4.92	8.84	6.01
AR-χ^2-test	12.35	14.37	11.43	7.11	7.07	12.66	8.64
Access to Market		X					X
Plantation Crops			X		X		X
Non-Plantation Crops				X	X		X
Territory Expansion						X	X

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All regressions control county fixed effect and robust standard error. Column (1) is the baseline result without control variables. Column (2) controls the transportation cost from counties to New Orleans, New York, and Charleston. Column (3) controls sugar and tobacco suitable land area as instrument variables. Column (4) controls wheat and oat suitable land area as instrument variables. Column (5) controls the sugar, tobacco, wheat, and oat suitable land area as instrument variables. Column (6) controls the distance from counties to Rio-Grande River as instrument variables. Column (7) controls all variables listed in Column (2), (5), and (6).

We know from our analysis that OLS results are biased. Next, we present the results based on our estimation model. The results of equation (1.1) and (1.2) are presented in Table 1.3 Panel B and Panel A. We use $\ln(Cotton\ Land)_i * D_t^{Post}$ as an instrumental variable for the endogenous variable crop value. Panel A of Table 1.3 reports DDIV estimates of the coefficient interest σ, and Panel B shows the corresponding in the first stage. Since slavery is likely to be correlated within counties or states, we separately cluster the slave population at the county and state levels. Standard errors of no clustering, clustering at the county level, and clustering at the state-level are reported below the estimated coefficient.

Panel (A) column (1) displays the relation between crop value and cotton suitable land area after the Repeal of the Corn Laws in the first stage. Without other control variables. The corresponding DDIV estimate of crop value on slavery is 1.12. This estimate is significantly associated with the standard error of 0.288, which is larger than the OLS estimates reported in Table 1.2. It warns that the weak instrument might exist. The essential idea of the weak instrument is that the change of cotton suitable land area after the Repeal is only weakly related to the slave population, given crop value. The result suggests that the attenuation bias is more important than the omitted variable biases and the feedback issue. This attenuation bias is a measurement error that happens when the expected value of an estimator magnitude is less than the absolute value of the parameter. For example, crop value as the single measurement of agriculture performance could capture only a part of it. In reality, to build the connection between agriculture performance and slave population changes could be very complicated. The coefficient is 1.12, with standard error 0.29 that implies a 1 percent crop value increase associated with a 1.12 percent increase in the slave population.

Column (2) displays the coefficient of adding transportation costs from counties to New Orleans, New York, and Charleston cotton exchange market. The coefficient for crop value is very close to the previous one. It implies that adding transportation costs does not change the relationship. We then display coefficients with control of other major crops in column (3) to (5). Adding plantation crops, sugar, and tobacco, the coefficient for crop value slightly reduced to 1.05 with standard error 0.28. In column (4), when we control non-plantation crops, wheat, and oats, the coefficient for crop value increases to 1.76 with standard error 0.65. This result suggests that wheat was also an important export good to Great Britain as previous scholars found [77], and the Repeal of Corn Law affected its export quantity. Controlling both plantation and non-plantation crops together in column (5), we find the coefficient for crop value, 1.67 with standard error 0.61, is close to the estimate in column (4). We then display the coefficient for crop value with controlling the territory expansion effect in column (6). Comparing this result with column (1), we do not find an enormous change. It implies that the Mexican-American War did change the relationship between crop value and the slave population in the South. Our preferred coefficient results are in column (7) with control of all variables listed above. The result shows that an increase of 1 percent of the crop value associated a 1.55 percent increase in the slave population in cotton suitable counties.

In addition, Panel B displays the first stage F-statistics. According to Staiger and Stock [79] 1997 paper that if the F-statistic on the excluded instruments in the first stage is lesser than 10, the weak instrument will become an issue. The preferred result shows that the first stage F-statistics is 7.08. So the parameter vector is probably weakly identified, and the test statistic might not be well approximated by their standard asymptotic normal due to the limited information in the data. Then, according to Andrew and Stock lecture [2] on solutions of the weak instrument, we use two approaches to diagnose the potential weak instrument issue. Both approaches are using a statistic whose distribution does not depend on ν_{it}^2. First, we use the Anderson-Rubin Wald F test to check if the endogenous regressor exists. The F-statistic testing the hypothesis that the test statics β is zero and orthogonality conditions are valid. The preferred F-statistics in column (7) is 6.01 (P-value=0.03) and reject the null hypothesis. Then, using the χ^2 distribution for the Anderson-Rubin test, we reject the null hypothesis with the estimated value, 8.64 (P-value=0.003).[12]

1.6.3 Robustness

To test the causal relationship between the slave population and crop value within the old cotton plantation area, we then removed the Westward and Southward expansion areas in the data set. Texas and Florida joined the statehood as slave states in 1845. Later, Southern

[12] We have also estimated this equation using Limited information Maximum Likelihood (LIML) to obtain more robust results. The LIML result is very similar to the DDIV that the coefficient estimate for crop value is 1.55 with 0.39 standard error (P-value=0) because it doesn't have a moment. The first stage F statistics is 6.77; Anderson-Rubin Wald F statistics is 5.75 (P-value=0.04; Anderson-Rubin Wald χ^2 statistics is 0.003.

Table 1.4: Robustness Checks for IV Regression

	(1)	(2)	(3)	(4)	(5)
	Panel A: IV Regression (Cluster State)				
Crop Value	1.552^a	1.391^a	1.371^a	1.204^a	1.186^a
	(0.470)	(0.322)	(0.378)	(0.270)	(0.276)
Observations	2103	1945	2031	1873	1707
	Panel B: OLS Regression				
Crop Value	0.120^a	0.089^b	0.126^b	0.092^b	0.102^b
	(0.045)	(0.036)	(0.049)	(0.038)	(0.048)
Observations	2198	1999	2121	1922	1707
Adjusted R^2	0.596	0.573	0.599	0.579	0.596
Baseline	X				
Without Texas		X		X	
Without Florida			X	X	
Full Records					X

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All regressions control county fixed effect and robust standard error. Column (1) displays our preferred baseline result. Column (2) reports the results to exclude observations from the state of Texas. Column (3) reports the results to exclude observations from the state of Florida. Column (4) reports the results to exclude observations from Texas and Florida. Column (5) displays the results keep non-missing 3-year cotton value records.

planters successfully expanded their cotton plantations in these two states. Also, we test the results of excluding counties have missing records for crop value. Panel A column (1) in Table 1.4 displays our preferred baseline DDIV results, which is same as column (7) in Table 1.3. The DDIV estimate of the impact of the slave population on crop value is 1.55, with a 0.47 standard error. Column (2) reports the result of excluding Texas data. Comparing the result in column (1), we find the coefficient for crop value slightly reduced to 1.39 with 0.38 standard error. The results are robust to drop Texas the newly added slave state. We then drop the state of Florida and display the result in column (3). Similar to the result in the previous column, the result is significant to drop Florida another slave state. Column (4) reports the result without the newly added slave states. It shows that the relation between the slave population and crop value is robust. Last but not least, in column (5), we excluded counties with missing crop value data. The estimate is still robust but somewhat smaller due to the reduction of sample size. The estimate is 1.19, with a standard error of

0.28.

Panel B displays the results of OLS regressions. Column (1) is our preferred OLS results. Columns (2) and (3) show that excluding Texas and Florida data does not change the relationship between slaves and suitable cotton land after the Repeal of the Corn Laws. The coefficient for excluding Texas reduced to 0.9 with a standard error of 0.04. And the coefficient for excluding Florida is now 0.13 with a standard error of 0.05. Without Texas and Florida records, the relation between the slave population and cotton suitable land is similar to the preferred result. Column (4) shows that, without Texas and Florida, the estimate drops to 0.09 with a standard error of 0.04. Excluding the missing value of cotton production in column (5), we find our results are not driven by the missing crop value.

1.7 Conclusions

Many economic historians and historians point out the correlation between British cotton demand and U.S. slavery. In this paper, we extend the Costinot model of how external shock will affect agricultural production patterns to estimate the causal relationship between cotton production and slave population after the Repeal of the British Corn Laws in the American South. First, we found U.S. crop value correlated with the number of slaves before and after the Repeal. We then found crop value and slave population causally related using the cotton suitable land area after the Repeal as the instrumental variables. According to our results, the U.S. slave population was positively and significantly driven by the British cotton demand. However, the impacts were not uniform across all cotton suitable land in the South. After the Repeal, more slaves moved to the cotton suitable land.

CHAPTER 2

THE EFFECT OF THE REPEAL OF THE CORN LAWS ON THE SOUTHERN PARTY REALIGNMENT

2.1 Introduction

Following our study in the previous chapter, after the Repeal of the Corn Laws, Southern cotton production driven by overseas demand significantly increased the slave population in cotton suitable land counties. In this chapter, we explore the role of cotton in shaping the political arena leading to the Civil War.

In the antebellum period, a group of Southern politicians tried to justify the practice of segregating and depriving the civil rights of African Americans. Meanwhile, they believed White supremacy was reasonable and necessary. These politicians were beneficiaries of the plantation economy. They defended "slavery as a benevolent, paternalistic institution with social and economic benefits, an important bulwark of civilization, and a divine institution similar or superior to the free labor in the North" [46][54]. To them, slavery was a positive good. From the abolitionist's point of view, slavery was a pathological institution, slaves often suffer from lynchings, flogging and raping, or family separation. They also argued that the slavery institution was less efficient than the capitalist free labor system in the North. Many abolitionists mentioned that slavery lagged the explosive growth of the economy in the United States [19]. They believed that the transition from slaves to free labor would significantly increase cotton production [8]. However, this was not the truth. Later, economists evidenced that Southern slave agriculture was more efficient than the Northern system of family farming [86][35]. Although slavery supporters and abolitionists had different views on the morality of slavery, they all agreed that slavery was the prevailing economic model of the South. Slavery is only applicable to the early social development period. Slavery did not develop with the advent of the American Industrial Revolution.

Slavery was the engine for the Southern economic development in the antebellum period. Slave owners played an important role in creating the parties that virtually defined the politics in the Old South. One of the major conflicts of interest between southern slaveholding politicians and other non-slaveholding wealthy politicians was the abolition of slavery. This conflict of interest was transferred into the political applications in electoral returns and, later, in a more stark way, the Civil War. Gavin Wright points out the core behind "was not a conflict between agrarian interests and industry, nor was it caused by competition of land in the west (at least not directly) as the South had plenty of lands to grow cotton on in the South. It was the expansion of slavery into the territories that aroused Southern ire, not expansion per se. Since Northern politicians had the politically expedient free labor rhetoric to fall back on, they could please the abolitionists by arguing that slavery would actually die out if contained – without having to press for abolition per se. Free labor also had the appeal of bringing western interests under the 'big tent.' There was no political benefit to the North in respecting the 'peculiar institution' [87]." [1] In this study, we expand Wright's argument from the expansion of slaves to cotton production. Specifically we explore how cotton production affected the Southern political affiliation through slavery in the antebellum South. In the previous chapter, we have already found slavery tightly linked to Great Britain's cotton demand after the Repeal of the British Corn Law. We are now taken a step further to study the casual relationship between cotton production and Southern political affiliation.

Scholars in more recent contexts have discussed the link between trade liberalization policy and political affiliation. Kang and Greene found employment winners and losers from the NAFTA were important determinants of Congressional voting patterns [52]. Che et al. evidenced that from 1992 to 2010, voting shares for Democratic congressional candidates increased in the counties exposed to greater import competition from China [15]. On the other hand, Jensen et al. found increasing employment in high-skilled tradable services

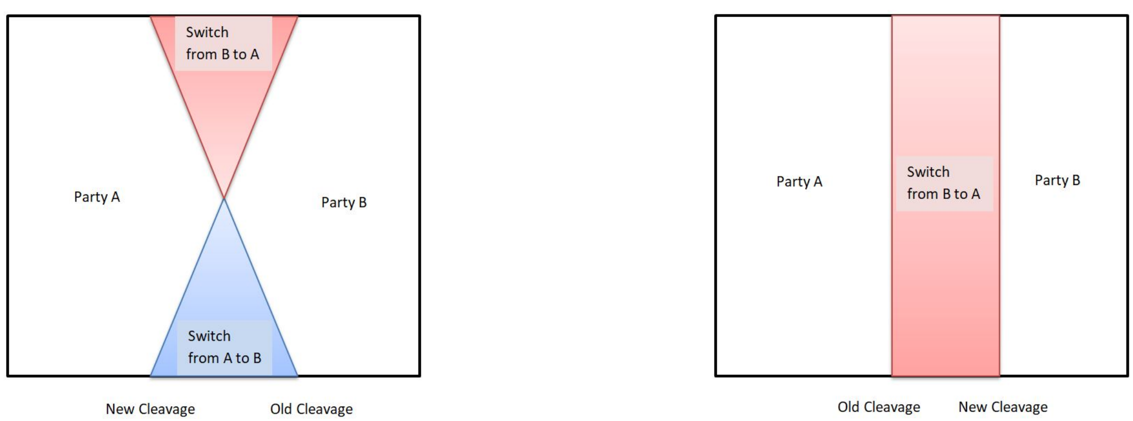
[1]This was retrieved from a review of Wright's book at http://www.librarything.com/work/523323/reviews/69036358

would affect voting [50]. An increase in exports is associated with increases in the presidential vote shares from the incumbent party. However, increase imports would negatively affect the vote shares from the incumbent party. Autor et al. used 2000s data to study the polarization of electoral returns. They found trade-exposed counties with majority white population or Republicans are more likely to vote for a conservative Republican. However, if trade-exposed districts have a majority of the people, they are more likely to vote for liberal Democrats. In presidential elections, trade-exposed counties shifted towards the Republican candidate [4]. Dippel et al. studied the relationship between import exposure and the number of votes for extreme rights and populism using German data. They found the import exposure induced voters to turn to protectionist, populist, and nationalist policy agendas via the labor market [24]. Rodrik further shows a move towards both the right and left-populist not only from trade but also demand shocks, technological changes, and other phenomena from globalization [71].

In this study, we use mediation analysis to estimate the causal relationship between cotton production and the election returns on pro-slavery by exploiting cross-sectional variation created by differences in cotton-suitable land across counties in the United States and temporal variation arising from the Repeal of the Corn Laws in England in 1846. We observe that the southern political affiliation was in a *stable phase*. The increase in the slave population after the Repeal of the British Corn Laws in cotton suitable land deteriorated this stability and induced a southern realignment to support slavery. We then use mediation analysis to estimate the causal relationship between the increase in British cotton demand and U.S. political affiliation on pro-slavery via changes in the slave population. Our results show that the effect of U.S. cotton production, mediated by slave population adjustment, is larger than the total impact of the cotton effect on the political affiliation on pro-slavery. Channels other than the slave population that links cotton production to pro-slavery political affiliation are moderating at the aggregated level.

2.2 Realignment Theory

According to the historical statistics, from 1840 to the eve of the Repeal of the British Corn Law in 1846, almost all recorded counties in the South are strongly pro-slavery in the presidential election [18]. However, right after the implementation of the trade liberalization policy, many counties in the east of the Mississippi River switch to anti-slavery. Later, in the 1860 presidential election, most Southern counties realigned to pro-slavery again because a new issue was raised– the unification problem of the South and North. We then summarized the change of electoral returns with respect to slavery using partisan realignment theory mentioned in the book of *Partisan Realignment* by Clubb et al. that "under some apparent crisis, partisan realignments focuses public attention on a narrow set of issue upon which the political parties take relatively clear, and differential stands. As time passes, the previous realignment issue begins to fade, and a new issue could change the existing party cleavage and defected the party loyalty in voting [17]."



(a) Differential Electoral Changes

(b) Across-the-Board Electoral Changes

Figure 2.1: Diagram of Electoral Changes

In Clubb et al. study of the United States electoral sequences from 1828 to 1980, they found followed by the end of the *stable phase* in the previous realignment period, there must be a *midsequence adjustment*. The *midsequence adjustment* also considered as a new period starting point. The adjustment indicates the political environment temporary loss of governmental control by the dominant party. Then it followed by a *Decay Phase* period, which was "characterized by great volatility of the popular vote, by deviating elections, and by third-party movement." They also pointed out that during the *Decay Phase* period, "the centrality of the issues produced by crisis and realignment tended to decline, and the process of policymaking worked less effectively, with an increasing propensity to avoid issues and to enter a deadlock." During the *Decay Phase* period, the deterioration of elite collations increased. Then, a new realignment and *stable phase* followed after. The form of realignment was summarized into two patterns (i) differential changes, and (ii) the across-the-board changes. The distinction between the two patterns was displayed in Figure 2.1. The differential changes were the aggregate votes in some units shifts toward one party, while in other unites shifts are towards the opposing party. This change can not be captured from the aggregated map, but we created a realignment measurement to capture these changes within county and time variation. The across-the-board change is a general increase or decrease in the votes at the aggregate level. We can easily see this type of change from the pro-slavery voting maps and graphs [17]. Under some apparent crisis, partisan realignments focus public attention on a narrow set of issues upon which the political parties take relatively clear, and differential stands. As time passes, the previous realignment issue begins to fade, and a new problem has arisen that could change the existing party cleavage and defected the party loyalty in voting [17].

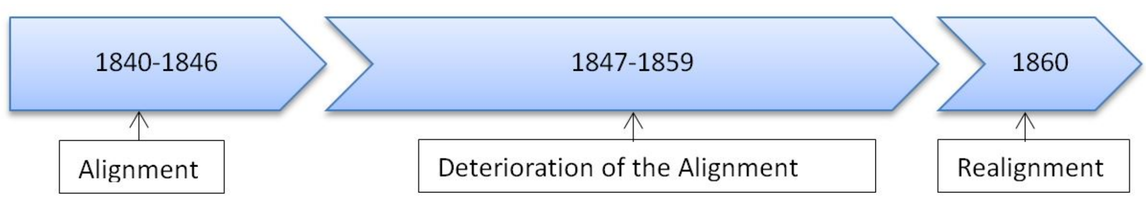


Figure 2.2: Partisan Realignment Timeline

Based on the theory, we transfer the change of Southern political affiliation on slavery issue into a timeline. As Figure 2.2 shows, from 1840 and 1846, the southern political affiliation on slavery was in a *stable phase*. Then suddenly, an external shock, the trade liberalization from Great Britain, deteriorated the *stable phase*. The year between 1847 and 1848 was the *midsequence adjustment* period that the pro-slavery parties lost control in the South. Consequently, the South ushered into a *Decay Phase*. In this period, the deterioration of the pro-slavery issue started, realignment tended to decline, and people tried to avoid the discussion of slavery. Until 1860, that Southerners realigned their opinions to support slavery. Meanwhile, a new problem raised in the South– the national unification problem. In the next section, we will introduce major parties in the South and the realignments, as well as their attitudes towards slavery.

2.3 Parties

From 1840 to 1860, around 40 parties actively participated in the elections, but only a few obtained sufficient votes. In other words, these parties had more or less governmental control ability to influence policymaking. In this section, we will introduce the details of major parties, such as Democrat, Whig, Constitutional Union, and American Party. Then summarize the other relatively important parities in the South.

2.3.1 Democratic Party

The roots of the Democrat Party can be traced back to a group assembled in the 1790s by Thomas Jefferson and James Madison in opposition to Alexander Hamilton and the Federalists. In 1824, president Andrew Jackson organized his supporters into the Democrat Party. The party was founded by farmers and immigrants who believed the state's rights and centralized federal government [73]. By late 1850, the Democratic Party split into two parties over slavery, the Northern Democratic Party and Southern Democratic Party. Northern Democrats held different imagines of the party. They believed Republicanism and advocated minimal government, state's rights, and personal liberty Southern Democrats

[59]. Most of them supported the war to preserve the Union and pro-slavery. Democrats who reside in the South believed Jacksonian democracy. Same as Northern Democrats, they defended slavery, but they also supported slavery in the western newly expanded land, and against Oppositions in the North.

