The Economic Geography of American Slavery

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How did slavery shape American economic development?

- Divergent opinions on how slavery and geography interacted to shape the American economy.
  - One view: the agricultural suitability for high-value plantation crops in U.S. South drove slave institutions (Engerman and Sokoloff 1996).
  - Another view: slavery drove patterns of specialization (Wright 2006).
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- Difficult question to answer, as slavery was a multifaceted institution:
  - Plantation Agriculture: Distinct slave production function, due to gang labor system, supervision, and coercion (Fogel and Engerman 1976, Acemoglu and Wolitsky 2010).
  - Property Rights: Slave property markets allows output-increasing spatial allocation, ignoring enslaved people’s locational preferences (Fleisig 1976, Wright 2006).
The Antebellum American economy

(a) Share of population enslaved

(b) Total economic output
The Effects of Emancipation

(a) Change in output (%): 1860 to 1870

(b) Change in black population (%): 1860 to 1870
The Incidence of Emancipation

Cotton, sugar, rice and tobacco, can be produced for commercial purposes, only in a mild climate, and by such labor as can be controlled; to make a crop of either, and prepare it for market, requires the entire year’s work, the least relaxation or neglect, in preparing the land, planting, cultivation, or gathering, insures defeat. Can such labor be found outside of slavery?
William Price (Commercial Benefits of Slavery 1853)
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“If Lincoln is elected today, you will have to compete with the labor of four million emancipated negroes....the North will be flooded with free negroes, and the labor of the white man will be depreciated and degraded.”

James Gordon Bennett (1860).
This paper: Three Contributions

1. Document a series of *stylized facts* about the geography of the antebellum economy.
   - Higher population in high productivity locations.
   - Enslaved workers differentially sorted into locations and tasks/occupations with comparative advantage in coercive production & low amenities.
   - Free blacks and free whites disagreed about what places were attractive to live.

2. Develop a quantitative general equilibrium spatial model incorporating slavery.
   - Different freedom and objective function in the sorting decision ("property rights").
   - Different production function ("plantation agriculture") as well as compensation.
   - Identify model parameters using post Mexican war expansion of US territory and Fugitive Slave Law.

3. Use model to answer three questions:
   - How did slavery affect the economic geography of the antebellum US?
   - What were the relative impacts of different components of slavery?
   - Quantify non-pecuniary costs of slavery (America, ed. "Wealth of Races" 1990)
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Conclusion and next steps
American Slavery

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- Output per capita also high in slave south.
Slavery’s Comparative Advantage in Southern Agriculture

- Slavery allowed “gang labor system” generating returns to scale in certain high-value crops (Fogel and Engerman 1976)

- Slaves could be “driven” in large teams implementing sophisticated division of labor e.g. ploughing and seeding cotton, harvesting sugar.


- Instead: slavery allowed an allocation of labor to tasks, sectors, and locations that ignored slaves’ own preferences.

- Slavery solves recruitment and retention problems (Fleisig 1976). That plague crops in remote places, with long tending periods, and demanding harvests. (Wright 2006).

- Slavery concentrated in disease-intensive locations (Esposito 2019) and costly turnover sectors (Hanes 1996)
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Free Black Population

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- Free black labor free, but “the prejudice of race appears to be stronger in the states that have abolished slavery than in those where it still exists; and nowhere is it so intolerant as in those states where servitude has never been known. “ (De Tocqueville 1836)
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- Segregation and discrimination pervasive, with real effects: e.g. black crude death rates 2x white in 1830s Boston and only half in Charleston. Black TB deaths 3x higher than whites in 1844-1860 NYC (Warren 1997).
Data Sources

- Primary data is US county-level census data from 1840-1870.
- Combine with county-county transportation cost network (railroad, coasts, and rivers) data by decade from Donaldson and Hornbeck (2014).
- Observe total value of output (ag + mfg), free white, free black, and enslaved population.
- 1840 manufacturing output imputed from mfg capital and labor using Lebergott (1960) weights.
- Supplement with arable land, malarial index, and agricultural productivity by crop (FAO GAEZ).
- Agricultural productivity = first principal component of crop-level data.
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Four facts about the geography of the Antebellum economy

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5. All hold with or without state FE.
Stylized Fact #1: Total population higher in locations with more productive geography
Stylized Fact #2: Enslaved population differentially sorts into locations with innate comparative advantage in plantation production.