Besides these two brunches in the Democratic Party, Calhoun Democrats and Nullifier Democrats were founded by John C. Calhoun, who defended slavery, opposed high tariffs, and supported the state's rights. They were split from the Democrat-Republican Party and merged to Democrat in the early 1840s. Another group of politicians who loosely identifies themselves as Democrats but chose not to be a formal member of the Democratic Party claimed they were Independent Democrats. During the mid of the nineteenth century, they actively participated in the Congressional and Presidential election. One group of the Independent Democrats was the Land Distribution Democrats, who sold state public land to the federal government and granted the money to the state. The oppositions of Land Distribution Democrats were called Anti-Land Distribution Democrats. People who prohibit the extension of slavery into western territories were known as the Anti-know-nothing democrats. One of the party's leaders, Galusha Aaron Grow, switched people's stereotypes on the Democrats and would never support the Free-Soil Movement. Similarly, the Benton Democrats, who support Thomas Hart Benton,[2] opposed to the slavery institution after the Mexican-American War. They also opposed the Compromise of 1850 because it was too favorable to pro-slavery in the new territory. His greatest enemy John Calhoun formed an Anti-Benton group, who were strongly defending slavery [78]. A group of segregationists, who supported state's rights, split from the Democrat Party named themselves State's Right Democrats and was also known as Dixiecrats. They sought to preserve the economic and social hierarchy in the South, which included the subordination of African Americans and the perpetuation of segregation [73]. In sum, from 1840 to 1860, most Southern Democrats supported slavery. Some of the anti-slavery branches were formed mainly after the year of

[2]Benton was a slaveholder and free-soiler.

1846.

2.3.2 Whig Party

The Whig Party was another major political party from 1834 to 1860. The majority of the party was formed by the remnants of the Federalists, National Republicans, Abolitionists, and Anti-Mason. In the party, the major faction, Conscience Whigs, strongly opposed slavery and against the Cotton Whigs, who supported the expansion of slavery. Throughout its existence, the greatest challenge of the national Whig Party was slavery. For example, Whigs had two opinions on the nomination of Zachary Taylor. The Whig editor in the *Independent Democrat* argued that Taylor was a captive of Southern Cotton Whigs. However, Abraham Lincoln thought Taylor was integrity, and he supported Taylor's presidential election in 1848 [73].[3] Bauer commented Taylor "was and remains an enigma" [10]. When we mentioned Zachary Taylor, we had to talk about the Taylor Whig Party. The party opposed the extension of slavery into areas where neither cotton nor sugar could be grown. In his opinion on slavery, we would identify Taylor Whigs are pro-slavery regardless of the geographical condition. Meanwhile, the party espoused many anti-southern rights causes, such as support the concept of a strong national bank.

In the South, many Independent Whigs were willing to discuss something farther than southern rights, but people did not buy it. The only time Whig succeed in Virginia was Morton, who successfully contested and reelected because he was deemed unsound on the slavery issue. The Democrats, who were in favor of dissolving the Union, thought the southern Whigs was unfaithful to the South. The Southern Rights Whig Party believed that the state's secession was the only way to prevent prospective freedmen and slavery in the South. Stephen Hale, one of the Southern Rights Whig leader and commissioner of Alabama, wrote that "They [Northern politicians] attack us through their literature, in their schools, from the hustings, in their legislative halls, through the public press, and even their

[3] pp.493-494

courts of justice forget the purity of their judicial ermine, to strike down the rights of the Southern slaveholder, and over-ride every barrier which the Constitution has erected for his protection; and the sacred desk is desecrated to this unholy crusade against our lives, our property, and the Constitutional rights guaranteed to us by the Compact of our Fathers."

Another branch of Whig Party in the South was the State Right Whig Party. The party was founded by William C. Preston [80], who was against slavery and tried to resolve the issue of slavery peacefully. In his public speech, he mentioned the act of the British emancipation of West India slavery and then showed the intimate sympathies existing between Great Britain and the United States [57]. Some Whigs are strongly opposed to slavery. For example, during the Virginia Slavery Debate of 1832-1832, Charles J. Faulkner, an Independent Union Whig, described slave as an "inherited evil institution". Southern Whig Party was not a planters' party in the South. It was furnished mainly by the commercial groups of the cities and towns, with their allied lawyers and editors [76]. In the eve of the Civil War, the conflicts of interest on slavery increased within the Whig Party. In this period, the Whig Party was polarized by the northern and southern sections. And ultimately, the party was disintegrated. Former Whig members joined separately to American, Free Soil, and Democratic Party.

2.3.3 American and Constitutional Union Party

During the *Decay Phase*, American and Constitutional Union Party were tried to ignore the slavery issue. American Party was formally called the Know-Nothing Party. The party was a nativist organization that achieved considerable success during its brief life span in the mid-1850s. The name Know-Nothings was given by their members' ignorance of their political affiliation. The party was comprised of thousands of loosely affiliated councils, especially the feelings regarding slavery, which split the party into Northern and Southern Know-Nothing Party. Later, many of Northern members joined the Republican Party and supported John Fremont for president in the 1856 presidential election [73].

Constitutional Union or Independent Whig Party is a U.S. political party actively participated in the presidential election in the 1850s. Most of the Constitutional Unions were formal members of the American Party and Whig Party. The Constitutional Union Party was short-lived that collapsed by the start of the Civil War. It succeeded only in helping Abraham Lincoln to own the presidential election in 1860 [29]. The Constitutional Unions principals were reconciliation, fraternity, and forbearance, but they ignored the slavery issue. Its platform particularly appealed to the border state, such as Tennessee, Virginia, and Kentucky, where the party collected most of electoral votes [29][73].

2.3.4 Other Parties

The party against the Constitutional Union was the Party of Secession. Secessionist supported withdrawing one or more states from the Union that constitutes the United States. The most serious attempt was in the year 1860 and 1861 as eleven southern states declared secession from the United States. Secessionists mainly lived in Mississippi, Alabama, Georgia, and South Carolina. Most of them supported Southern Rights and formed the Southern Rights parties [48]. Many Constitutional Unions self-identified as distinctive anti-secessionists. They claimed that they would rather give up slavery than dissolve the Union. However, historians criticized that "Unionist as having been less idealistic, and one might have liked then to have been" because they did not oppose slavery. In addition, the Party of Opposition were a small group diving from the Whig Party. Several Whig politicians adopted the name "Opposition Party" in the period between 1854 and 1858. They opposed the Democratic efforts to expand slavery into Western territories. And later, they merged with the Constitution Unions [5]. The Grand Old Party or the Republican Party was founded by oppositions of the Kansas-Nebraska Act, which allowed for the potential expansion of slavery within Kansas and Nebraska borders. Republicans fought for civil rights and won the Civil War. They garnered enough votes to approve the Fourteenth Amendment to the Constitution and passed acts ensuring black Americans' rights in the defeated southern states [73]. Later, in the 1850s, the Republican Party claimed as an independent party. And after Abraham Lincoln owned the 1860 presidential election, Republicans replaced the Whigs as the leading party against the Democrats, one of two contemporary political parties in the United States.

After the Repeal of the British Corn Law, most of the politicians in the South, who advocated the colonization of free black people in Africa and Latin America and abolished slavery in the US, were Whigs. Moral reformers were more likely to be Whig than Democrats. Most Know-Nothings and Constitutional Unions pretended to ignore the slavery issue. Base on the partisan realignment theory, this is a deterioration of alignment on the pro-slavery issue in the *Decay Phase*. After the disintegration of the Whig Party, the South ushered a short realignment period on pro-slavery. However, the realignment of pro-slavery and the national unification issue further aggravated the conflict of interest between the North and South, and finally triggered the Civil War.

2.4 Data

To study the causal relationship between cotton production and the political affiliation in the South, we use a couple of data sources: (i) the cotton production value from the Census of Agriculture; (ii) slave population from the Census; (iii) presidential electoral returns from the ICPSR electoral data for counties in the United States; (iv) crops suitable land area from Food and Agriculture Organization (FAO); (v) transportation cost data from Donaldson and Hornbeck market access paper. The cotton production value, slave population, crops suitable land area, and transportation cost data have been introduced in the previous chapter. Thus, we will only introduce the presidential electoral information and summarize the relevant variables in table 2.1.

The county-level presidential voting data are available in the ICPSR. We used two electoral returns data from ICPSR. One is *Electoral Data for Counties in the United States: Presidential and Congressional Races, 1840-1972* [18], which summarized the number of

Table 2.1: Summary Statistics Presidential Election, 1840-1860

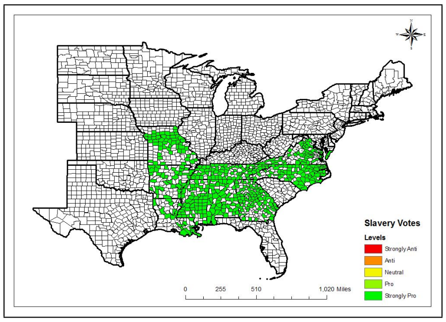
	No. Obs	Mean	Std. Dev.	Min	Max
		Year=1840			
Pro-Slavery Votes	583	902	657	68	4429
Total Votes	583	902	657	68	4429
Realignment Indicator	1436	60	131	0	1436
Pro-Slavery Party Number	591	1	.12	0	1
Total Party Number	591	2	.52	1	4
		Year=1850 (Election:1852)			
Pro-Slavery Votes	820	429	414	7	5821
Total Votes	820	756	757	7	10124
Realignment Indicator	1436	110	170	0	1222
Pro-Slavery Party Number	860	1	.58	0	3
Total Party Number	860	3	1.03	1	6
		Year=1860			
Pro-Slavery Votes	930	642	564	6	9876
Total Votes	930	1096	1139	8	24751
Realignment Indicator	1436	122	215	0	4856
Pro-Slavery Party Number	1048	2	.68	1	3
Total Party Number	1048	5	2	2	8

votes from major parties in the elections. We display the summary statistics of voting in the table 2.1. To calculate the pro-slavery votes, we first define the pro-slavery party. The 1840-1972 data summarized ten parties' voting records.[4] We defined Democrats, Southern Democrats, Southern Right Whig, and Whig Party before the year of 1848 supported slavery.[5]. We then calculate the pro-slavery voting rate using the aggregated pro-slavery votes over the total slavery votes. The average pro-slavery voting rate was 1 in 1840 indicates that all recorded counties in the South aligned to support slavery. However, after the Repeal of the British Corn Laws, the *midsequence adjustment*, the opinion on slavery diverged that the county averaged pro-slavery rate reduced to 0.57 in 1850. It then realigned in 1860 that the pro-slavery ratio rebounded to 0.62.

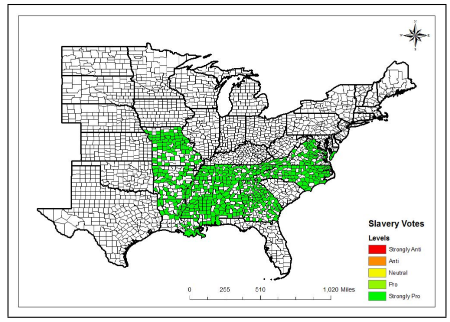
The dynamic change of presidential election returns on pro-slavery votes was displayed in Figure 2.3. In each election, if a county only has 0 to 25 percent of pro-slavery votes, we define the county was strongly anti-slavery. If it has more than 25 and less than 49 percent pro-slavery votes, it is defined as an anti-slavery county. The neutral county was the one with 49 to 51 percent pro-slavery votes. The county has more than 51 percent, and less than 75 percent of pro-slavery votes is considered a pro-slavery county. And if the county has more than 75 percent of pro-slavery votes, we define it as a strongly pro-slavery county. Before the Repeal of the British Corn Law in 1840 and 1844 presidential elections, almost all recorded counties in the South are strongly pro-slavery. However, right after the trade liberalization was implemented, many counties in the east of the Mississippi River switched to anti-slavery counties. Some counties in the Appalachian Mountains area were strongly anti-slavery. Later, in the 1860 presidential election, most Southern counties realigned to pro-slavery again, except some counties in North Carolina, Tennessee, central of Georgia, and counties along the Mississippi River. We then aggregate the pro-slavery voting maps

[4]The ten parties are Democratic, Southern Democratic, Whig, Southern Rights Whig, American, Constitution, Free Soil, Liberty, Republican, Southern Republican.

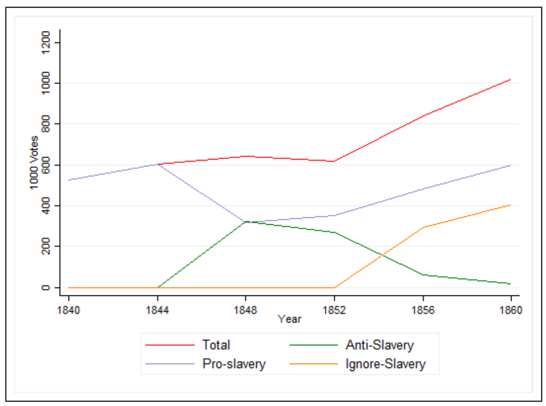
[5]After we checked with the data in *United States Historical Election Returns, 1824-1968* we found a typo in 1860 Texas that the 1840-1972 data named the Southern Democratic party as Constitution Party and vice versa [49].



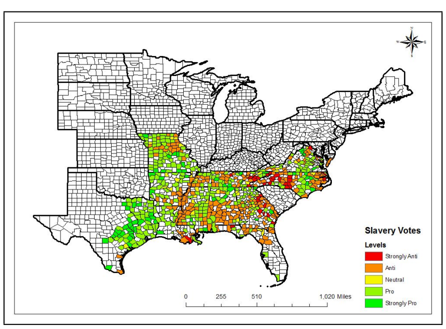
(a) Presidential Votes in 1840



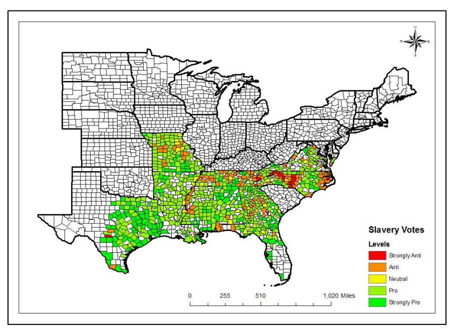
(b) Presidential Votes in 1844



(c) Change in Presidential Votes



(d) Presidential Votes in 1848



(e) Presidential Votes in 1860

Figure 2.3: Presidential Votes

into a graph and display it in Figure 2.3 panel (c) [18]. We observe that in the presidential election, the number of pro-slavery votes dramatically decreased from 1844 to 1848 and gradually increased. Reversely, the number of anti-slavery votes increased in the 1848 presidential election and then reduced after that. We also find the votes from parties which tried to ignore the slavery issue, dramatically increased in the 1852 election and after. And these ignore-slavery votes occupied a huge proportion of the total number of votes.

The information on partisan realignment towards slavery was retrieved from *United States Historical Election Returns, 1824-1968* [49], which provides detailed information on parties participating in the elections.[6] The realignment can be measured in two dimensions. One is whether the slavery opinion change in a county over time. There are four possible cases: (i) majority votes are from pro-slavery parties in the previous election and still pro-slavery now; (ii) majority votes are from pro-slavery parties in the previous election but switch to anti-slavery now; (iii) majority votes are from anti-slavery parties in the previous election but switch to pro-slavery now; (iv) majority votes are from anti-slavery parties in the previous election and still anti-slavery now. Another dimension is the variation of the realignment. We applied the following formula to measure it,

$$\begin{aligned} Realignment\ Variation = \{&[\max(Proslavery\ Vote_{it=N}) - \max(Proslavery\ Vote_{it=N-1})]^2 \\ &+ [\max(Not\ Proslavery\ Vote_{it=N}) \\ &- \max(Not\ Proslavery\ Vote_{it=N-1})]^2\}^{1/2} \end{aligned} \tag{2.1}$$

[6] The 1824-1968 data set contains more voting details on small parties. The data set recorded 37 parties' voting information between the year of 1840 to 1860. They are Whig, Calhoun Democrat, Nullifier Democrat, State Right Democrat, State Rights Whig, Democrat, Modern Republican, Union Whig, Unionist, American, Democrat and American, Independent, Independent, and Democrat, Independent Democrat, Union Democrat, Union, Independent Whig, Opposition Democrat, State Rights, Secessionist Whig, Secession Democrat, Land Distribution Democrat, Anti-Land Distribution Democrat, Southern Rights, Southern Rights Democrat, Independent Union Whig, Secessionist, Anti-Know-Nothing Democrat, Anti-Know-Nothing Independent, Anti-Know-Nothing-Independent Democrat, Taylor Whig, State's Rights Democrat, Opposition, Southern Rights Whig, Southern Democrat, Benton Democrat, Anti-Benton Democrat, Independent Democrat, And Opposition.

where (i) $\max(Proslavery\ Vote_{it=N})$ is the largest pro-slavery party votes in county i at time N; (ii) $\max(Proslavery\ Vote_{it=N-1})$ is the largest pro-slavery party votes in county i at time N-1; (iii) $\max(Not\ Proslavery\ Vote_{it=N})$ is the largest non-pro-slavery party votes in county i at time N; (iv) $\max(Not\ Proslavery\ Vote_{it=N-1})$ is the largest non-pro-slavery party votes in county i at time N-1. A small variation indicates that parties' opinions towards slavery were stable over each period. If the variation is large, there is a change of alignment on slavery among parties. To construct the pro-slavery realignments variable, we then assemble the change of slavery opinion and the variation using the pro-slavery dummy variable multiply by the variation of realignment. According to the statistics in table 2.1, the averaged pro-slavery realignments variation was 60 in 1840, and close to doubled in 1850 at 110, then slightly increased in 1860 at 122. The average number of pro-slavery parties against the total number of parties was one to two in 1840. It decreased to one third in 1850 implies the deterioration of the alignment on pro-slavery opinion. Then it bounced back to one to one in 1860 due to the raise of the national unification problem.

2.5 Empirical Framework

Following our study in the previous chapter that after the trade liberalization cotton production significantly increased the slave population in cotton suitable land counties, we extend the further discussion to the role of cotton played on the political arena using the data listed above. We want to learn how Southern cotton production affected political affiliation on pro-slavery by adjusting the slave population in cotton suitable land after the Repeal of the British Corn Laws. To identify the causal relationship, we applied the mediation analysis by Dippel et al. [24]. The mediation analysis model can impose casual relations among unobserved variables. The model also can identify three causal effects using only one dedicated instrument for the treatment variable. We use the mediation analysis to solve the issue of both endogenous treatment variable and its outcome, the mediator, together cause the outcome of interest. In our case, the endogenous treatment, an increase in cotton production, and the increase in the slave population cause the outcome of interest, the change of political affiliation on pro-slavery. The mediation analysis can solve the problem using Two-Stage Least Square (2SLS) with one instrumental variable, the measure of the cross-sectional variation created by differences in cotton-suitable land across counties in the South and temporal variation arising from the Repeal of the Corn Laws in 1846.

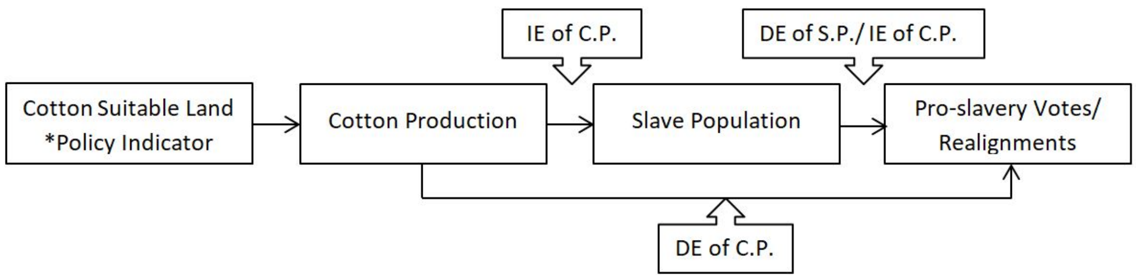


Figure 2.4: Mediation Analysis Causal Chain

The identification problem of the mediation analysis can be visualized in Figure 2.4. The causal relation between cotton production and the slave population was identified using the variation of cotton suitable land area and the implementation of trade liberalization policy. Both cotton production and the slave population can affect the political affiliation of pro-slavery. In Figure 2.4, the arrow from cotton production to the slave population represents the conditional indirect effect of cotton production on the measures of political affiliation on pro-slavery through the channel of the slave population. The arrow from cotton production to political affiliation on pro-slavery represents the direct effect of cotton production. And the arrow from the slave population to political affiliation on pro-slavery is the direct effect of the slave population. We then study these three effects using 2SLS estimations and display the equations as follows.

$$\ln Cotton\ Production\ Value_{it} = \alpha \ln Cotton\ Suitable\ Land_i * Post + X_i + X_{it} + \delta_i + \delta_t + \varepsilon_{it} \tag{2.2a}$$

$$\ln Slave\ Population_{it} = \beta \ln Cotton\ \widehat{Production}\ Value_{it} + X_i + X_{it} + \delta_i + \delta_t + \nu_{it} \tag{2.2b}$$

The first model tests the causal relationship between cotton production and the slave population using the cotton suitable land area after the Repeal of the British Corn Law as the instrumental variable in 2SLS. The equation (2.2a) shows the first stage. $\ln Cotton\ Production\ Value_{it}$ is the value of cotton production in county i at time t, which is treated as endogenous. Cotton suitable land area, $\ln Cotton\ Suitable\ Land_i$, measures the area of land suitable for growing cotton. We defined a piece of land is suitable to grow cotton if it can produce 25 percent and above the maximum yield. The time indicator, $Post$, indicates whether the county is subjected to the policy treatment. It equals to zero before the trade liberalization and equals to one after the policy was implemented. The multiplication of $\ln Cotton\ Suitable\ Land_i$ and $Post$ is the instrumental variable. The instrumental variable has two properties: (i) $\ln Cotton\ Suitable\ Land_i * Post$ does not cause the cotton production, and (ii) it does not affect political affiliation on pro-slavery other than slave population.

To avoid the potential problem of control variables and the treatment are linked and furthermore affect the measures of political affiliation on pro-slavery, we use a principal component analysis (PCA) to aggregate the multiple mechanisms into few indices. PCA generates purely statistical measurements base on the total variation and is orthogonal to one another by construction [24]. X_i are time-invariant control variables include the PCA of plantation crops suitable land area, PCA of non-plantation suitable land area, and the distance to Rio-Grande River. X_{it} are time-variant variables includes PCA of the transportation cost, the number of parties participate in the election, and the pro-slavery realignments variable. δ_i is the county fixed effect variable can eliminate the bias generated by the fact that treated counties generally have higher cotton production and a larger farmland value than controlled counties over time. δ_t is the time fixed effect to capture the common trends across counties. To identify α, we assume the unobserved county-specific effects are constant over time, and the trend in treated counties and control counties are the same over time, which can be expressed by $E[Post * \varepsilon_{it}; \delta_i] = 0$. Also, ε_{it} is an unobserved disturbance with the identification assumption.

In the second stage, we plug the estimated cotton production value, $\ln Cotton\ \widehat{Production}_{it}$, from equation (2.2a) into equation (2.2b). In equation (2.2b), $\ln Slave\ Population_{it}$ is the number of slaves in county i at year t. The rest of the control variables are as same as equation (2.2a). ν_{it} is an unobserved disturbance with the identification assumption. β relies on the identification assumption that there is no omitted time-varying and region-specific effects correlation. Our primary interest parameter, β, is the cotton production effect on the slave population and the conditional indirect effect of cotton production on the measurements of political affiliation. β is expected to be positive that increases cotton production from the overseas demand leads to an increase in the slave population.

$$\ln Cotton\ Production\ Value_{it} = \xi \ln Cotton\ Suitable\ Land_i * Post + X_i + X_{it} + \delta_i + \delta_t + \psi_{it} \quad (2.3a)$$

$$\ln Y_{it} = \eta \ln Cotton\ \widehat{Production}\ Value_{it} + X_i + X_{it} + \delta_i + \delta_t + \omega_{it} \quad (2.3b)$$

The second model equation (2.3a) and (2.3b), stands for the instrumental variable model that evaluates the total effect of cotton production value on pro-slavery political affiliation.

It is a deformation of the mediation model. The second stage estimation uses the same variables as the first model with replacing $\ln Y_{it}$, the political affiliation on pro-slavery. We use three measurements to understand the political affiliation on pro-slavery: (i) the number of pro-slavery votes, (ii) the pro-slavery dummy, and (iii) the pro-slavery realignments variable. We devote more attention to the second model because it can estimate the total effect of cotton production value on our interested measurements of the political affiliation on pro-slavery. This estimation also tests whether the instrument can solve the cotton production endogeneity issue or not. Our interest coefficient estimate, η, represents the total effect of cotton production on the political affiliation on pro-slavery variables.

$$\ln Slave\ Population_{it} = \delta \ln Cotton\ Suitable\ Land_i * Post + X_i + X_{it} + \delta_i + \delta_t + \tau_{it} \tag{2.4a}$$

$$\ln Y_{it} = \gamma \ln Slave\ \widehat{Population}_{it} + \sigma \ln Cotton\ Production\ Value_{it} + X_i + X_{it} + \delta_i + \delta_t + \upsilon_{it} \tag{2.4b}$$

Last, combining the estimate from the first model and the mediation model in equation (2.4a) and (2.4b), we can estimate the indirect effect of cotton production value on three measurements of political affiliation on slavery that only runs through the channel of the slave population. The extent to which cotton production affected the political affiliation on slavery due to the changes in farm value is identified by comparing this indirect effect with the total effect of cotton production on political affiliation. Equation (2.4a) shows the first stage of the mediation analysis using $\ln Cotton\ Suitable\ Land_i * Post$ as an instrument of the slave population controlling cotton production and all other time-variant and time-invariant variables. In the second stage, plugging the fitted farmland value into equation (2.4b), we obtain the indirect effect of cotton production on the political affiliation on slavery. The control variables are the same as the one we used in the previous models.

The indirect effect of cotton production is the multiplication of γ from equation (2.4b) and β from the equation (2.2b). The σ in equation (2.4b) is the direct effect of cotton production. Adding the indirect and direct effect, we can obtain the total effect of cotton production, η. The calculation of the total effect was listed in the equation (2.5).

$$\begin{aligned} \text{Total Effect } &= \text{Indirect Effect} + \text{Direct Effect} \\ &= \gamma * \beta + \sigma \end{aligned} \tag{2.5}$$

The mediation analysis identifies that cotton production causes the change of pro-slavery opinion only through the slave population. We assume cotton production is endogenous. The unobserved confounding factors that directly affect cotton production and the political affiliation allow correlation between (i) cotton production and slave population, and (ii) slave population and the measurements of political affiliation on pro-slavery. The identifying assumption of IV is as strong and normal as we did in 2SLS under the linearity [24]. The mediation analysis results and the total effect of cotton production are shown in the following section.

2.6 Baseline Results

In this section, we separately report the cotton production effect on the political affiliation on pro-slavery by (i) the number of pro-slavery votes, (ii) the pro-slavery dummy, and (iii) the pro-slavery realignments. In each result table, Panel A displays the estimation results from equations (2.2b) and (2.2a). Our interested estimate in the second stage, β, is the conditional indirect effect of cotton production on the measurements of political affiliation on pro-slavery. Panel B displays the total effect of cotton production, η, from equation (2.3b), and the coefficient estimate, ξ, from its first stage. Panel C shows the results from the mediation analysis following equation (2.4a) and (2.4b). Following each table, we report the estimation of the indirect effect, direct effect, total effect, and a proportion of the indirect effect of cotton production on three measurements of political affiliation.

Table 2.2 shows the coefficient estimate of equation (2.2a) to (2.4b) where Y_{it} is the number of pro-slavery votes. Column (1) reports the baseline results without control variables. Column (2) shows the results of adding PCA of the sugar and tobacco suitable land area in each county. Column (3) shows the estimates of controlling the PCA of wheat and oat suitable land area. In column (4), we add PCA variables for all crops suitable land area. We then separately control the PCA of transportation cost from county to cotton exchange market in New Orleans, Charleston, and New York in column (5). In column (6), we display the results of adding the county's distance to the Rio-Grande River. Column (7) records the estimates of considering the number of parties. Column (8) displays the estimates with the realignment indicator. Column (9) listed the results of considering both the party number and the realignment indicator. Column (10) is our interested estimates, which controls all variables listed above. All estimates contain a county fixed effect, time fixed effect, and state trend. The estimates were also clustered in the county and state levels. The first row of standard error terms report the results without clusters, the second row shows the error term at county cluster, and the third error terms are retrieved from the results of clustering at the state level.

Table 2.2: Presidential Election [Dependent: Pro-slavery Votes]

Pro-slavery Votes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
				Panel A: Model 1 [Dependent: Slave Population]						
				Second Stage (2.2b)						
Cotton Production (β)	0.227^a	0.229^a	0.241^a	0.243^a	0.246^a	0.270^a	0.228^a	0.225^a	0.222^a	0.278^a
	(0.030)	(0.032)	(0.043)	(0.046)	(0.028)	(0.035)	(0.033)	(0.030)	(0.032)	(0.059)
	(0.038)	(0.041)	(0.053)	(0.056)	(0.035)	(0.042)	(0.040)	(0.038)	(0.040)	(0.074)
	(0.062)	(0.068)	(0.084)	(0.091)	(0.057)	(0.082)	(0.063)	(0.063)	(0.064)	(0.130)
				First Stage (2.2a)						
Cotton Suitable Land$\times$ Post	0.685^a	0.645^a	0.616^a	0.588^a	0.744^a	0.624^a	0.652^a	0.683^a	0.646^a	0.486^a
	(0.084)	(0.083)	(0.106)	(0.104)	(0.082)	(0.084)	(0.086)	(0.084)	(0.086)	(0.102)
	(0.099)	(0.099)	(0.119)	(0.120)	(0.099)	(0.035)	(0.094)	(0.098)	(0.093)	(0.110)
	(0.272)	(0.279)	(0.352)	(0.351)	(0.265)	(0.296)	(0.276)	(0.270)	(0.273)	(0.335)
Observations	2088	2088	2088	2088	2085	2088	1953	2088	1953	1950
F-test	67.01	61.12	33.79	31.73	81.96	54.91	57.67	66.69	56.78	22.48
				Panel B: Model 2						
				Second Stage (2.3b)						
Cotton Production (η)	0.106^a	0.114^a	0.106^a	0.112^a	0.100^a	0.134^a	0.096^a	0.103^a	0.089^a	0.125^a
	(0.024)	(0.025)	(0.034)	(0.036)	(0.022)	(0.029)	(0.023)	(0.023)	(0.022)	(0.039)
	(0.026)	(0.028)	(0.036)	(0.038)	(0.024)	(0.033)	(0.025)	(0.025)	(0.024)	(0.045)
	(0.070)	(0.077)	(0.077)	(0.082)	(0.060)	(0.088)	(0.061)	(0.072)	(0.062)	(0.089)
				First Stage (2.3a)						
Cotton Suitable Land$\times$ Post	0.647^a	0.617^a	0.569^a	0.548^a	0.708^a	0.577^a	0.654^a	0.643^a	0.648^a	0.486^a
	(0.086)	(0.086)	(0.109)	(0.107)	(0.084)	(0.086)	(0.086)	(0.086)	(0.086)	(0.103)
	(0.094)	(0.094)	(0.116)	(0.118)	(0.094)	(0.096)	(0.095)	(0.093)	(0.093)	(0.110)
	(0.279)	(0.283)	(0.347)	(0.345)	(0.272)	(0.303)	(0.275)	(0.274)	(0.272)	(0.335)
Observations	1945	1945	1945	1945	1942	1945	1945	1945	1945	1942
F-test	56.92	53.11	27.5	26.17	70.99	44.75	57.82	56.55	56.95	22.49
				Panel C: Model 3						
				Second Stage (2.4b)						
Slave Population (γ)	0.868^a	0.890^a	0.741^a	0.750^a	0.578^a	0.793^a	0.805^a	0.867^a	0.793^a	0.619^a
	(0.241)	(0.247)	(0.266)	(0.267)	(0.125)	(0.179)	(0.242)	(0.241)	(0.247)	(0.184)
	(0.349)	(0.353)	(0.394)	(0.387)	(0.183)	(0.250)	(0.350)	(0.348)	(0.356)	(0.287)
	(0.337)	(0.295)	(0.422)	(0.380)	(0.221)	(0.283)	(0.396)	(0.338)	(0.413)	(0.277)
Cotton Production (σ)	−0.093^a	−0.091^a	−0.076^b	−0.074^b	−0.044^a	−0.084^a	−0.084^a	−0.093^a	−0.084^a	−0.045^b
	(0.032)	(0.033)	(0.035)	(0.035)	(0.015)	(0.025)	(0.033)	(0.032)	(0.032)	(0.020)
	(0.048)	(0.048)	(0.053)	(0.051)	(0.022)	(0.036)	(0.048)	(0.047)	(0.048)	(0.032)
	(0.058)	(0.051)	(0.061)	(0.055)	(0.029)	(0.049)	(0.063)	(0.057)	(0.063)	(0.035)
				First Stage (2.4a)						
Cotton Suitable Land$\times$ Post	0.065^a	0.064^a	0.067^a	0.066^a	0.098^a	0.083^a	0.061^a	0.064^a	0.059^a	0.082^a
	(0.020)	(0.020)	(0.025)	(0.025)	(0.019)	(0.020)	(0.019)	(0.019)	(0.019)	(0.023)
	(0.026)	(0.025)	(0.030)	(0.030)	(0.025)	(0.025)	(0.026)	(0.025)	(0.025)	(0.031)
	(0.034)	(0.353)	(0.038)	(0.037)	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.032)
Observations	1945	1945	1945	1945	1942	1945	1945	1945	1945	1942
F-test	10.77	10.49	7.25	7.17	26.81	17.98	9.63	11.11	9.36	13.12
Plantation Crops		X		X						X
Non-plantation Crops			X	X						X
Transportation Costs					X					X
Territory						X				X
Party Numbers							X		X	X
Realignments								X	X	X

Notes: [a], [b], and [c] denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and cluster at state.

Panel A in table 2.2 reports the effects of cotton production value on the slave population, β, which is also the conditional indirect effect of cotton production value on the pro-slavery votes. The baseline results in the first column show that a one percent increase in cotton production value associates with a 0.23 percent increase in the slave population in the trade liberalization policy exposed counties. The coefficient estimates of cotton production value are robust when we separately add control variables. The point estimate of controlling plantation and non-plantation crops suitable land is 0.23 in columns (2) and 0.24 in column (3). When we control both plantation and non-plantation suitable land area, the coefficient estimate does not change. Adding the transportation cost, we obtain the coefficient estimate of cotton production value is 0.25 and display it in column (5). And in column (6), the estimated β slightly increases to 0.27. We then consider the election features in the regression. When we control the number of parties in column (7), the coefficient estimate is 0.23, which is close to the baseline estimate. We use the realignment indicator instead in column (8). The point estimate is 0.23 as well. Column (9) shows the effect of cotton production on the slave population using the number of participated parties and the realignment indicator. The point estimate is 0.22, which is similar to the baseline estimate. Our preferred coefficient estimate is in column (10) with control of all variables listed above. The results are also the conditional indirect effect of cotton production on the measurements of political affiliation. The coefficient is 0.28, with state clustered standard error 0.13 implies a 1 percent increase in cotton production associate with a 0.28 percent slave population increase.

Panel B displays the results of equation (2.3a) and (2.3b) using the same control variables. Instead of the slave population, we use pro-slavery votes as the estimate of interest. The coefficient estimates of cotton production is η in equation (2.3b), which the total effect of cotton production on the number of presidential pro-slavery votes. Column (1) shows, without controls, the total effect of cotton production on pro-slavery votes is 0.11, with state clustered stand error 0.07. We then add the control variables to follow the listed order.

The coefficient estimates are in the range of 0.09 to 0.13. Our interested total effect of cotton production is in column (10) that a 1 percent cotton production increase will lead a 0.13 percent increase in the pro-slavery votes.

In Panel C, we separately report the mediation model results of the coefficient estimate of the slave population γ and the coefficient estimate of cotton production value σ in equation (2.4a) and (2.4b). In column (1), without control variables, the point estimate of the slave population is 0.87, with 0.34 state clustered error term. The direct effect of cotton production on pro-slavery votes is -0.09 implies the pro-slavery votes have a greater response to the increase of cotton production via the slave population after the implementation of the trade liberalization policy. Adding all control variables in column (10), we obtain the coefficient estimate of the slave population reduces to 0.62, and cotton production increases to -0.05. The results imply that the response to the cotton production via slave population reduced when we control all variables. We then calculate the indirect effect of cotton production value and the proportion of the indirect effect on the total effect in table 2.3.

The indirect effect of cotton production value on the pro-slavery votes that runs through the slave population is the multiplication of β in the equation (2.2b) and γ in equation (2.4b). And the direct effect of cotton production on pro-slavery population is the σ in equation (2.3b). Column (1) in table 2.3 is the estimate without controls that the indirect effect. Column (2) to (9) report the indirect effect of cotton production and the proportion of the indirect effect using different control variables. The estimates suggest that the indirect effect can explain 142 to 191 percent of the total cotton production effect through the slave population. Our preferred estimates are listed in column (10). The indirect effect of cotton production on pro-slavery votes is 0.172, which is 138 percent of the total effect. The indirect effect is all more than 100 percent implies that the pro-slavery votes would have a greater response to the change in cotton production via the slave population only. The negative direct effect can offset the part of more than 100 percent of the total effect.

Table 2.3: Cotton Production Effects on Pro-slavery Votes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
β	0.227^a	0.229^a	0.241^a	0.243^a	0.246^a	0.27^a	0.228^a	0.225^a	0.222^a	0.278^a
γ	0.868^a	0.890^a	0.741^a	0.750^a	0.578^a	0.793^a	0.805^a	0.867^a	0.793^a	0.619^a
Indirect Effect ($\beta * \gamma$)	0.197^a	0.204^a	0.179^a	0.182^a	0.142^a	0.214^a	0.184^a	0.195^a	0.176^a	0.172^a
Direct Effect (σ)	-0.093^a	-0.091^a	-0.076^a	-0.074^a	-0.044^a	-0.084^a	-0.084^a	-0.093^a	-0.084^a	-0.045^a
Total Effect (η)	0.106^a	0.114^a	0.106^a	0.112^a	0.100^a	0.134^a	0.096^a	0.103^a	0.089^a	0.125^a
Proportion of Indirect Effect	186%	179%	168%	163%	142%	160%	191%	189%	198%	138%

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and state trend.