Binned Scatter of Fraction Slave 1860 and Cotton Productivity conditional on ag. productivity
Stylized Fact #3: Enslaved population differentially sorts into locations with worse innate amenities

Not true for free blacks
Stylized Fact #4: Free black population differentially sort away from "racist" locations
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Conclusion and next steps
Goals of the model:

- Match stylized facts of spatial sorting of labor
- Disentangle how different aspects of slavery shaped the American economy.
- Calculate welfare impact of large scale counterfactuals (e.g. emancipation)
Model Overview

- Goals of the model:
  - Match stylized facts of spatial sorting of labor
  - Disentangle how different aspects of slavery shaped the American economy.
  - Calculate welfare impact of large scale counterfactuals (e.g. emancipation)

- Quantitative GE economic geography model with two key ingredients:
  - Multiple imperfectly substitutable labor types, with varying degrees of labor mobility.
  - Locations that differ in their production structure & allowance of slavery (and racial disamenities).
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Model Setup: Standard components

- $N$ locations.

- Each location $i \in \{1, \ldots, N\}$ endowed with:
  - A fixed factor (land) $H_i$.
  - An innate (total factor) productivity $A_i$.
  - An innate amenity $u_i$.
  - Technology for producing a differentiated variety.

- Each pair of locations $i, j \in \{1, \ldots, N\}$ endowed with (iceberg) trade cost $\tau_{ij} \geq 1$. 
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- Each pair of locations $i, j \in \{1, \ldots, N\}^2$ endowed with (iceberg) trade cost $\tau_{ij} \geq 1$. 
Model Setup: New components

- Three types of labor:
  - Enslaved blacks ($L^S$).
  - Free blacks ($L^B$).
  - Free whites ($L^W$).
Model Setup: New components

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  - Enslaved blacks ($\tilde{L}^S$).
  - Free blacks ($\tilde{L}^B$).
  - Free whites ($\tilde{L}^W$).

- Three types of locations:
  - Slave locations with coerced (say “plantation”) production ($\mathcal{N}^{\text{slave,plantation}}$).
  - Slave locations without slave production [counterfactual]. ($\mathcal{N}^{\text{slave,noplantation}}$).
  - Free locations ($\mathcal{N}^{\text{free}}$).
Model Setup: Free whites

- Perfectly mobile across locations.
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- Cannot work as plantation labor.

Derive amenity value $u$ from living in a location.
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- Endowed with $\kappa$ units of labor.
Model Setup: Enslaved People

- Can only reside in slave locations.
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- Paid constant real subsistence wage $c = s/P_i$, $s$ fixed at lowest free wage.
Model Setup: Enslaved People

- *Can only reside in slave locations.*

- Paid constant real subsistence wage \( c = \frac{s}{P_i} \), \( s \) fixed at lowest free wage.

- Owners place enslaved people to *maximize real output.*
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  - Dividing by $\mu_i$ disutility from uncompensated task disamenities in production function.
Model Setup: Consumption

- Identical CES preferences over differentiated varieties with EoS $\sigma$. 
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- Yields a Dixit-Stiglitz price index $P_i$. 
Model Setup: Production

- Quantity of good $i$ produced in location $i$ (with labor input $L_i$ and land input $H_i$) is:

\[ Q_i = A_i L_i^\alpha H_i^{1-\alpha}, \]

where:

\[ L_i = \left( F_i^{\frac{\rho - 1}{\rho}} + \mu_i S_i^{\frac{\rho - 1}{\rho}} \right)^{\frac{\rho}{\rho - 1}} \]

- $F_i$ is the total efficiency units of free labor.