Table 2.4: Presidential Election [Dependent: Pro-slavery Dummy]

Pro-slavery Dummy	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: Model 1 [Dependent: Slave Population]							
	Second Stage (2.2b)							
Cotton Production (β)	0.227[a]	0.229[a]	0.241[a]	0.243[a]	0.246[a]	0.270[a]	0.228[a]	0.289[a]
	(0.0300)	(0.0320)	(0.0432)	(0.0455)	(0.0283)	(0.0352)	(0.0325)	(0.0595)
	(0.0379)	(0.0408)	(0.0530)	(0.0564)	(0.0352)	(0.0422)	(0.0395)	(0.0730)
	(0.0621)	(0.0677)	(0.0844)	(0.0905)	(0.0572)	(0.0817)	(0.0627)	(0.131)
	First Stage (2.2a)							
Cotton Suitable Land× Post	0.685[a]	0.645[a]	0.616[a]	0.588[a]	0.744[a]	0.624[a]	0.652[a]	0.497[a]
	(0.084)	(0.083)	(0.106)	(0.104)	(0.082)	(0.084)	(0.086)	(0.103)
	(0.099)	(0.099)	(0.120)	(0.120)	(0.099)	(0.100)	(0.094)	(0.110)
	(0.273)	(0.279)	(0.352)	(0.351)	(0.265)	(0.296)	(0.276)	(0.336)
Observations	2088	2088	2088	2088	2085	2088	1953	1950
F-test	67.01	61.12	33.79	31.73	81.96	54.91	57.67	23.44
	Panel B: Model 2							
	Second Stage (2.3b)							
Cotton Production (η)	0.054[a]	0.056[a]	0.071[a]	0.073[a]	0.048[a]	0.048[a]	0.057[a]	0.072[a]
	(0.013)	(0.014)	(0.021)	(0.022)	(0.011)	(0.014)	(0.013)	(0.023)
	(0.016)	(0.017)	(0.023)	(0.024)	(0.014)	(0.017)	(0.016)	(0.025)
	(0.016)	(0.018)	(0.033)	(0.035)	(0.013)	(0.018)	(0.017)	(0.040)
	First Stage (2.3a)							
Cotton Suitable Land× Post	0.644[a]	0.614[a]	0.566[a]	0.545[a]	0.707[a]	0.574[a]	0.650[a]	0.496[a]
	(0.086)	(0.085)	(0.108)	(0.107)	(0.084)	(0.086)	(0.086)	(0.103)
	(0.094)	(0.095)	(0.116)	(0.118)	(0.094)	(0.096)	(0.095)	(0.110)
	(0.279)	(0.284)	(0.346)	(0.344)	(0.272)	(0.303)	(0.275)	(0.335)
Observations	1951	1951	1951	1951	1948	1951	1942	1939
F-test	56.61	52.84	27.23	26.00	70.93	44.45	57.19	23.32
	Panel C: Model 3							
	Second Stage (2.4b)							
Slave Population (γ)	0.490[b]	0.493[b]	0.561[b]	0.562[b]	0.288[a]	0.304[b]	0.549[b]	0.372[b]
	(0.203)	(0.207)	(0.269)	(0.271)	(0.101)	(0.123)	(0.229)	(0.151)
	(0.278)	(0.282)	(0.332)	(0.331)	(0.139)	(0.164)	(0.312)	(0.201)
	(0.307)	(0.311)	(0.422)	(0.418)	(0.133)	(0.180)	(0.318)	(0.197)
Cotton Production (σ)	−0.057[b]	−0.056[b]	−0.065[c]	−0.065[c]	−0.023[c]	−0.035[b]	−0.064[b]	−0.034[b]
	(0.027)	(0.027)	(0.035)	(0.035)	(0.012)	(0.017)	(0.030)	(0.017)
	(0.037)	(0.037)	(0.044)	(0.043)	(0.017)	(0.023)	(0.042)	(0.023)
	(0.045)	(0.044)	(0.059)	(0.058)	(0.019)	(0.026)	(0.049)	(0.026)
	First Stage (2.4a)							
Cotton Suitable Land× Post	0.063[a]	0.063[a]	0.065[a]	0.065[a]	0.096[a]	0.082[a]	0.061[a]	0.087[a]
	(0.020)	(0.020)	(0.025)	(0.024)	(0.019)	(0.019)	(0.020)	(0.023)
	(0.026)	(0.025)	(0.030)	(0.030)	(0.025)	(0.025)	(0.026)	(0.031)
	(0.033)	(0.033)	(0.038)	(0.037)	(0.033)	(0.033)	(0.033)	(0.033)
Observations	1951	1951	1951	1951	1948	1951	1942	1939
F-test	10.55	10.28	7.14	7.07	26.35	17.71	9.53	14.21
Plantation Crops		X		X				X
Non-plantation Crops			X	X				X
Transportation Costs					X			X
Territory						X		X
Party Numbers							X	X

Notes: [a], [b], and [c] denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and cluster at state.

We then estimate the effect of cotton production on the pro-slavery dummy. The dummy can show the switch towards slavery opinion in a county over each decade. The control variables in table 2.4 is little bit different than the variables listed in table 2.2. Column (1) reports the estimates without control variables. Column (2) to (4) shows the results of the plantation crops suitable land area, non-plantation crops suitable land area, and both. We then control the transportation effect and display the results in column (5). And column (6) was the result of controlling the distance from the Rio-Grande River. Column (7) separately controls the number of parties that participated in the presidential elections. Column (8) displays our preferred estimates, which include all variables listed above.

Table 2.4 Panel A shows the results of equation (2.2a) and (2.2b). The coefficient estimates of cotton production on the slave population, β, is the first row in table 2.2 Panel A. The estimated total effect of cotton production, η, was summarized in Panel B. According to table 2.4 column (1), without controls, the total effect of cotton production is 0.05 with state clustered stand error 0.016. Our interested estimate is 0.07 with clustered state standard error 0.04 in column (8). It implies the increase in cotton production value positively affects the county's opinion towards slavery.

We then report the mediation estimation framework developed from equation (2.4a) and (2.4b) in Panel C. The point estimates γ are positive in column (1) to column (8) indicates that county with more slave population is more likely to vote for candidates from pro-slavery parties. And the negative direct effects of cotton production indicate that the voters' willingness to realign to pro-slavery had a greater response to the change in cotton production via the slave population after the Repeal of the British Corn Laws. Using the coefficient estimates from table 2.4, we calculate the proportion of indirect effect on the total effect with different control variables and report them in table 2.5.

The estimation shows that without control variables, the indirect effect of cotton production is 0.11 (0.227*0.490=0.111), which can explain 206 percent (0.111/0.054=2.06) of the total effect. The estimated indirect effect remains 0.11 (0.229*0.493=0.113) when we

Table 2.5: Cotton Production Effects on Pro-slavery Dummy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
β	0.227^a	0.229^a	0.241^a	0.243^a	0.246^a	0.270^a	0.228^a	0.289^a
γ	0.490^a	0.493^a	0.561^a	0.562^a	0.288^a	0.304^a	0.549^a	0.372^a
Indirect Effect ($\beta * \gamma$)	0.111^a	0.113^a	0.135^a	0.137^a	0.071^a	0.082^a	0.125^a	0.108^a
Direct Effect (σ)	-0.057^a	-0.056^a	-0.065^a	-0.065^a	-0.023^a	-0.035^a	-0.064^a	-0.034^a
Total Effect (η)	0.054^a	0.056^a	0.071^a	0.073^a	0.048^a	0.048^a	0.057^a	0.072^a
Proportion of Indirect Effect	206%	202%	190%	187%	148%	171%	220%	149%

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and state trend.

add PCA of plantation crops suitable land area. It increases to 0.14 (0.241*0.561=0.135) when we control both plantation and non-plantation crops suitable land area. Comparing the baseline results, we find the estimated indirect effect of cotton production reduces to 0.07 (0.246*0.288=0.071) and 0.08 (0.270*0.304=0.082) when we separately control the transportation cost and the distance from county to Rio-Grande River. In column (7), the indirect effect is 0.125 (0.228*0.549=0.125) by controlling the number of parties in the election. Our interested estimate is in column (8) that the indirect effect of cotton production is 0.11 (0.289*0.372=0.108), which is 149 (0.108/0.072=1.49) percent of the total effect. Similar conclusion as we obtained from the pro-slavery votes study, we found that the dynamic pro-slavery affiliation would have a greater response to the change in cotton production via the slave population.

Table 2.6: Presidential Election [Dependent: Pro-slavery Realignments]

Pro-slavery Realignments	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: Model 1 [Dependent: Slave Population]							
	Second Stage (2.2b)							
Cotton Production (β)	0.227^a	0.229^a	0.241^a	0.243^a	0.246^a	0.270^a	0.228^a	0.289^a
	(0.0300)	(0.0320)	(0.0432)	(0.0455)	(0.0283)	(0.0352)	(0.0325)	(0.0595)
	(0.0379)	(0.0408)	(0.0530)	(0.0564)	(0.0352)	(0.0422)	(0.0395)	(0.0730)
	(0.0621)	(0.0677)	(0.0844)	(0.0905)	(0.0572)	(0.0817)	(0.0627)	(0.131)
	First Stage (2.2a)							
Cotton Suitable Land× Post	0.685^a	0.645^a	0.616^a	0.588^a	0.744^a	0.624^a	0.652^a	0.497^a
	(0.084)	(0.083)	(0.106)	(0.104)	(0.082)	(0.084)	(0.086)	(0.103)
	(0.099)	(0.099)	(0.120)	(0.120)	(0.099)	(0.100)	(0.094)	(0.110)
	(0.273)	(0.279)	(0.352)	(0.351)	(0.265)	(0.296)	(0.276)	(0.336)
Observations	2088	2088	2088	2088	2085	2088	1953	1950
F-test	67.01	61.12	33.79	31.73	81.96	54.91	57.67	23.44
	Panel B: Model 2							
	Second Stage (2.3b)							
Cotton Production (η)	0.250^a	0.257^a	0.353^a	0.363^a	0.228^a	0.219^a	0.276^a	0.371^a
	(0.069)	(0.072)	(0.108)	(0.113)	(0.0610)	(0.0761)	(0.0689)	(0.121)
	(0.076)	(0.080)	(0.113)	(0.116)	(0.0659)	(0.0848)	(0.0764)	(0.124)
	(0.056)	(0.063)	(0.121)	(0.131)	(0.0492)	(0.0628)	(0.0759)	(0.192)
	First Stage (2.3a)							
Cotton Suitable Land× Post	0.644^a	0.614^a	0.566^a	0.545^a	0.707^a	0.574^a	0.650^a	0.496^a
	(0.086)	(0.085)	(0.108)	(0.107)	(0.084)	(0.086)	(0.086)	(0.103)
	(0.094)	(0.095)	(0.116)	(0.118)	(0.094)	(0.096)	(0.095)	(0.110)
	(0.279)	(0.284)	(0.346)	(0.344)	(0.272)	(0.303)	(0.275)	(0.335)
Observations	1951	1951	1951	1951	1948	1951	1942	1939
F-test	56.61	52.84	27.23	26.00	70.93	44.45	57.19	23.32
	Panel C: Model 3							
	Second Stage (2.4b)							
Slave Population (γ)	2.045^b	2.067^b	2.628^b	2.651^b	1.217^b	1.266^b	2.461^b	1.833^b
	(0.918)	(0.935)	(1.279)	(1.292)	(0.491)	(0.595)	(1.053)	(0.751)
	(1.221)	(1.243)	(1.604)	(1.603)	(0.632)	(0.746)	(1.433)	(1.004)
	(1.344)	(1.362)	(1.908)	(1.895)	(0.622)	(0.810)	(1.429)	(0.761)
Cotton Production (σ)	-0.213^c	-0.214^c	-0.287^c	-0.287^c	−0.070	−0.126	-0.269^c	-0.148^c
	(0.122)	(0.122)	(0.167)	(0.166)	(0.058)	(0.081)	(0.140)	(0.085)
	(0.164)	(0.164)	(0.210)	(0.208)	(0.076)	(0.104)	(0.193)	(0.115)
	(0.191)	(0.192)	(0.264)	(0.262)	(0.086)	(0.117)	(0.215)	(0.105)
	First Stage (2.4a)							
Cotton Suitable Land× Post	0.063^a	0.063^a	0.065^a	0.065^a	0.096^a	0.082^a	0.061^a	0.087^a
	(0.020)	(0.020)	(0.025)	(0.024)	(0.019)	(0.019)	(0.020)	(0.023)
	(0.026)	(0.025)	(0.030)	(0.030)	(0.025)	(0.025)	(0.026)	(0.031)
	(0.033)	(0.033)	(0.038)	(0.037)	(0.033)	(0.033)	(0.033)	(0.033)
Observations	1951	1951	1951	1951	1948	1951	1942	1939
F-test	10.55	10.28	7.14	7.07	26.35	17.71	9.53	14.21
Plantation Crops		X		X				X
Non-plantation Crops			X	X				X
Transportation Costs					X			X
Territory						X		X
Party Numbers							X	X

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and cluster at state.

In table 2.6, we display the results of using pro-slavery realignments variable. The pro-slavery realignments variable estimates the political affiliation in pro-slavery in two dimensions. The first one is the time variation created by the realignment of slavery within the county. Another is the cross-sectional variable created by the polarization of votes on slavery. Panel A is same as the one in table 2.2 and table 2.4. In Panel B column (1), the estimated total effect of cotton production without control variables is 0.25 with state clustered standard error 0.056. In column (4), the coefficient estimate increases to 0.363 when we control the PCA of both plantation and non-plantation crops suitable land area. The result of controlling all variables in column (8) shows that the total effect of cotton production on pro-slavery realignments is 0.371. In addition, Panel C reports the mediation analysis results using equation (2.4a) and (2.4b). It summarizes the results of the coefficient estimate of the slave population γ and the direct effect of cotton production on the pro-slavery realignments, σ. The positive point estimate of the slave population without and with control variables in column (1) to (8) implies that the slave population would directly and positively affect the political affiliation on pro-slavery. The negative direct effects of cotton production indicate that the pro-slavery realignments had a greater response to the change in cotton production via the slave population. We then use coefficient estimates from the mediation analysis to find the indirect effect of cotton production on the pro-slavery realignments and the proportion of the pro-slavery realignments that can be explained by the slave population.

Without control variables, table 2.7 column (1) shows the indirect effect of cotton production on pro-slavery realignments is 0.46 (0.227*2.045=0.464) and the indirect effect is 186 percent (0.464/0.250=1.86) of the total effect through the slave population. When we control the PCA of plantation and non-plantation suitable land area, the proportion of indirect effect can explain 177 to 184 percent of the total effect. In column (5) and (6), the proportion reduces to 131 (0.299/0.228=1.31) and 156 (0.342/0.219=1.56) percent controlling the transportation cost and the distance from the Rio-Grande River. In column (7), we

Table 2.7: Cotton Production Effects on Pro-slavery Realignments

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
β	0.227^a	0.229^a	0.241^a	0.243^a	0.246^a	0.270^a	0.228^a	0.289^a
γ	2.045^b	2.067^b	2.628^b	2.651^b	1.217^b	1.266^b	2.461^b	1.833^b
Indirect Effect ($\beta * \gamma$)	0.464^a	0.473^a	0.633^a	0.644^a	0.299^a	0.342^a	0.561^a	0.530^a
Direct Effect (σ)	-0.213^c	-0.214^c	-0.287^c	-0.287^c	-0.070^c	-0.126^c	-0.269^c	-0.148^c
Total Effect (η)	0.250^a	0.257^a	0.353^a	0.363^a	0.228^a	0.219^a	0.276^a	0.371^a
Proportion of Indirect Effect	186%	184%	179%	177%	131%	156%	203%	143%

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and state trend.

control the number of parties participated in the election. The result shows the proportion of indirect effect is 203 percent of the total effect. Column (8) reports the preferred estimates that the indirect effect of cotton production is 0.53 (0.289*1.833=0.530), which is 143 (0.530/0.371=1.43) percent of the total effect. The estimates suggest that the indirect effect of cotton production can explain 143 percent of the total effect through the slave population. The negative significant direct cotton production effect on the slave population implies the effect of cotton production on realignments would be stronger than what we observed via the slave population. The negative direct effect can offset the part of more than 100 percent of the total effect. This implies other channels linking cotton production to pro-slavery realignments need to be aggregated moderating [24].

2.7 Conclusion

Prior academic research indicated that trade policy could shape political activity through its effect on the labor market. The impact of the Repeal of the British Corn Laws on the U.S. political affiliation characterized by voting and partisan realignments are not well understood. In this paper, we found from 1840 and 1846, the southern political affiliation on pro-slavery was in a *stable phase*. The increase in the slave population after the Repeal of the British Corn Laws in cotton suitable lands deteriorated the *stable phase*. Consequently, the alignment on slavery tended to decline. Until 1860, that Southerners realigned their opinions to support slavery. We then use mediation analysis to estimate the causal relationship between the British cotton demand and U.S. political affiliation on pro-slavery via the slave population. The results show that the effect of U.S. cotton production, mediated by slave population adjustment, is larger than the total effect of cotton production impact on pro-slavery political affiliation. Channels other than the slave population that links cotton production to pro-slavery political affiliation are moderating at the aggregated level.

The significance of our work is that we found a trade exposure, the Repeal of the British Corn Laws, on a single agriculture product, cotton, influenced the presidential election in the American South via the slave labor market. There is still much work to be done to understand the broader effect of the British trade liberalization policy on the U.S. economy and political affiliation. Whether the Repeal of the British Corn Laws affected the North economy? And how did it change the political affiliations in the North in the antebellum period?

CHAPTER 3

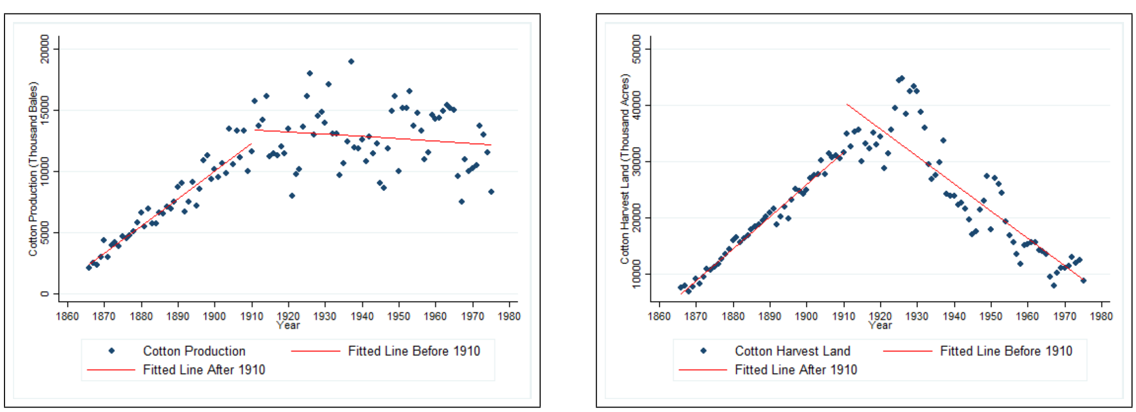
POSTBELLUM SOUTHERN LAND REDISTRIBUTION, POLARIZATION, AND INEQUALITY

3.1 Introduction

The Civil War emancipated Southern slaves and, at the same time, destroyed the original cotton production system. After the Civil War, the primary question faced by cotton planters and politicians was whether southern plantations could restore the antebellum productivity and when cotton could ascend to its throne. To maintain a dominant position of cotton in the Southern economy, they had to find a new way to combine the land, labor, capital, and political power [11]. They further redistributed the land to adapt to the new labor structure, but this also created a polarization of landholding and inequality issues. Land inequality is one of the most pervasive drivers of poverty, political competition, social conflicts, displacements, and human rights violations [40][68]. Many factors can cause more inequality in the distribution of lands, such as gender, age, ethnic groups, and the small-scale farmers and pastoralists [12][22][65][40].

In this study, we want to learn what caused land inequality in the postbellum American South? Although the structure of Southern economic production changed, agriculture remained the most important economic activity over this period [68]. Therefore, we use farmland inequality as a proxy of wealth concentration, which was estimated using the polarization of farms by size. Farmland inequality is generally measured by the distribution of farms by size. A rich literature on the global change of farm size and distribution has been widely concerned by economists in past decades. Ramcharan was the first researcher using the US county-level data to study the causal relationship between land inequality and political competition in the postbellum period. He found that increased variation in land inequality at this period reduced the political contest, suggesting high levels of inequality can generate socially inefficient policy [68]. Nagayet used agriculture census data to estimate the number of farms in the world by size [62]. Eastwood et al. studied the world agriculture census in the second half of the twentieth century. They found the average farm size increased in North American and European countries and decreased in Asian and African Countries [28]. Deininger and Byerlee used the data from 1970 to 2000 in land-abundant counties to find that countries in Latin America, Eastern Europe, and Central Asia moved toward large-scale farming. Southeast Asia had more large farms to support the plan of oil demand. And Sub-Saharan Africa tried to increase the number of large farms but not effective [23].

Later, the Food and Agriculture Organization of the United Nations (FAO) reported a pooled average and median of mean farm size decreased from 1930 to 2000 globally [37]. Meanwhile, the High-Level Panel of Experts(HLPE) from FAO found the same results using a smaller sample [44]. Many scholars used agricultural census data to study the causal relationship between farm size and the agriculture productivity [1], and the correlation between income and farm size. They found both farm size and agriculture productivity were low in developing countries, while small family farms operated more than 70 percent of the land. Reversely, more than 70 percent of the land was operated by large farms in the high-income countries [1][56].



(a) Cotton Production

(b) Cotton Harvest Land

Figure 3.1: Cotton Production and Land Use

In the antebellum period, cotton was widely grown in the large Southern plantations. In the previous chapters, we mentioned that the overseas demand drove the increase in cotton production. However, we observe that the cotton production as stagnant at a certain point of time. Figure 3.1 panel (a) shows the national annual cotton production in the United States steadily increased from 2,097 thousand bales in 1866 to 11,609 thousand bales in 1910. Then there was a stagnation of the average output in the middle of the twentieth century. Panel (b) shows the cotton harvest land area steadily increased from 1866 to the 1910s then gradually reduced after the 1910s. What happened to the cotton production in the American South at the beginning of the twentieth century? A small cotton pest named boll weevil slowly and widely exposed in the Southern cotton land during this period. Historians recognized this little pest was the slayer of cotton farming and the destroyer of the last bastion of cotton society in the American South. The boll weevil infestation leads to the foreclose of some old cotton plantations. Southerners commented that "This evil little weevil literally are farmers out of [the] house and home," and "eliminated cotton as a viable crop [39]."