- $S_i$ is the total efficiency units of unfree labor.

- $\mu_i$ is the relative productivity of unfree labor (due to coercion).

- $q_i^F$ is marginal product of free white labor.

- $\kappa q_i^F$ is marginal product of free black labor.

- $q_i^S$ is marginal product of slave labor.
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Model Allocation Rules

- Enslaved person welfare in location $i$—fixed consumption times amenity/relative slave productivity: $W^S = \frac{s}{P_i} \frac{u_i \lambda_i}{\mu_i}$

- Free black welfare in location $i$—(skill adjusted) marginal product times (race adjusted) amenity:

$W^B = \kappa q F_i u_i \lambda_i P_i$

- Free white welfare in location $i$—marginal product times amenity:

$W^F = q F_i u_i P_i$

- (Absentee) slave owner flow of income from slave wealth $V^S_i$ is $\frac{s}{P_i} \frac{u_i \lambda_i}{\mu_i}$ (ignore for now).
Model Allocation Rules

- Enslaved person welfare in location $i$ = fixed consumption times amenity/relative slave productivity: $W^S = \frac{s_i u_i \lambda_i}{\mu_i}$

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- (Absentee) slave owner flow of income from slave wealth $V^S$ is $rV_i^S = q_i^S - s/P_i$ (ignore for now).
Location choice

Free whites choose location to maximize welfare:

\[
\max_{i \in \{1, \ldots, N\}} \frac{q_i^F}{P_i} u_i \epsilon_i \implies \pi_i^W \propto \left( \frac{q_i^F}{P_i} u_i \right)^\theta \implies F_i^W \propto \left( \pi_i^W \right)^{\frac{\theta-1}{\theta}} L^W
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▷ Free blacks choose location to maximize welfare:

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- Enslaved blacks have location chosen to maximize real output:

$$\max_{i \in N_{slave}} \frac{q_i^S}{P_i} \varepsilon_i(\nu) \implies \pi_i^S \propto \left(\frac{q_i^S}{P_i}\right)^{\nu \theta} \implies S_i \propto \left(\frac{\pi_i^S}{\nu \theta}\right)^{\frac{\nu - 1}{\nu \theta}} \kappa \bar{L}^S$$
Equilibrium

For any geography \((\tau_{ij}, A_i, u_i, \lambda_i, \mu_i)\), equilibrium is a set of prices \((q^F_i, q^S_i, p_i)\) and quantities \((L_i^W, L_i^B, L_i^S)\) such that:

1. Goods markets clear:

\[
p_i Q_i = \sum_j \tau_{ij}^{1-\sigma} p_i^{1-\sigma} p_j^{\sigma-1} p_j Q_j
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1. Goods markets clear:

\[
p_i Q_i = \sum_j \tau_{ij}^{1-\sigma} p_i^{1-\sigma} P_j^{\sigma-1} p_j Q_j
\]

2. Trade is balanced:

\[
P_i^{\sigma-1} = \sum_j \tau_{ji}^{1-\sigma} p_j^{1-\sigma}
\]
Equilibrium

For any geography \((\tau_{ij}, A_i, u_i, \lambda_i, \mu_i)\), equilibrium is a set of prices \((q_i^F, q_i^S, p_i)\) and quantities \((L_i^W, L_i^B, L_i^S)\) such that:

1. Goods markets clear:
   \[ p_i Q_i = \sum_j \tau_{ij}^{1-\sigma} p_i^{1-\sigma} p_j^{\sigma-1} Q_j \]

2. Trade is balanced:
   \[ P_i^{\sigma-1} = \sum_j \tau_{ji}^{1-\sigma} p_j^{1-\sigma} \]

3. Workers (or owners of enslaved labor) are paid marginal product:
   \[ q_i^F = w_i L_i^{\frac{1}{\rho}} F_i^{-\frac{1}{\rho}}, \quad q_i^S = w_i \mu_i L_i^{\frac{1}{\rho}} S_i^{-\frac{1}{\rho}}, \]

where:
   \[ w_i = \left( (q_i^F)^{1-\rho} + \mu_i^{\rho} (q_i^S)^{1-\rho} \right)^{\frac{1}{1-\rho}}, \quad p_i = \frac{1}{\alpha} \frac{w_i}{A_i} \left( \frac{L_i}{H_i} \right)^{1-\alpha} \]
Explaining the stylized facts

$\triangleright \quad q_i^F$ and $q_i^S$ increasing in $A_i \implies L_i^W, L_i^B, L_i^S$ increasing in $A_i$ (Stylized Fact #1)
Explaining the stylized facts

- $q^F_i$ and $q^S_i$ increasing in $A_i \implies L^W_i, L^B_i, L^S_i$ increasing in $A_i$ (Stylized Fact #1)

- $\frac{q^S_i}{q^F_i}$ increasing in $\mu_i \implies \frac{L^S_i}{L^W_i + L^B_i + L^S_i}$ increasing in $\mu_i$ (Stylized Fact #2)
Explaining the stylized facts

▶ $q_i^F$ and $q_i^S$ increasing in $A_i \implies L_i^W, L_i^B, L_i^S$ increasing in $A_i$ (Stylized Fact #1)

▶ $\frac{q_i^S}{q_i^F}$ increasing in $\mu_i \implies \frac{L_i^S}{L_i^W + L_i^B + L_i^S}$ increasing in $\mu_i$ (Stylized Fact #2)

▶ $L_i^S$ not increasing in $u_i$ (but $L_i^W$ and $L_i^B$ are) $\implies \frac{L_i^S}{L_i^W + L_i^B + L_i^S}$ decreasing in $u_i$ (Stylized Fact #3)
Explaining the stylized facts

- \( q_i^F \) and \( q_i^S \) increasing in \( A_i \) \( \implies \) \( L_i^W, L_i^B, L_i^S \) increasing in \( A_i \) (Stylized Fact #1)

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- \( L_i^B \) increasing in \( \lambda_i \) (but \( L_i^W \) is not) \( \implies \) \[ \frac{L_i^B}{L_i^W + L_i^B + L_i^S} \] increasing in \( \lambda_i \) (Stylized Fact #4)
Outline of Talk

Introduction

Historical Background

A General Equilibrium Spatial Model of Slavery
  Setup
  Equilibrium

Taking the model to the data

The economic geography of American slavery

Actual vs Predicted Emancipation

Conclusion and next steps
Overview

- Core part of model needs 2 parameters: elasticity of substitution $\rho$ and elasticity of migration $\theta$.
- Parameters map into coefficients from changes in white/black free population shares on
  - Price index (access to other counties).
  - Enslaved population share
- But need instruments.
  - Use Westward expansion and Fugitive Slave Law.
  - Counties change proximity to other populations because of addition of new territory from 1848 Mexican War
  - Enslaved population becomes relatively more profitable near the border after 1850 due to FSL.
- Use these to estimate $\rho$ and $\theta$, use literature to guide other parameters
- Recover estimates of $A_i$ (productivity), $\mu_i$ (slave productivity), $u_i$ (amenity) and $\lambda_i$ (racial discrimination).
Taking the model to the data: Details

- Data we observe:
  - Values: $Y_i$ (total income)
  - Quantities: $H_i$ (total land), $L^W_i$ (free white population), $L^B_i$ (free black population), $L^S_i$ (enslaved population)
  - Trade costs ($\tau_{ij}$) from Donaldson and Hornbeck ’14.

- Variables we would like to recover:
  - Model parameters: $\theta$ (labor supply elasticity), $\nu$ (relative labor supply elasticity of slaves), $\sigma$ (trade elasticity), $\rho$ (elasticity of substitution between free and coerced labor)
  - For now fix $\nu = 1$ and take $\sigma = 5$ from Donaldson and Hornbeck.