In this study, we use the mediation analysis to estimate the causal relationship between cotton production and the polarization measures of farms, using the magnitude of the boll weevil infestation in the agricultural South. We find the arrival of boll weevils did not end the cotton production in the South. People learned to rotate food crops as soon as boll weevil arrived and switched back to cotton as soon as weevils were gone. However, the infestation did change the distribution of cotton production. These changes polarized the redistribution of farmland. Large corporate farms relocated to the Southwestern area, and small family farms quickly grew in the rest of cropland the South. At the same time, the land inequality issue became more severe due to land polarization in the South.

3.2 The Exposure of Boll Weevil

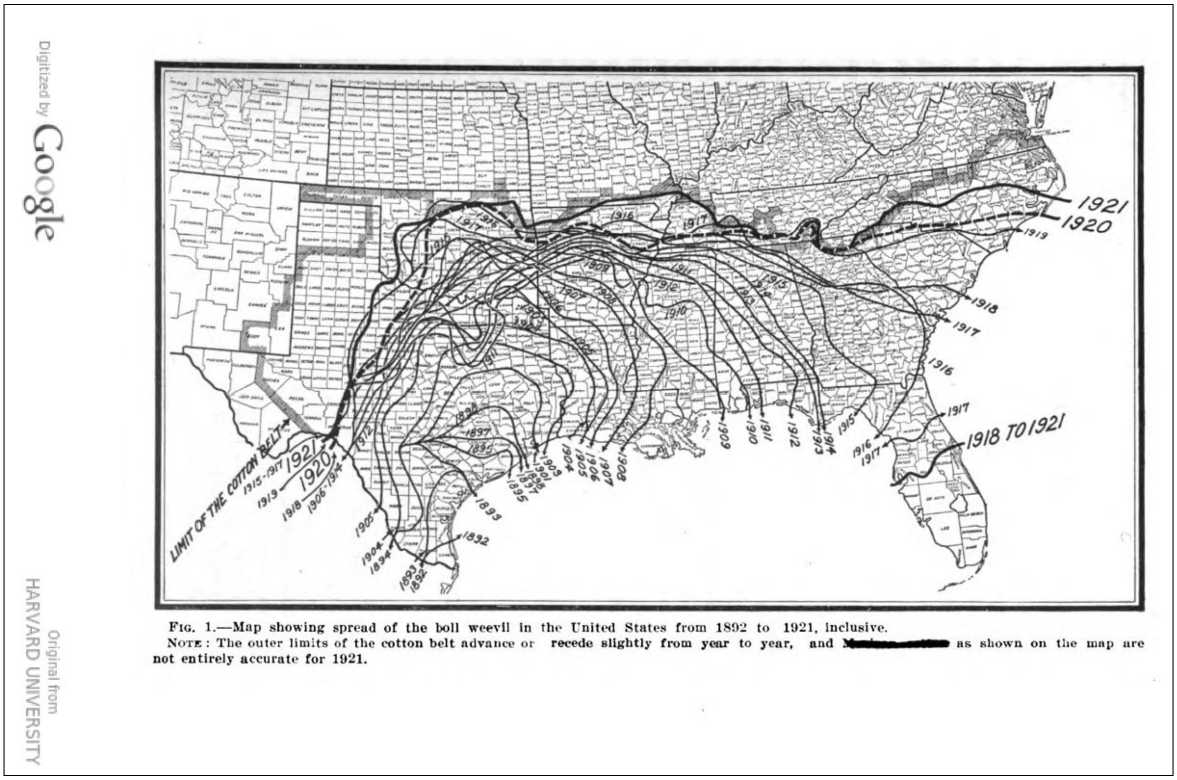


Figure 3.2: Map of Boll Weevil Exposure from USDA

The boll weevil is an infamous pest first time introduced from Mexico in the 1800s. In 1892, the boll weevil first entered into Brownsville, TX, from Mexico [32]. Weevils consumed cotton leaves in the early season and then attacked the cotton bolls. Female weevils lay their eggs inside cotton bolls. Later the larvae derived nutrients from the cotton boll and grow into adults. The infested bolls lost cotton fibers inside, turned yellow, and fall off the plant. In the heavily infested land area, plants would lose their young cotton bolls at the initial, which reduced the cotton production [27].

Farmers need manually remove the infected plant one by one. Boll weevils uniformly and summarily destroyed cotton across Southern land in the following two decades. Ultimately the infestation reached the most cotton production land in the early 1920s [39][33].

Figure3.2 tracks the propagation route of the boll weevil [47]. Weevils fly only short distances by themselves, but a hundred miles followed the prevailing wind. The extreme weather, such as hurricanes, could extend their habitat way beyond their existing range [32]. They first infected most cotton land in the state of Texas, Arkansas, and Louisiana around the 1910s. To deal with the boll weevil infestation, government agents assembled landowners and passed the message of beating the boll weevil by early planting, selective seed use, and reducing cotton acreage. Ironically, the efforts to teach farmers how to fight the boll weevil increased the pest damage of cotton land over the period [39]. The weevil quickly moved towards the east coast and conquered the rest of cotton land in the South.

Boll Weevil was called "the bane of cotton farmers throughout the United States." One reason that people use boll weevil as an explanation of the change in Southern economic, social, and political systems is the little pest influenced the core of old Southern way of life, cotton. Southerners met each other on the street, not say "Hello" but "How's crops" instead [39]. Unlike the other kind of natural disasters, boll weevil infestation did not pose a quick attack. The pest was slowly spreading across the cotton land that gave planters time to prepare for it. Some planters seriously considered the option of not growing cotton at all and temporarily shifted to other crops to avoid the risk of infestation [32][39]. According to the Bureau of Agriculture Economics (BAE) studies, the estimated cotton yield reduction by boll weevil was 10.5 percent on average. It peaked in 1921 of 31 percent and a low of 1.3 percent in 1911 [32].

The boll weevil infestation affected not only the business in the farmland but also other fields, such as education and electoral returns. The arrival of the boll weevil exogenously dropped the marginal product of child labor in the agriculture sector [7]. It also reduced the violence against African Americans, and, led the number of black people votes increased [33]. Consequently, the economic activity of black people decreased as well, such as patenting [20].

3.3 Conceptual Framework

In this study, we particularly interested in the damage of the boll weevil infestation on cotton production and the consequent effect on land distribution and inequality through land value. Ransom and Sutch estimated the short-run losses of average cotton acreage and yields before and after the boll weevils arrival [69]. The infestation could devastate the cotton production that reduced one-quarter of cotton acreage and one-third of yields. However, Osband argued that the US equilibrium cotton production increased in response to the increase in world price [66]. The increase in world prices offset production losses. Thus the boll weevil infestation reduced cotton supply. The majority of cotton growers continuously cultivated cotton in the South. A few farmers switched to other crops regardless of the increase in cotton price from the oversea demand only if the infestation devastated the cotton yield. Farmers who continuously grew cotton were at the margin, in which the value of 1 percent yield loss at the regular price equaled to 1 percent price drop without yield loss. Later Fabian, Olmstead, and Rhode made an extension on the boll weevil impact on local economics [32]. They found farmers rotate the cotton land to grow corn or other crops when boll weevils arrived in the region. They also found, in the short run, the arrival of boll weevil changed internal migration and reduced the land values in the counties engaged in cultivating cotton.

In this study, we continuously investigate the local impact of cotton production on land value, redistribution, and inequality in the counties involved in growing cotton after boll weevils' arrival. The identification strategy exploits the boll weevil infestation effect across counties and time after their arrival. The measure of the infestation is determined by the cotton production and wind direction. The variation of cotton production across counties was a result of the natural suitability of the land to produce cotton. And the mobility of the weevils is minimal, for most of the time, they relied on wind directions to travel little by little. The damage of infestation should have a more significant impact in the high cotton production area than the low production area after the boll weevils' arrival. The change in cotton production had two ways to affect land redistribution and inequality. One is the reduced cotton productivity caused by the infestation would directly affect the equality of landholdings. Another is the decrease in productivity impact on the land values in the equilibrium and consequently affects landholdings and land inequality[1].

3.4 Data

To conduct the boll weevil's baneful influence on the distribution of farmland and land inequality, we have assembled decennial county-level farm and crop data from the Agriculture Census from 1890 to 1930. The county-level data increase the number of degree of freedom and avoid the aggregation problem. The data we retrieved from Agriculture Census data were listed in the Table 3.1 [41]. Based on the statistic numbers, on average, around one-third of large farms were split into small farms, the average number of small farms more than doubled before and after the boll weevil infestation, from 180 in 398. Meanwhile, the average cotton production and cotton harvest land area simultaneously increased. Corn harvest land increased during the boll weevil infestation time and reduced after the infestation. At the same time, we also observe that oats harvest land kept reducing, and wheat harvest land increased. We then delve into the changes beyond the statistics.

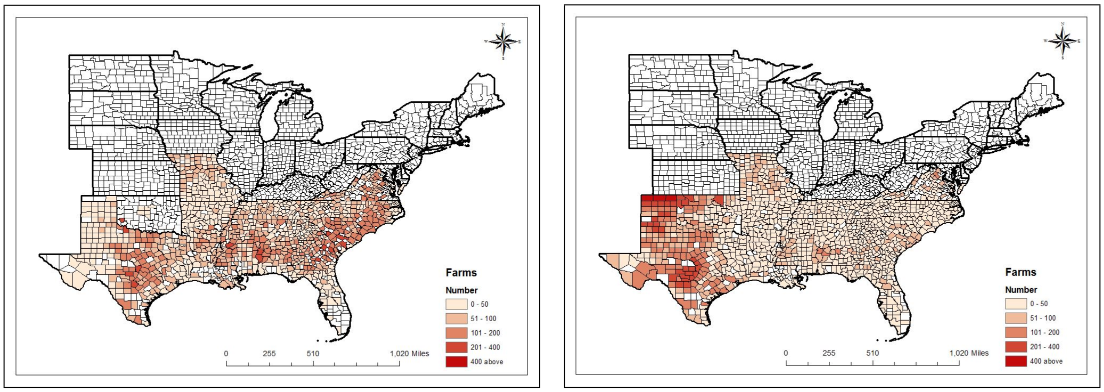
3.4.1 Southern Farms

The Agriculture Census generally reported farmland for size categories for each county: 1 to 9 acres, 10 to 19 acres, 20 to 49 acres, 50 to 99 acres, 100 to 499 acres, 500 to 999 acres, and 1000 acres and above. We define the large farms are more than 500 acres, the small farms are less than 19 acres, and the rest are middle-sized farms.

[1]We obtain the mediation analysis model idea from Dipple et al. 2016 paper study on how the export price change of sugar directly and indirectly affected wages via market force and institutional changes [25].

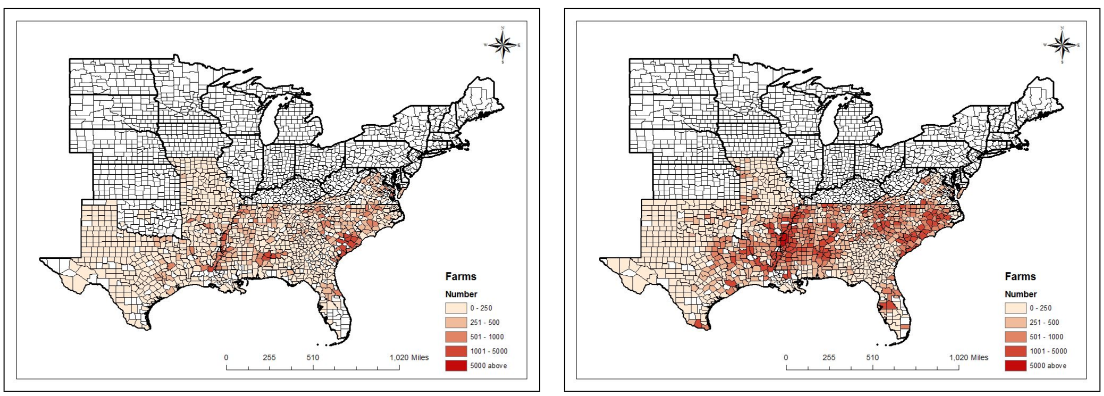
Table 3.1: Summary Statistics, 1890-1930

	No. Obs	Mean	Std. Dev.	Min	Max
	Year=1890				
No. of Large Farms (500 acres above)	1121	58	45	0	307
No. of Small Farms (20 acres below)	1121	180	228	0	3597
Farm Land Value (Thousand Dollar)	1121	2213	2345	7	20100
Cotton Production (Bale)	1084	6855	9924	0	87022
Cotton Land (Acre)	1084	18531	24631	0	135048
Corn Land (Acre)	1110	23901	20600	0	177557
Oats Land (Acre)	1110	4950	5804	0	45056
Wheat Land (Acre)	1110	4574	9062	0	74940
Bifurcation Inequality	1081	9	10	0	130
	Year=1910				
No. of Large Farms (500 acres above)	1262	48	45	0	343
No. of Small Farms (20 acres below)	1262	346	425	0	5299
Farm Land Value (Thousand Dollar)	1262	5123	5401	0	43400
Cotton Production (Bale)	1234	8624	11837	0	77141
Cotton Land (Acre)	1261	25393	34882	0	274666
Corn Land (Acre)	1262	31514	28634	0	262120
Oats Land (Acre)	1262	3366	5227	0	59776
Wheat Land (Acre)	1262	4388	11278	0	132538
Bifurcation Inequality	1220	11	11	0	150
	Year=1930				
No. of Large Farms (500 acres above)	1321	44	61	0	736
No. of Small Farms (20 acres below)	1321	398	586	0	8319
Farm Land Value (Thousand Dollar)	1321	7197	7277	6	68400
Cotton Production (Bale)	1320	10653	16772	0	161650
Cotton Land (Acre)	1320	32224	47207	0	324778
Corn Land (Acre)	1321	24435	19734	0	162924
Oats Land (Acre)	1321	2470	6322	0	56189
Wheat Land (Acre)	1321	7938	32022	0	476678
Bifurcation Inequality	1288	12	11	0	100



(a) Large Farm 1890 (b) Large Farm 1930

Figure 3.3: The Change of Large Farms



(a) Small Farm 1890 (b) Small Farm 1930

Figure 3.4: The Change of Small Farms

Figure 3.3(a) is the distribution of large farms in 1890. We see that large farms located in most of the cotton belt, two sides of the Appalachian Mountains, downstream of Mississippi River, and the east of Texas. However, from Figure 3.3(b), we found, after the boll weevil infestation in 1930, the number of large-sized farms reduced in the east of Southern land. Reversely, in the west of Mississippi River, small farms yielded to the more modern, centralized, corporation large ranches that cotton production dramatically increased in these ranches. By 1923 more cotton was produced in these corporate cotton ranches than in the old Southern cotton farms [36]. As we can observe from Figure 3.4, in 1890, only a few counties in the South had a large number of small farms. Most of them located by the coast of South Carolina, central Alabama, and on the riverside in the state of Mississippi. In 1930, the number of small farms increased significantly in these three states as well as their neighboring states. The total number of small farms in the South increased more than doubled from 201,362 to 525,270.

At the same time, the average value of farm land[2] tripled over the forty years. The average farmland value remained stable from 2213 thousand to 2211 thousand in the 1890s. It then doubled to 5123 thousand dollars in 1910 and doubled again to 10200 thousand dollars in 1920. Then it dropped back to 7197 thousand dollars in 1930. The increase in farmland value from the 1900s to 1920 drew our attention. According to Key and Burns post in USDA, that rapid land value appreciation could increase the rate of land purchases more for smaller farms, since smaller farms generally own a larger share of their land [53]. This argument is also consistent with the increase in the number of small farms at this period.

3.4.2 Farm Ratio and Bifurcation Inequality Index

We then assembled a measure of farm size ratio and bifurcated land inequality using the large and small farm information conducted by the Agriculture Census. Ramcharan, in his land inequality study, created a land ratio of the total number of acres of agricultural land operated by farms under 500 acres versus the total number of acres of land above 500 acres [68]. Based on his idea, we created a farm ratio using the number of large farms versus the other farms. This ratio suggested agricultural land, especially the cotton harvest land, is relatively concentrated among large farms. According to the statistics, the average of this farm ratio is 0.14 in 1890. When boll weevil arrived at the Southwestern area in 1910, the rate increased to 0.24 then remains relatively constant in the following decades.[3]

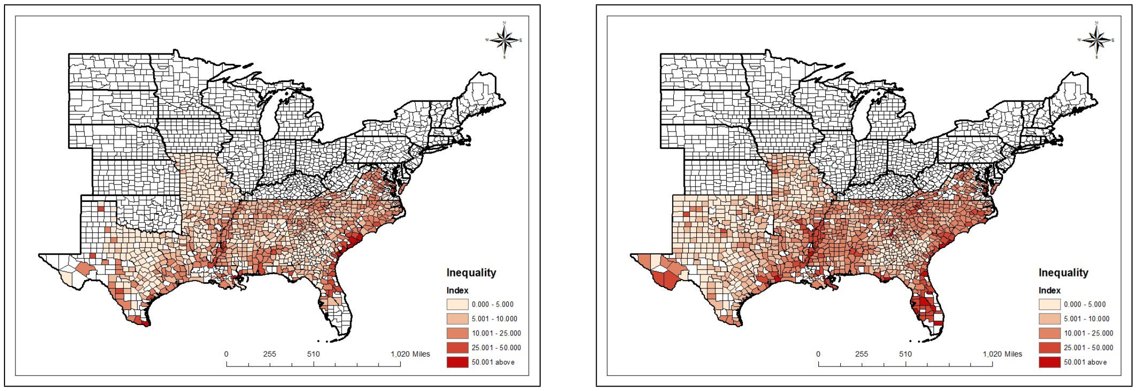
The bifurcation ratio is the ratio of the average landholding of the large farms to the small farms. The ratio is the average acres per large farm over the average number of acres

[2]The variable includes the valuation of farmland and improvements such as fences, but excludes buildings.
[3]The farm ratio was 0.27 in 1930.

per small farm. And the bifurcation inequality index the bifurcation ratio weighted by the proportion of small farms in the county [61]. The formula of the bifurcation inequality index is listed as follows.

$$
\begin{aligned}
Bifurcation\,Inequality\,Index &= \frac{Average\,Acres\,Per\,Large\,Farm}{Average\,Acres\,Per\,Small\,Farm} \\
&\quad * \frac{Number\,of\,Small\,Farms}{Number\,of\,Total\,Farms} \\
&= Land\,Bifurcation\,Ratio * Small\,Farm\,Proportion
\end{aligned}
\tag{3.1}
$$

The index of bifurcated inequality ranges from zero to an infinitely large number. If the index is zero, it indicates there is no large farm. A small index number means there are relatively fewer large farms to small farms, or the proportion of small farms is low to the total number of farms. If the index is a large number, it means both land bifurcation ratio and the proportion of small farms are high. In this case, the bifurcation inequality index is able to show a polarization situation. In our study, we calculate the average size of the small farms using the proportion of 0-9 acre farms among the number of all small farms multiplies by 4.5, which is the average size of 0 to 9 acre, plus the proportion of 10-19 acre farms multiply by 14.5. Similarly, to conduct the average size of the large farms, we use the percentage of 500-999 acre farms among the number of all large farms multiply by 750, then plus the proportion of 1000 acre above farms multiply by 1000. We assume that the average area of 1000 acre above farms is 1000, followed by Muller's method [61].



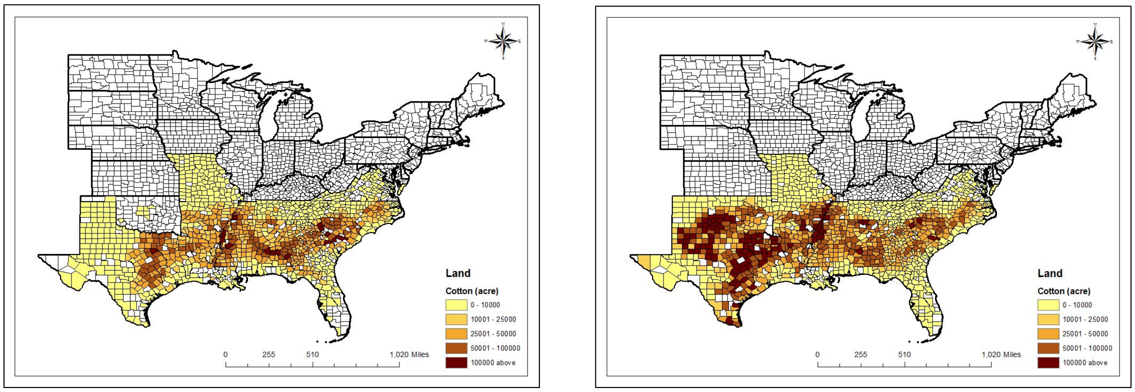
(a) 1890 (b) 1930

Figure 3.5: Bifurcation Inequality Index

Figure 3.5 shows in 1890, land inequality issue was not severe in the South. It mainly concentrated on the Mississippi River banks and the east coast of South Carolina, Georgia, and Florida. However, after the boll weevil arrived, land inequality became a more critical issue in the South, primarily the farmland located in the area along the Mississippi River and east of it. Over time, the highest inequality counties were all located in these areas. In 1890, the county of Charleston in South Carolina had the most severe land inequality issue. From 1900 to 1920, the Orleans county in Louisiana had the highest bifurcation inequality index. Later, in 1930, Staunton in Virginia became the top of the land inequality list.[4] On average, the size of the bifurcation inequality index increased 34 percent from 8.85 in 1890 to 11.9 in 1930. We decompose the bifurcation inequality index into the bifurcation ratio and the small farm proportion. We found the average of the bifurcation ratio remained stable over time. The average was 72 in 1890, 76 in 1910, and 77 in 1930. However, the small farm ratio increased 40 percent after the boll weevil infestation, from 0.116 in 1890 to 0.162 in 1930.

[4]There's a missing value in Orleans, Louisiana, in 1890 and 1930. We highly suspect this county had the highest land inequality over this time-period.

3.4.3 Cotton



(a) 1890 cotton Land

(b) 1930 cotton Land

Figure 3.6: The Change of Cotton Harvest Land

Comparing panel (a), cotton harvest land area in 1890, and panel (b), cotton harvest land area in 1930, in Figure 3.6, we conduct the same conclusion as Neil's that cotton had been produced more in the Western corporate cotton ranches than in the traditional Southern cotton land [36]. However, the cotton production remains relatively unchanged in the west of Mississippi river.[5] Both the average and total cotton production in the South did not significantly change in the area during the boll weevil infestation period. The average cotton production was 8443 bales in each county in 1890 before the infestation. It was 8962 in each county in 1910 during the infestation. And in 1930, the average cotton production remained unchanged at 8852. The total number of bales of cotton production increased due to the cotton land expansion in the southwestern cotton suitable land. It was 28.87 million bales with 3329 counties in 1890, 29.55 million bales with 3352 counties in 1910, and 30.23 million bales with 3415 counties in 1930.

We then use the cotton production and the area of cotton harvest land roughly estimated the average cotton yield in these states. In 1890, the average cotton yield was 0.37 (6855/18531=0.3699) bales per acre. The average yield reduced to 0.34 (8624/25393=0.3396)

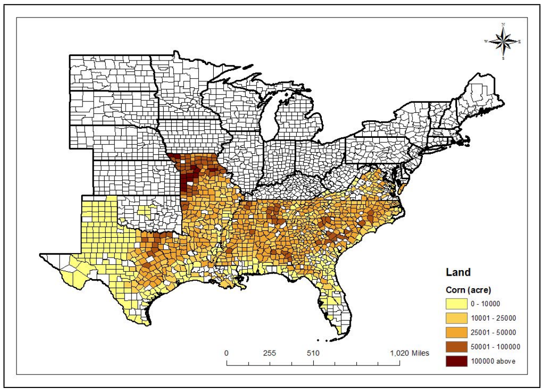
[5]The state of Oklahoma, Texas, Missouri, Arkansas, and Louisiana belongs to the west of Mississippi River.

bales per acre in 1910 and slightly decreased to 0.33 (10653/32224=0.3306) in 1930. The estimated cotton yield reduced 10.8 percent on average before and after the boll weevil infestation. This founding was consistent with the Bureau of Agriculture Economics (BAE) studies that they found the cotton yield reduction by boll weevil was 10.5 percent on average [32].

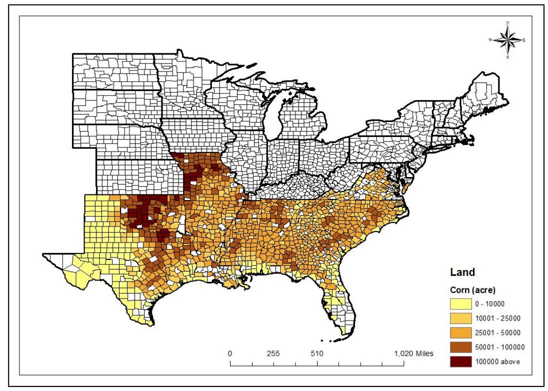
3.4.4 Other Crops

Besides cotton, a couple of other crops were widely cultivated in the South during the boll weevil infestation. Lange et al. 2009 study showed arms switched to other food crops in the years when boll weevils were severe. Corn was one of the leading alternative crops for cotton [32].[6] In this study, we considered the other alternative food crops, oats, and wheat that were not motioned in Lange's paper. We then displayed the change of the distribution of these alternative crops as follows.

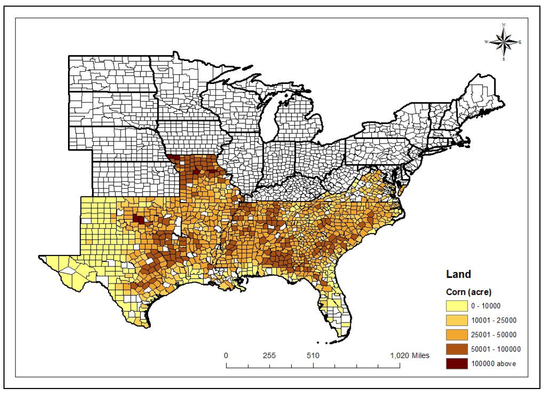
[6]Lange et al. found, after the arrival of boll weevils, the production of hay, Irish potatoes, peanut, rice, sweet potatoes, sugarcane also significantly increased in the infestation [32].



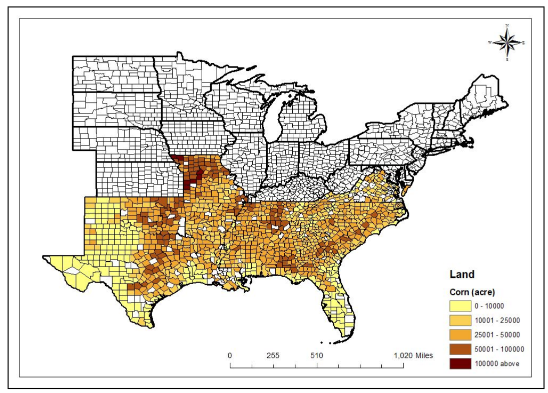
(a) 1890 Corn Land



(b) 1910 Corn Land



(c) 1920 Corn Land

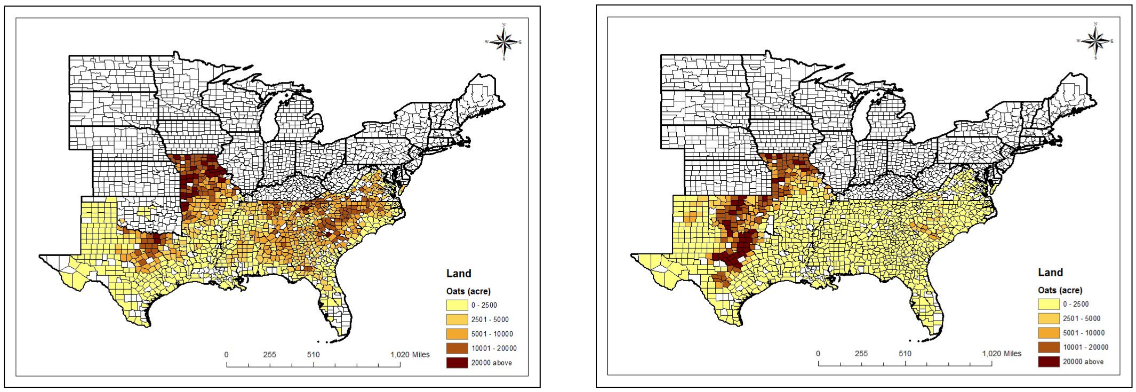


(d) 1930 Corn Land

Figure 3.7: The Change of Corn Harvest Land

In 1890, the county average of corn production was 480 thousand bushels, and the total was 533 million bushels across 1110 counties. In 1910, the averaged corn production increased to 548 thousand bushels, and the total was 691 million across 1262 counties. However, in 1930, the averaged production dropped to 404 thousand bushels, and the total reduced to the 1890 level, which was 534 million bushels. We can visualize the statistics from Figure 3.7 shows the corn harvest land distribution before and after the boll weevil infestation. Panel (a) shows the most of corn land in 1890 are in the state of Missouri and northeast of Texas. Panel (b) and (c) shows the land distribution during the exposure of boll weevil. We observe the same as the boll weevil exposure path that, in 1910, corn harvest land rapidly expanded in East Texas. In 1920, the number of corn land in the east of Texas reduced but increased the east of Mississippi River and the two sides of the Appalachian

Mountains. In panel (d), the corn harvest land distribution was similar to the one in 1890. The dynamic changes of corn land distribution and production evidenced that corn was an important alternative crop for cotton during the boll weevil infestation years.



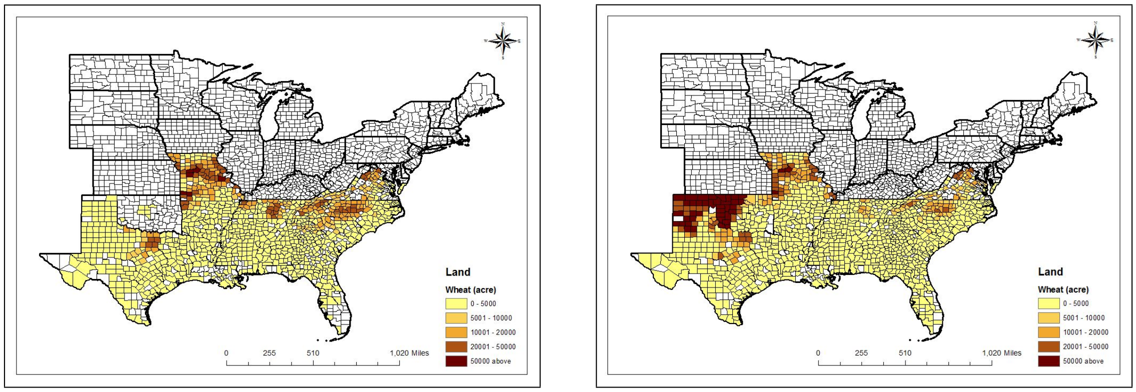
(a) 1890 Oats Land

(b) 1930 Oats Land

Figure 3.8: The Change of Oats Harvest Land

Figure 3.8 panel (a) shows oats widely grew in the cotton belt area expect the bank of Mississippi River in 1890. However, after the arrival of boll weevils, only Missouri, East Oklahoma, and Central Texas kept the tradition to grow oats. The other places in the South reduced their oats production in the 1920s. The statistics show that the average county-level oat production kept decreasing during the boll weevil infestation years from 79 thousand bushels in 1890 to 53 thousand bushels in 1930. The total output reduced 20 percent from 87 million to 70 million in this period.

Wheat is another alternative rotation crop for cotton. Figure 3.9 shows a small amount of cultivation of wheat in the northern counties in the state of Missouri, Tennessee, North Carolina, and Virginia. In 1920, wheat harvest land expanded in central Texas and Missouri and gradually decreased in these areas. In 1930, the wheat harvested land was in the north of Texas and central Missouri. According to the statistics, the average wheat production was 52 thousand bushels in 1890 and remained stable until the 1910s. In 1920, the average wheat production in each county tripled from 53 thousand bushels to 156 thousand bushels in 1920. The average production dropped to 95 thousand bushels per county in 1930. The total wheat production increased from 58 million bushels in 1890 to 194 million bushels in 1910, then fell back to 126 million bushels in 1930.



(a) 1890 Wheat Land

(b) 1930 Wheat Land

Figure 3.9: The Change of Wheat Harvest Land

3.5 Empirical Strategy

We assembled all data information listed above and discuss how did the Southern cotton economy adjust to the arrival of boll weevils. Following Lange et al. study on the labor wage, farm tenancy, and sharecropping [32], we extend the discussion to the redistribution of farmland and land inequality. To understand the redistribution and increase in land inequality, we used the arrival of boll weevil as a negative exogenous shock to cotton production. The reduction of cotton production could affect the polarization of farm size, where farm size is the measurement of land redistribution and inequality. Thus, in this study, we need to identify casual relations when an endogenous treatment and its outcome together cause the outcome of interest. Follow by Dippel et al., we propose the mediation analysis to solve the problem [24]. The analysis uses Two-Stage Least Square (2SLS) without additional instrumental variables.

The advantage of using the arrival of boll weevil infestation is that both the introduction and spread of the infestation were orthogonal to the redistribution of farmland in the South. The mobility of the weevils is minimal, and most of the time, they relied on wind directions to travel little by little from Mexico to the South. So the spread of the boll weevil infestation can be treated as haphazard and plausible exogenous. Besides Lange et al. study, Feigenbaum et al. in their 2019 paper, used the boll weevil infestation as a negative exogenous shock to identify the causal effect of the cotton production on the nature of labor coercion in the South from 1892 to 1922 [33].

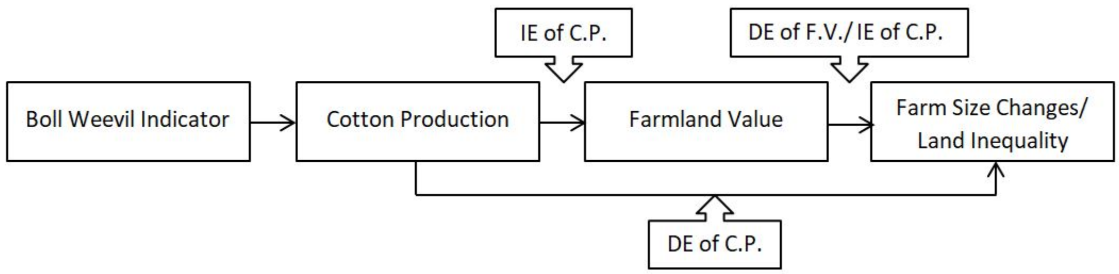


Figure 3.10: Mediation Analysis Causal Chain

In our primary empirical strategy, we implement the mediation analysis from Dippel et al. paper [24]. The identification problem was displayed in Figure 3.10. As we discussed, the boll weevil infestation was only able to affect cotton production negatively. The reduction of cotton production will change both the farmland value and farm size. At the same time, the change of farmland value can also influence the size of farms. In Figure 3.10, the arrow from cotton production to farmland value represents the conditional indirect effect of cotton on the measures of farm size polarization through the farmland value channel. The arrow from cotton production to farm size represents the direct effect of cotton production. And the arrow from farmland value to farm size is the direct of farmland value. We then translate the map into three 2SLS estimations and display them as follows.

$$\ln Cotton\ Production_{it} = \alpha \ln Boll\ Weevil\ Post + X_{it} + \delta_i + \delta_t + \varepsilon_{it} \tag{3.2a}$$

$$\ln Farmland\ Value_{it} = \beta \ln Cotton\ \widehat{Production}_{it} + X_{it} + \delta_i + \delta_t + \nu_{it} \tag{3.2b}$$

The first model learns the causal relationship between farmland value and cotton production using the arrival of the boll weevil in 2SLS. The equation (3.2a) shows the first stage. $\ln Cotton\ Production_{it}$ is the cotton production in county i at time t. $Boll\ Weevil\ Post$ is the time indicator to show the arrival of the boll weevil in each state. It equals to one if boll weevil infested in a state and zero is it did not arrive. According to the USDA map of boll weevil exposure, from 1900 to 1910, the boll weevil infestation gradually affected the farms in the state of Texas, Arkansas, and Louisiana. Then the weevils exposed to the rest of the area in the South in the following decade. Based on the historical evidence, we set the boll weevil infestation indicator in Texas, Arkansas, and Louisiana, which equals one after 1910. For other states in the South, the infestation indicator equals to one after 1920. X_{it} are time-variant variables includes the area of corn harvest land, oats harvest land, and the wheat harvest land. δ_i is the county fixed effect variable can eliminate the bias generated by the fact that treated counties generally have higher cotton production and larger farmland value than controlled counties over time. δ_t is the time fixed effect to capture the common trends across counties. To identify α, we assume the unobserved county-specific effects are constant over time, and the trend in treated counties and control counties are the same over time, which can be expressed by $E[Post * \varepsilon_{it}; \delta_i] = 0$. Also, ε_{it} is an unobserved disturbance with the identification assumption.

We then add the fitted crops value $\ln Cotton\ \widehat{Production}_{it}$ from equation (3.2a) as an instrumental variable to equation (3.2b). In equation (3.2b), $\ln Farmland\ Value_{it}$ is the log-transformed slave population. The rest of control variables are as same as equation (3.2a). ν_{it} is an unobserved disturbance with the identification assumption. β relies on the identification assumption that there is no omitted time-varying and region-specific effects correlation. Our primary interested parameter, β, is the cotton production effect on farmland value, as well as the indirect effect of cotton production on the change of farm size and land inequality. We expect β to be negative that the reduction of cotton production would increase the farmland value. Large farm owners are reluctant to sell few areas because of their ties to the land [70].

$$\ln Cotton\ Production_{it} = \xi \ln Boll\ Weevil\ Post + X_{it} + \delta_i + \delta_t + \psi_{it} \tag{3.3a}$$

$$\ln Y_{it} = \eta \ln \widehat{Cotton\ Production}_{it} + X_{it} + \delta_i + \delta_t + \omega_{it} \tag{3.3b}$$

We then use 2SLS to test the relationship between cotton production and the polarization measures of farms. The second model is more important to us because we investigate the cause of the polarization of farms. The estimation uses the same variables as the first 2SLS with replacing $\ln Y_{it}$ in the second stage equation (3.3b). $\ln Y_{it}$ are polarization measures of farm size and farmland include (i) the number of farm ratio above 500 acres and below 500 acres, and (ii) the bifurcation land inequality index. This estimation tests whether the boll weevil instrument can solve the cotton production endogeneity issue or not. Our interest coefficient estimate, η, shows the total effect of cotton production on the polarization measures of farmland using different control variables.

$$\ln Farmland\ Value_{it} = \delta \ln Boll\ Weevil\ Post + X_{it} + \delta_i + \delta_t + \tau_{it} \tag{3.4a}$$

$$\ln Y_{it} = \gamma \ln \widehat{Farmland}\ Value_{it} + \sigma \ln Cotton\ Production_{it} + X_{it} + \delta_i + \delta_t + \upsilon_{it} \tag{3.4b}$$

Last, the third model estimates both cotton production and farmland value on the farm ratio and land inequality index using the boll weevil indicator as an instrumental variable for farmland value. The model allows us to estimate the indirect effect of cotton production on the farmland's polarization that runs through the farmland value. The extent to which cotton production polarized farm size due to the changes in farm value is identified by comparing this indirect effect with the total effect of cotton production on farm size. Equation

(3.4a) shows the first stage of the mediation analysis using the boll weevil infestation as an instrument of farmland value. Then we plug the fitted farmland value into equation (3.4b) to estimate the indirect effect of cotton production on the polarization of farm size. The indirect effect equals to γ multiply β in the equation (3.2b). σ is the direct effect of cotton production on farm size. Adding the indirect and direct effect, we can obtain the total effect of cotton production on the polarization of farm size. The formula was listed as follows.

$$\begin{aligned} \text{Total Effect} &= \text{Indirect Effect} + \text{Direct Effect} \\ &= \gamma * \beta + \sigma \end{aligned} \tag{3.5}$$

This mediation framework assumes cotton production is endogenous in the regression because of the confounding factors that influence farm value, which allows correlation between (i) cotton production and farmland value, and (ii) farmland value and the polarization measures of farm size. The assembled unobserved factors which simultaneously affect cotton production and farmland value were the only effect of cotton production on the polarization measures of farm size. The identifying assumption of IV is as strong and normal as we did in 2SLS [24].

3.6 Baseline Results

We then display the estimated effect of cotton production on farm ratio in Table 3.2, and the effect of cotton production on land inequality index in Table 3.4. Each table includes three panels. Panel A displays the conditional indirect effect of cotton production on the polarization measures of farm size following equations (3.2b) and (3.2a) in model 1. Panel B displays the total effect of cotton production on the polarization of farm size by estimating equation (3.3a) and (3.3b) in model 2. And Panel C shows the direct effect of cotton production on the polarization of farm size using model 3 equation (3.4a) and (3.4b). Column (1) reports the results without control variables. Column (2) shows the results of controlling the corn harvest land area in each county. Column (3) controls the oats harvest land area.

And column (4) displays the estimates considering the wheat harvest land area. Column (5) is our interested estimates, which controls all variables listed above. All estimates contain county fixed effect, time fixed effect, and state trend. The estimates were also clustered in the county and state levels. The first row of standard error terms report the results without clusters, the second row shows the error term at county cluster, and the third error terms are retrieved from the results of clustering at the state level.

Table 3.2: Mediation Analysis [Dependent: Large to Other Farm Ratio]

Farm Ratio	(1)	(2)	(3)	(4)	(5)
			Panel A: Model 1 [Dependent: Farmland Value]		
			Second Stage (3.2b)		
Cotton Production (β)	-0.306^a	-0.200^a	-0.321^a	-0.320^a	-0.209^a
	(0.038)	(0.023)	(0.038)	(0.038)	(0.022)
	(0.055)	(0.032)	(0.055)	(0.056)	(0.031)
	(0.155)	(0.101)	(0.167)	(0.172)	(0.097)
			First Stage (3.2a)		
Boll Weevil Post	-1.255^a	-1.432^a	-1.257^a	-1.262^a	-1.549^a
	(0.112)	(0.109)	(0.112)	(0.109)	(0.101)
	(0.159)	(0.156)	(0.162)	(0.156)	(0.154)
	(0.895)	(0.950)	(0.909)	(0.747)	(0.767)
Observations	6104	6104	6104	6044	6044
F-test	125.15	173.05	125.52	134.14	233.22
			Panel B: Model 2		
			Second Stage (3.3b)		
Cotton Production (η)	0.027^a	0.011^b	0.030^a	0.029^a	0.011^b
	(0.007)	(0.005)	(0.007)	(0.007)	(0.005)
	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)
	(0.030)	(0.019)	(0.034)	(0.035)	(0.020)
			First Stage (3.3a)		
Boll Weevil Post	-1.280^a	-1.431^a	-1.283^a	-1.293^a	-1.548^a
	(0.112)	(0.109)	(0.112)	(0.109)	(0.101)
	(0.160)	(0.156)	(0.162)	(0.156)	(0.155)
	(0.894)	(0.957)	(0.909)	(0.741)	(0.773)
Observations	6084	6084	6084	6024	6024
F-test	130.14	172.20	130.71	141.19	232.91
			Panel C: Model 3		
			Second Stage (3.4b)		
Farmland Value (γ)	-0.128^a	-0.083^a	-0.131^a	-0.134^a	-0.086^a
	(0.022)	(0.031)	(0.021)	(0.020)	(0.024)
	(0.025)	(0.042)	(0.025)	(0.024)	(0.037)
	(0.087)	(0.088)	(0.087)	(0.088)	(0.085)
Cotton Production (σ)	-0.010^a	-0.006^a	-0.010^a	-0.011^a	-0.007^a
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	(0.003)	(0.002)	(0.003)	(0.004)	(0.002)
	(0.008)	(0.007)	(0.008)	(0.009)	(0.007)
			First Stage (3.4a)		
Boll Weevil Post	0.396^a	0.267^a	0.419^a	0.453^a	0.342^a
	(0.030)	(0.025)	(0.027)	(0.026)	(0.024)
	(0.044)	(0.034)	(0.040)	(0.040)	(0.035)
	(0.184)	(0.125)	(0.177)	(0.131)	(0.121)
Observations	6084	6084	6084	6024	6024
F-test	179.49	109.93	243.83	302.89	195.61
Corn Land		X			X
Oats Land			X		X
Wheat Land				X	X

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and state trend. The first row of error term reports the results without cluster, second row reports county cluster, and third row reports state cluster.

In Table 3.2, the second stage in Panel A shows the results of β in equation (3.2b), the effect of cotton production on farmland value after the arrival of the boll weevil. The first column shows that cotton production negatively affects farmland value. One percent of cotton production associate with a 0.31 percent reduction of farmland value. The point estimate increases to -0.20 when we control the corn harvest land in column (2) because farmers rotated to grow corn instead of cotton when boll weevil arrived. The estimates in column (3) and (4) are very similar, evidence that oat and wheat are not as important as corn alternative crops for cotton. Our preferred coefficient estimate is in column (5) controlling all crops harvest land listed above. The results are also the conditional indirect effect of cotton production on the measures of polarization of farm sizes. The coefficient is -0.21 with state clustered standard error 0.097, which implies a 1 percent increase in cotton production associated with a -0.21 percent reduction in farmland value.

Panel B in model 2 displays the results of using the same control variables as model 1, but the estimate of interest is the farm ratios. The estimates show, without controls, the total effect of cotton production on farm ratio is 0.03, with state clustered stand error 0.03. This implies a 1 percent increase in cotton production increase 0.03 percent farm ratio. Adding corn harvest land to the estimation, the coefficient estimate in column (2) significantly dropped to 0.11 percent due to corn's rotation. We then separately control the oats and wheat harvest land and obtain similar results as column (1). Our interested total effect of cotton production on farm ratio is in column (5) that a 1 percent cotton production increase lead to a 0.01 percent increase in the farm ratio. Giving the increased farm ratio statistics from the Agriculture Census, the increase in farm ratio was lead by the increased proportion of large farms in the west of Mississippi River area. The result shows that the change in cotton production increased the number of large farms in the Southwest.

We apply the estimation framework developed in equation (3.4a) and (3.4b) in model 3 and summarize the results of the coefficient estimate of farmland value γ and the coefficient estimate of cotton production σ in Panel C. Recall that the multiplication of β in the equa-

Table 3.3: Cotton Production Effects on Farm Ratio

	(1)	(2)	(3)	(4)	(5)
β	-0.306^a	-0.200^a	-0.321^a	-0.320^a	-0.209^a
γ	-0.128^a	-0.083^a	-0.131^a	-0.134^a	-0.086^a
Indirect Effect ($\beta * \gamma$)	0.039^a	0.017^a	0.042^a	0.043^a	0.018^a
Direct Effect (σ)	-0.010^a	-0.006^a	-0.010^a	-0.011^a	-0.007^a
Total Effect (η)	0.027^a	0.011^a	0.030^a	0.029^a	0.011^a
Proportion of Indirect Effect	145%	151%	140%	148%	163%

Notes: [a], [b], and [c] denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and state trend.

tion (3.2b) and γ is the indirect effect of cotton production on farm ratio that runs through the farmland value. σ is the direct effect of cotton production on farm ratio. The point estimate γ in column (1) indicates that a reduction of 1 percent farmland value increases 0.13 percent farm ratio. The estimated result is consistent with Hammond's argument that land value increases when large farm owners selling a small piece of land to other individuals [42]. The indirect effect of cotton production on farm ratio is 0.04 (-0.306*-0.128=0.039), and the indirect effect is 145 percent (0.039/0.027=1.451) of the total effect. The point estimate increase from -0.13 to -0.08 by adding corn harvest land implies the corn rotation plays an important role during the boll weevil infestation. The indirect effect is 151 (-0.200*-0.083/0.011=1.509) percent of the total effect. When we separately control oats and wheat harvest land, the indirect effect is 140 (-0.321*-0.131/0.03=1.401) percent and 148 (-0.320*-0.134/0.029=1.479) percent of the total effect. Our preferred estimate is -0.09 in column (5). Therefore, we can calculate the indirect effect of cotton production on farm ratio is 0.02 (-0.209*-0.086=0.018). The indirect effect is 163 (0.018/0.011=1.627) percent of the total effect report in Panel B column (5). We summarized the above analysis in Table 3.3. In sum, the estimates suggest that the indirect effect can explain 140 to 163 percent of the total effect of cotton production through the farmland value. The direct effect will offset the part of more than 100 percent of the total effect. Also, the negative significant direct cotton production effect indicates that the farm ratio would have a greater response to the change in cotton production via the farmland value.

Table 3.4: Mediation Analysis [Dependent: Bifurcation Inequality Index]

Bifurcation Inequality Index	(1)	(2)	(3)	(4)	(5)
		Panel A: Model 1 [Dependent: Farmland Value]			
		Second Stage			
Cotton Production (β)	-0.306[a]	-0.200[a]	-0.321[a]	-0.320[a]	-0.209[a]
	(0.038)	(0.023)	(0.038)	(0.038)	(0.022)
	(0.055)	(0.032)	(0.055)	(0.056)	(0.031)
	(0.155)	(0.101)	(0.167)	(0.172)	(0.097)
		First Stage			
Boll Weevil Post	-1.255[a]	-1.432[a]	-1.257[a]	-1.262[a]	-1.549[a]
	(0.112)	(0.109)	(0.112)	(0.109)	(0.101)
	(0.159)	(0.156)	(0.162)	(0.156)	(0.154)
	(0.895)	(0.950)	(0.909)	(0.747)	(0.767)
Observations	6104	6104	6104	6044	6044
F-test	125.15	173.05	125.52	134.14	233.22
		Panel B: Model 2			
		Second Stage			
Cotton Production (η)	0.098[a]	0.064[a]	0.104[a]	0.103[a]	0.068[a]
	(0.020)	(0.016)	(0.020)	(0.020)	(0.015)
	(0.025)	(0.021)	(0.025)	(0.025)	(0.019)
	(0.093)	(0.079)	(0.094)	(0.091)	(0.069)
		First Stage			
Boll Weevil Post	-1.291[a]	-1.429[a]	-1.304[a]	-1.322[a]	-1.575[a]
	(0.113)	(0.111)	(0.113)	(0.109)	(0.103)
	(0.162)	(0.159)	(0.164)	(0.158)	(0.158)
	(0.922)	(0.975)	(0.932)	(0.739)	(0.792)
Observations	5919	5919	5919	5859	5859
F-test	129.77	165.29	132.76	147.36	234.96
		Panel C: Model 3			
		Second Stage			
Farmland Value (γ)	-0.432[a]	-0.449[a]	-0.432[a]	-0.423[a]	-0.447[a]
	(0.063)	(0.093)	(0.058)	(0.053)	(0.072)
	(0.084)	(0.125)	(0.077)	(0.072)	(0.097)
	(0.200)	(0.309)	(0.180)	(0.166)	(0.228)
Cotton Production (σ)	-0.023[a]	-0.024[a]	-0.023[a]	-0.021[a]	-0.022[a]
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
	(0.011)	(0.013)	(0.011)	(0.013)	(0.010)
		First Stage			
Boll Weevil Post	0.377[a]	0.260[a]	0.407[a]	0.444[a]	0.338[a]
	(0.029)	(0.025)	(0.026)	(0.025)	(0.024)
	(0.043)	(0.033)	(0.040)	(0.040)	(0.034)
	(0.177)	(0.120)	(0.176)	(0.130)	(0.117)
Observations	5919	5919	5919	5859	5859
F-test	174.01	108.41	241.28	304.61	198.63
Corn Land		X			X
Oats Land			X		X
Wheat Land				X	X

Notes: [a], [b], and [c] denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and state trend. The first row of error term reports the results without cluster, second row reports county cluster, and third row reports state cluster.

Moreover, we estimate the effect of cotton production on the bifurcation inequality index. The bifurcation inequality index measures the polarization situation of farm sizes. Table 3.4 Panel A shows the results of equation (3.2a) and (3.2b). The coefficient estimates of cotton production on farmland value, β, is the same as the one in Panel A in Table 3.2. The estimated total effect of cotton production on the bifurcation inequality index, η, was summarized in Panel B. According to Table 3.2, without controls, the total effect of cotton production on the bifurcation inequality ratio is 0.10 with state clustered stand error 0.093, which implies 1 percent increase in cotton production increase 0.10 percent inequality index. With corn harvest land, the point estimate in column (2) significantly dropped to 0.64 percent due to the rotation of corn. Column (3) coefficient estimate, 0.10, is close to the one in column (1). Same as column (4), the estimate is not very different from the one without control variables. Column (5) displays our preferred total effect of cotton production on the bifurcation inequality index that increases 1 percent of cotton production associate with a 0.07 percent increase in the inequality index. Combining the map of the number of small farms in Figure 3.4 and bifurcation inequality index in Figure 3.5, the increase in the bifurcation inequality index was not only due to the number of large farm increase in the southwestern corporate farms but also the small-sized farms in the two-side of Mississippi River and southeast cropland.

Panel C reports the estimation framework in model 3, equation (3.4a) and (3.4b). It summarizes the results of the coefficient estimate of farmland value γ and the coefficient estimate of cotton production σ on the inequality index. The point estimate of farmland value in column (1) indicates that a reduction of 1 percent farmland value increases 0.43 percent of the inequality index. The estimates are robust with control the harvest land area of other crops. Our preferred estimate is -0.45 in column (5). The estimated direct effect of cotton production on the bifurcation inequality index with and without the control variables are very close. The estimated direct effect of cotton production on the inequality index is negative but small. Our preferred estimation result is -0.02 in column (5). We then use

Table 3.5: Cotton Production Effects on Bifurcation Inequality Index

	(1)	(2)	(3)	(4)	(5)
β	-0.306^a	-0.200^a	-0.321^a	-0.320^a	-0.209^a
γ	-0.432^a	-0.449^a	-0.432^a	-0.423^a	-0.447^a
Indirect Effect ($\beta * \gamma$)	0.132^a	0.090^a	0.139^a	0.135^a	0.093^a
Direct Effect (σ)	-0.023^a	-0.024^a	-0.023^a	-0.021^a	-0.022^a
Total Effect (η)	0.098^a	0.064^a	0.104^a	0.103^a	0.068^a
Proportion of Indirect Effect	135%	140%	133%	131%	137%

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All columns contains a county fixed effect and state trend.

all coefficient estimates from the mediation analysis to find the indirect effect of cotton production on the inequality index as well as the percentage of the inequality index that can be explained by the farmland value.

Without control variables, Table 3.3 column (1) shows the indirect effect of cotton production on bifurcation ratio is 0.13 (-0.306*-0.432=0.132) and the indirect effect is 135 percent (0.132/0.098=1.349) of the total effect. When we control the corn harvest land, the indirect effect reduces to 0.09 (-0.2*-0.449=0.09), which can explain 140 (0.09/0.064=1.403) percent of the total effect. If we control the oats harvest land only, the indirect effect is 0.14 (-0.321*-0.432=0.139) and 133 (0.139/0.104=1.333) percent of the total effect. With the wheat harvest land, the indirect effect is 0.14 (-0.32*-0.423=0.135). The indirect effect is 131 (0.135/0.103=1.314) percent of the total effect. Column (5) shows our preferred estimates that the indirect effect of cotton production is 0.09 (-0.209*-0.447=0.093), which is 137 (0.093/0.068=1.374) percent of the total effect. The estimates suggest that the indirect effect can explain 131 to 140 percent of the total effect of cotton production through the farmland value. The direct effect can offset the part of more than 100 percent of the total effect. This implies other channels linking cotton production to inequality ratio need to be aggregated moderating [24]. Also, the inequality issue would be more severe than what we observed.

3.7 Conclusion

The legend of cotton in the South was widely studied by scholars from many different perspectives. In this study, we use the mediation analysis to estimate the causal relationship between cotton production and the polarization measures of farms, using the magnitude of the boll weevil infestation in the agricultural South. We found the arrival of boll weevils did not end the cotton production in the South. People learned to rotate food crops as soon as boll weevil arrived and then switch back when they were gone. However, the infestation redistributed cotton production. As well as the size of the farmland that large corporate farms relocated to the Southwestern area, and small family farms quickly grew in the rest of the South. At the same time, the land inequality issue became more severe due to land polarization in the South.

The studies of agricultural, economic, and social revolution when the boll weevil arrives are still ongoing. Indeed, the treat was not as simple as we observed from the impact on cotton production. Things behind the fight against the boll weevils are not battle between human beings and insects. The struggle could transfer to a thousand kinds of conflicts among local policymakers, large farm owners, small farm families, and tenant farmers, and it was never a foregone conclusion about who would win.

CHAPTER 4

CONCLUSION

The empire of cotton had a profound influence on the economy, social and political institutions of the South in the nineteenth and twentieth centuries. In this study, we only focused on a small part of the labor system, political affiliation, and land resource allocation. The first study uses an episode of trade liberalization to causally estimate the relation between cotton production, slavery, and pro-slavery political affiliation in the antebellum South. We employ two empirical approaches that exploit cross-sectional variation created by differences in cotton-suitable land across counties in the United States and temporal variation arising from the Repeal of the Corn Laws in England in 1846. Our results suggest that this single episode of trade liberalization can explain slaves' growth in the South. In the second study, we show the southern aligned political affiliation on pro-slavery was deteriorated by the repeal of the British Corn Laws in cotton suitable lands. Southerners realigned their opinions to support slavery until the eve of the Civil War. The results show that the repeal of the British Corn Laws significantly impacted cotton production, thus intensifying slavery and altering the presidential election outcomes in the American South.

In the third study, we identify the causal relationship between cotton production and the polarization measures of farms in the postbellum South, using the magnitude of the boll weevil infestation. We found the arrival of boll weevils did not end cotton production in the South. People learned to rotate food crops as soon as boll weevil arrived and then switch back when they were gone as well as redistributed the farmland. The redistribution caused a polarization that large corporate farms relocated to the Southwestern area, and small family farms quickly grew in the rest of the South. Meanwhile, the land polarization land raised the inequality issue in the South.

The impact of cotton in the United States is far more than these points we mentioned, and it is not limited to the South. Although the empire of cotton no longer exists, the economy formed by cotton production has a tremendous influence on the American economic, social, and political development. It helped elites accumulate more wealth, and it has also caused more people to suffer or even die. During the cotton expansion in the South, many people became the participants and advocates of the cotton economy, but more of them were victims and opponents[11].

Appendices

.1 Chapter 1: Summary Statistics

.1.1 Summary Statistics of Other Variables

Table 1: Summary Statistics County Level, 1840-1860

	No. Observations	Mean	Std. Dev.	Min	Max
New Orleans Cost(1840 cents/ton)	3303	18.0	14.6	0	94.7
New York Cost(1840 cents/ton)	3303	20.9	16.2	4.7	101.3
Charleston Cost(1840 cents/ton)	3303	19.4	16.0	0	99.3
Sugar Land Area(km^2)	3900	592.9	959.4	0	5605.4
Tobacco Land Area(km^2)	3900	1292.2	819.2	0	6039.6
Wheat Land Area(km^2)	3900	1501.7	812.0	0	6039.6
Oats Land Area(km^2)	3900	1396.6	829.3	0	6039.6
Distance to Rio Grande(km)	3900	1220.4	591.6	0	2419.3

.1.2 Summary Statistics, 1840

Table 2: Summary Statistics County Level, 1840

	No. Observations	Mean	Std. Dev.	Min	Max
Cotton Value(1840 1000USD)	591	158	353	0	2572
Crops Value(1840 1000USD)	591	425	459	0	2842
Slave Population	1300	1677	3450	0	58539
Population	1300	4425	7167	73	102193
Cotton Land Area(km^2)	1300	1324	868	0	6040

.1.3 Summary Statistics, 1860

Table 3: Summary Statistics County Level, 1860

	No. Observations	Mean	Std. Dev.	Min	Max
Cotton Value(1840 1000USD)	888	293	578	0	7119
Crops Value(1840 1000USD)	888	649	708	0	7500
Slave Population	1300	2770	4309	0	37290
Population	1300	7602	10483	26	190524
Cotton Land Area(km^2)	1300	1324	868	0	6040

.2 GAEZ Data

GAEZ estimates each unit of land in a grid cell, which is approximately 56 by 56 kilometers by giving the specific input level. Each cell contains climate and land information, from other sources. The climate variables are retrieved from Climate Research Unit at University of East Anglia, which include daylight duration, precipitation, wet days, frequency, temperature mean, temperature range, vapor pressure, cloud cover, sunshine, ground-frost frequency, and wind speed. In addition, the major land characteristics data are retrieved from Digital Soil Map of the World by FAO. The measure of erosion, soil slop, is obtained from GTOPO30 by US Geographical Survey (USGS) Earth Resources Observation and Science Center. Given the input and management information, FAO simulates environmental variables to estimate the potential yield and production of certain crop in each grid cell.[64]

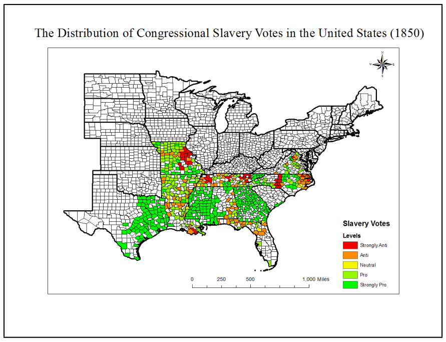
.3 OLS Results of Cotton and Other Crops Value

Table 4: OLS Results (Cont'd)

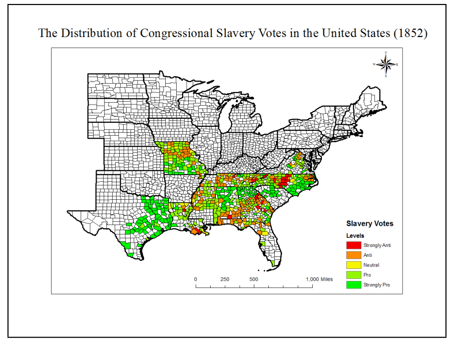
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Panel B: OLS				
Other Crops Value	0.152^a	0.149^a	0.147^a	0.148^a	0.142^a	0.128^a	0.114^a
	(0.055)	(0.054)	(0.054)	(0.054)	(0.052)	(0.047)	(0.043)
Cotton Value	0.039^a	0.039^a	0.037^a	0.037^a	0.035^a	0.030^a	0.027^a
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
New Orleans Cost		0.662^a					0.428^a
		(0.152)					(0.136)
New York Cost		0.193					0.133
		(0.139)					(0.126)
Charleston Cost		-0.592^a					-0.448^a
		(0.080)					(0.082)
Sugar × 1850			−0.006		−0.007		0.008^c
			(0.005)		(0.005)		(0.005)
Sugar × 1860			0.014^b		0.012^b		0.008
			(0.006)		(0.006)		(0.005)
Tobacco × 1850			0.080^a		0.079^a		0.007
			(0.026)		(0.027)		(0.013)
Tobacco × 1860			-0.066^a		-0.071^a		-0.033
			(0.022)		(0.024)		(0.022)
Wheat × 1850				0.507^a	0.507^a		0.501^a
				(0.146)	(0.136)		(0.134)
Wheat × 1860				0.536^a	0.529^a		0.501^a
				(0.147)	(0.140)		(0.135)
Oats × 1850				-0.393^a	-0.400^a		-0.411^a
				(0.122)	(0.114)		(0.116)
Oats × 1860				-0.398^a	-0.383^a		-0.364^a
				(0.122)	(0.116)		(0.119)
Rio-Grande × 1850						0.086^c	0.110^a
						(0.044)	(0.040)
Rio-Grande × 1860						-0.300^a	-0.239^a
						(0.067)	(0.062)
Observations	2251	2198	2251	2251	2251	2251	2251
Adjusted R^2	0.451	0.503	0.489	0.455	0.495	0.536	0.563

Notes: ^{a}, ^{b}, and ^{c} denote significance at the 1 percent, 5 percent and 10 percent levels, respectively. All regressions control county fixed effect and robust standard error.

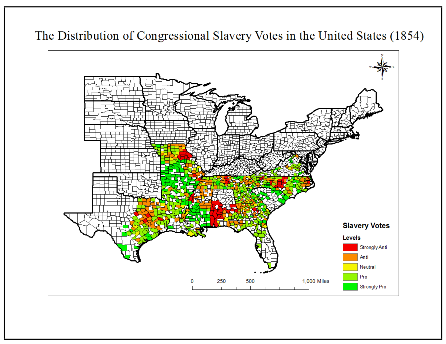
.4 Congressional Votes Maps, 1850-1856



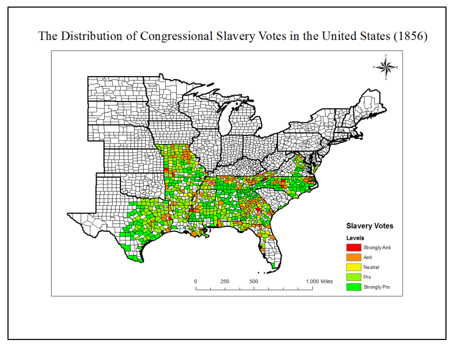
(a) Congressional Votes in 1850



(b) Congressional Votes in 1852



(c) Congressional Votes in 1854



(d) Congressional Votes in 1856

Figure 1: Congressional Votes (1850-1856)

REFERENCES

[1] T. Adamopoulos and D. Restuccia, "The size distribution of farms and international productivity differences," *The American Economic Review*, no. 104(6), pp. 1667–1697, 2014.

[2] I. Andrews and J. H. Stock, "Weak instruments and what to do about them," *NBER Method Lecture*, 2018.

[3] J. D. Angrist and G. W. Imbens, "Two-stage least squares estimation of average causal effects in models with variable treatment intensity," *Journal of American Statistical Association*, no. 90, pp. 431–442, 1995.

[4] D. Autor, D. Dorn, G. Hanson, and K. Majlesi, "Importing political polarization? the electoral consequences of rising trade exposure," *NBER*, no. Working Paper No. 22637, 2017, retrieved from, `http://www.nber.org/papers/w22637`.

[5] J. A. Baggett, *The Scalawags: Southern Dissenters in the Civil War and Reconstruction*. Baton Rouge, LA: LSU Press, 2004.

[6] R. Bailey, "The Other Side of Slavery: Black Labor, Cotton, and Textile Industrialization in Great Britain and the United States," *Agricultural History*, vol. 68, no. 2, pp. 35–50, 1994.

[7] R. B. Baker, "From the field to the classroom: The boll weevil's impact on education in rural georgia," *The Journal of Economic History*, no. 75(4), pp. 1128–1160, 2015.

[8] E. E. Baptist, *The Half Has Never Been Told : Slavery and the Making of American Capitalism*. New York: Basic Books, a member of the Perseus Books Group, 2014.

[9] Baripedia, *Between free trade and protectionism: 1846 - 1914*, data retrieved from, `https://baripedia.org/wiki/Between_Free_Trade_and_Protectionism:_1846_-_1914`, 2020.

[10] K. J. Bauer, *Zachary Taylor: Soldier, Planter, Statesman of the Old Southwest*. Baton Rouge, LA: LSU Press., 1993.

[11] S. Beckert, *Empire of Cotton: A Global History*. New York, NY: Alfred A. Knopf, 2014, ISBN: 9780375414145.

[12] S. Borras Jr, J. Franco, and C. Kay, "Land grabbing in latin america and the caribbean, viewed from a broader international perspective," *In: Gómez S (ed) The land mar-*

ket in Latin America and the Caribbean: concentration and foreignization., no. 21, 2014.

[13] M. M. Brescia and J. C. Super, *North America: An Introduction*. Toronto: University of Toronto Press, 2009.

[14] S. Bruchey, *Cotton and the Growth of the American Economy: 1790-1860*. New York: Harcourt, Brace World Inc., 1967.

[15] Y. Che, Y. Lu, J. R. Pierce, P. K. Schott, and Z. Tao, "Does trade liberalization with china influence u.s. elections?" *NBER*, no. Working Paper 22178, 2016, retrieved from, `http://www.nber.org/papers/w22178`.

[16] G. Clark, "Land rental values and the agrarian economy: England and wales, 1500-1914," *European Review of Economic History*, no. 6(3), pp. 281–308, 2002.

[17] J. M. Clubb, W. H. Flanigan, and N. H. Zingale, *Partisan Realignment: Voters, Parties, and Government in American History*. London: Sage Publication, 1980, pp. 1–311.

[18] J. M. Clubb, W. H. Flanigan, and N. H. Zingale, *Electoral data for counties in the united states: Presidential and congressional races, 1840-1972*, data retrieved from, `https://doi.org/10.3886/ICPSR08611.v1`, 2006.

[19] A. H. Conrad, "Slavery as an obstacle to economic growth in the united states: A panel discussion," *The Journal of Economic History*, no. 27(4), pp. 518–560, 1967.

[20] L. D. Cook, "Violence and economic activity: Evidence from african american patents, 1870–1940," *Journal of Economic Growth*, no. 19, pp. 221–257, 2014.

[21] A. Costinot, D. Donaldson, and C. Smith, "Evolving comparative advantage and the impact of climate change in agricultural markets: Evidence from 1.7 million fields around the world," *Journal of Political Economy*, no. 124(1), 205–248, 2016.

[22] L. Cotula, "Land rights and investment treaties: Exploring the interface london," *UK: International Institute for Environment and Development; and Columbia Center on Sustainable Investment.*, 2015.

[23] K. Deininger and D Byerlee, "The rise of large farms in land abundant countries: Do they have a future?" *World Development*, no. 40(4), 701–714, 2012.

[24] C. Dippel, R. Gold, S. Heblich, and R. Pinto, "Instrumental variables and causal mechanism: Unpacking the effect of trade on workers and voters," *NBER*, no. Working Paper 23209, 2018, retrieved from, `http://www.nber.org/papers/w23209`.

[25] C. Dippel, A. Greif, and D. Trefler, “The rents from trade and coercive institutions: Removing the sugar coating,” *Rotman School of Management Working Paper*, no. 2864727, 2016.

[26] D. Donaldson and R. Hornbeck, “Railroads and american economic growth a ”market access” approach,” *Quarterly Journal of Economics*, no. 1131(2), pp. 799–858, 2016.

[27] B. Drees and J. Jackman, *A Field Guide to Common Texas Insects*. Houston: Gulf Publishing Company, 1998.

[28] R. Eastwood, M. Lipton, and A. Newell, “Farm size. in p. l. pingali, r. e. evenson (eds.),” *Handbook of agricultural economics*, 2010.

[29] Encyclopedia Britannica, *Anti-masonic movement*, retrieved from, `https://www.britannica.com/event/Anti-Masonic-Movement`, 1998.

[30] K. L. Engerman Stanley L.and Sokoloff, “Factor endowments, inequality, and paths of development among new world economies,” *National Bureau of Economic Research*, no. Working Paper 9259, 2002.

[31] ——, “How latin america fell behind,” in, S. Harber, Ed. Palo Alto, CA: Stanford University Press, 2008, ch. Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States, pp. 260–304.

[32] L. Fabian, A. L. Olmstead, and P. W. Rhode, “The impact of the boll weevil, 1892-1932,” *The Journal of Economic History*, no. 69(3), pp. 685–718, 2009.

[33] J. Feigenbaum, S. Mazumder, and C. Simth, “When coercive economies fail: The political economy of the us south after the boll weevil,” *NBER Working Paper*, no. No. 27101, 2020.

[34] A. Fishlow, *American Railroads and the Transformation of the Ante-bellum Economy*. MA: Harvard University Press, 1965.

[35] R. Fogel and S. Engerman, *Time on the Cross*. Boston: Little, Brown and Comp., 1974, pp. 91–93.

[36] N. Foley, “Mexicans, mechanization, and the growth of corporate cotton culture in south texas: The taft ranch, 1900-1930,” *The Journal of Southern History*, no. 62(2), pp. 275–302, 1996.

[37] Food and Agriculture Organization, “2000 world census of agriculture methodological review (1996–2005,” *FAO statistical development series 14*, 2013.

[38] R. Gallman, "Self-sufficiency in the cotton economy of the antebellum south," *Agricultural History*, no. 44(1), pp. 5–23, 1970.

[39] J. C. Giesen, "The south's greatest enemy? the cotton boll weevil and its lost revolution, 1892-1930," *Ph.D. Dissertation*, 2004.

[40] A. Guerena and M. Wegerif, "Land inequality and farming document," *International Land Coalition Land Inequality Research Initiative*, pp. 1–92, 2019.

[41] M. Haines, P. Fishback, and P. Rhode, *United states agriculture data, 1840 - 2012 (icpsr 35206)*, data retrieved from, `https://doi.org/10.3886/ICPSR35206.v4`, urldate = 2018-08-20, 2018.

[42] M. B. Hammond, "The southern farmer and the cotton question," *Political Science Quarterly,*, no. 12(3), pp. 450–475, 1897.

[43] K. C. Harley, "Ocean freight rates and productivity, 1740-1913: The primacy of mechanical invention reaffirmed," *The Journal of Economic History*, no. 48(4), pp. 851–876, 1988.

[44] High Level Panel of Experts (FAO), "Investing in smallholder agriculture for food security.," *A report by The High Level Panel of Experts on Food Security and Nutrition*, no. 6, 2013.

[45] L. A. Hoffman and J. Livezey, *The U.S. oats industry*. Washington, D.C: U.S. Dept. of Agriculture, Economic Research Service, 1987, pp. 2–3.

[46] D. W. Howe, *What Hath God Wrought: The Transformation of America, 1815-1848*. Oxford: Oxford University Press, 2007, pp. 58;480.

[47] W. D. Hunter and B. R. Coad, *The Boll-Weevil Problem*. Washington, DC: GPO: USDA Farmers' Bulletin No. 1329, 1923.

[48] J. L. Huston, "Southerners against session: The agrumets of the constitional unionist in 1850-51," *Civil War History*, no. 46(4), pp. 281–299, 2000.

[49] Inter-university Consortium for Political and Social Research, *United states historical election returns, 1824-1968 (icpsr 1)*, data retrieved from, `https://www.icpsr.umich.edu/web/ICPSR/studies/1`, 1999.

[50] J. B. Jensen, D. P. Quinn, and S. Weymouth, "Winners and losers in international trade: The effect on u.s. presidential voting," *NBER*, no. Working Paper 21899, 2016, retrieved from, `http://www.nber.org/papers/w21899`.

[51] P. D. Jones and M. E. Mann, "Climate over past millennia," *Review of Geophysics*, no. 42(2), pp. 1–42, 2004.

[52] I. Kang and K. Greene, "A political economic analysis of congressional voting patterns on nafta," *Public Choice*, no. 98, p. 1999, 385–397.

[53] N. Key and C. Burns, "Changing farmland values affect renters and landowners differently," *Amber Waves:The Economics of Food, Farming, Natural Resources, and Rural America, United States Department of Agriculture, Economic Research Service*, no. 0(01), 2018.

[54] A. Kulikoff, *Abraham Lincoln and Karl Marx in Dialogue*. Oxford: Oxford University Press, 2018, p. 55.

[55] S. J. Lee, *Aspects of British political history, 1815-1914*. London: Routledge, 1994, pp. 102–115.

[56] S. K. Lowder, J. Skoet, and T. Raney, "The number, size, and distribution of farms, smallholder farms, and family farms worldwide," *World Development*, no. Vol. 87, 16–29, 2016.

[57] E. Magoon, *"William C. Preston, The Inspired Declaimer," Living Orators in America*. New York: Baker and Scribner, 1850, pp. 347–363.

[58] J. Mann, *The Cotton Trade of Great Britain: Its Rise, Progress, and Present Extent*. New York, NY: Augustus M. Kelley, 1968, pp. 93–96.

[59] R. P. McCormick, "Affairs of party: The political culture of northern democrats in the mid-nineteenth century by jean h. baker; the transformation of political culture: Massachusetts parties, 1790s-1840s by ronald p. formisano," *The American Historical Review*, no. 89(1), pp. 200–201, 1984.

[60] B. Mitchell and D. Phyllis, *Abstract of British Historical Statistics*. New York, NY: Cambridge University Press, 1962.

[61] E. N. Muller, M. A. Seligson, H.-d. Fu, and M. I. Midlarsky, "Land inequality and political violence," *The American Political Science Review*, no. 83(2), pp. 577–596, 1989.

[62] O. Nagayets, "Small farms: Current status and key trends," *In The future of small farms: Proceedings of a research workshop, Wye, UK*, 2005.

[63] N. Nunn, "Institutions and economic performance," in, E. Helpman, Ed. Cambridge, MA: Harvard University Press, 2008, ch. Slavery, Inequality, and Economic Devel-

opment in the Americas: An Examination of the Engerman-Sokoloff Hypothesis, pp. 148–180.

[64] N. Nunn and N. Qian, “The Potato’s Contribution to Population and Urbanization: Evidence from a Historical Experiment,” *Quarterly Journal of Economics*, vol. 126, no. 2, pp. 593–650, 2011.

[65] D. Olivier, “Report submitted by the special rapporteur on the right to food,” *Promotion and protection of human rights: human rights questions*, no. A/HRC/16/49, 2010.

[66] K. Osband, “The boll weevil versus ”king cotton”,” *The Journal of Economic History*, no. 45(3), pp. 627–643, 1985.

[67] C. Post, “Plantation slavery and economic development in the antebellum southern united states,” *Journal of Agrarian Change*, no. 3(3), pp. 298–332, 2003.

[68] R. Ramcharan, “Inequality and redistribution: Evidence from us counties and states, 1890-1930,” *The Review of Economics and Statistics*, no. 92(4), pp. 729–744, 2010.

[69] R. L. Ransom and R. Sutch, *One Kind of Freedom: The Economic Consequences of Emancipation*. Cambridge: Cambridge University Press, 1977.

[70] J. E. Reynolds and J. F. Timmons, “Factors affecting farmland values in the united states,” *Iowa Agriculture and Home Economics Experiment Station Research Bulletin*, no. 36(566), Article 1, 1969.

[71] D. Rodrik, “Populism and the economics of globalization,” *NBER*, no. Working Paper 23559, 2017, retrieved from, `http://www.nber.org/papers/w23559`.

[72] C. Rosenthal, *Accounting for Slavery: Masters and Management*. Cambridge, MA: Harvard University Press, 2018.

[73] L. J. Sabato and E. Howard, *Encyclopedia of American Political Parties and Elections*. New York: Facts On File, Inc., 2006.

[74] M. Schmitz, “The transformation of the southern cane sugar sector: 1860-1930,” *Agricultural History, Southern Agriculture Since the Civil War: A Symposium*, no. 53(1), pp. 270–285, 1979.

[75] C Schonhardt-Bailey, *From the Corn Laws to Free Trade: interests, ideas, and institutions in historical perspective*. Cambridge: The MIT Press, 2006.

[76] C. G. Sellers, “Who were the southern whigs,” *The American Historical Review*, no. 59(2), pp. 335–346, 1954.

[77] P. Sharp, "The long american grain invasion of britain: Market integration and the wheat trade between north america and britain from the eighteenth century," *Economic History Society*, no. working papers 8001, 2008.

[78] E. B. Smith, "Thomas hart benton: Southern realist," *The American Historical Review*, no. 58(4), pp. 795–807, 1953.

[79] D. Staiger and J. H. Stock, "Instrumental variables regression with weak instruments," *Econometrica*, no. 65, pp. 557–586, 1997.

[80] The North-Carolina standard, *Chronicling america: Historic american newspapers. lib. of congress*, retrieved from, `https://chroniclingamerica.loc.gov/lccn/sn85042147/1838-09-26/ed-1/seq-2/`, 1838.

[81] R. Vogel and J. Harrigan, *Political Change in the Metropolis*. New York: Routledge Member of the Taylor and Francis Group, 2002.

[82] J. Watkins, *King Cotton: A Histroical and Statistical Revew 1790 to 1908*. James L. Watkins and Sons, 1908.

[83] E. Williams, *Capitalism and Slavery*. Chapel Hill, NC: The University of North Carolina Press, 1994, ISBN: 0807844888.

[84] J. G. Williamson, "The impact of the corn laws just prior to repeal," *Explorations in Economic History*, no. 27(2), pp. 123–156, 1990.

[85] A. Wilmore and L. Wood, *The Romance of The Cotton Industry in England*. London: Oxford University Press, 1927, pp. 248–249.

[86] G. Wright, "Slavery and cotton boom," *Exploration in Economic History*, no. 12, pp. 439–451, 1975.

[87] ——, *The Political Economy of the Cotton South: Households, Markets and Wealth in the Nineteenth Century*. New York: W.W. Norton Co., 1978.

[88] ——, *Slavery and American Economic Development*. Baton Rouge: Louisiana State Univ Press, 2013.

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