- Geography:
  - $A_i$ (total productivity), $\mu_i$ (relative slave productivity), $u_i$ (total amenity), $\lambda_i$ (relative amenity of blacks)

- Two step procedure:
  1. Estimate model parameters simultaneously using structural IV regression in differences.
  2. Recover unobserved geography through model inversion.
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- **Two step procedure:**
  1. Estimate model parameters simultaneously using structural IV regression in differences.
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Step #1: Estimating model parameters

In the U.S. North, we have the following equilibrium relationship:

$$\ln \frac{\pi_i^W}{\pi_i^B} = \beta_0^N + \beta_1^N \ln \frac{Y_i/P_i}{\pi_i^B} + \varepsilon_i^N,$$

where $\beta_1^N \equiv \theta$ and $\varepsilon_i^N$ is a function of only exogenous structural parameters and geography.

Note: Only a function of observables.

Intuition: how much free white labor responds to increases in (race composition adjusted) real output identifies migration elasticity.
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- Need an instrument that shifts \( Y_i / \pi_i^B P_i \) that are uncorrelated with local geography.
Step #1: Estimating model parameters (ctd.)

In the U.S. South, we have the following equilibrium relationship:

\[
\ln \frac{\pi_i^W}{\pi_i^B} = \beta_0^S + \beta_1^S \ln \frac{\pi_i^S}{\pi_i^B} + \epsilon_i^S,
\]

where \( \beta_1^S \equiv \frac{\theta + \rho - 1}{\rho} \), and \( \epsilon_i^S \) is a function of only exogenous structural parameters and geography.

Note: Also only a function of observables.

Intuition: how much free white labor responds to enslaved labor identifies combination of elasticity of substitution and elasticity of supply.
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Need an instrument that shifts $\frac{\pi_i^S}{\pi_i^B}$ that are uncorrelated with local geography.
Constructing an instrument (1): Westward migration

- Take advantage of big expansion in US territory during 1840 and 1860.
  - California added as free state.
  - Texas added as slave state.
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- Take advantage of big expansion in US territory during 1840 and 1860.
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- Construct instruments from expansion:
  - Change in the price index from free state expansion.
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  - Both effects vary across existing counties because of differences in travel network accessibility to new states (e.g. Texas and California).
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Westward Expansion Effect on Price Index

Market access due to admission of new free state

Market access due to admission of new slave state

(a) Free states

(b) Slave states
First Stages: Real Output/Free Black

(a) Addition of Free States

(b) Addition of Slave States
Reduced Form: Free White/Free Black

(a) Addition of Free States
(b) Addition of Slave States
Constructing an instrument (2): Fugitive Slave Law

- 1850 Fugitive Slave Law makes runaways from border states less likely.
  - Raises return from slaveholding in Upper South.
Constructing an instrument (2): Fugitive Slave Law

1850 Fugitive Slave Law makes runaways from border states less likely.
   - Raises return from slaveholding in Upper South.

Construct instrument from change in distance to freedom:
   - Before 1850, distance to freedom = distance to Northern US/Mexico (parts of Texas too)
   - After 1850, distance to freedom = distance to Canada (entry points from Siebert 1898)/Mexico

Identifying assumption: changes in distance to freedom orthogonal to changes in local geography.
Constructing an instrument (2): Fugitive Slave Law

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Change in Distance to Freedom Induced by FSL

Figure: Change in Distance to Freedom between 1850 and 1860

Change in distance to freedom after 1850's Fugitive Slave Law (miles)

Legend:
- Change (1850-1860)
- 0
- 460-2577
- No Data
First Stage For Slave-Free Black Ratio

Figure: Increase in market accessibility increases change in real output, conditional on state FE
Reduced Form For Fugitive Slave Law

Figure: Increase in real output /black ratio increases with change in distance to freedom, conditional on state FE
Pool instruments and endogenous variables interacted with region in one specification:

\[
\Delta \ln \frac{\pi_i^W}{\pi_i^B} = \text{North}_i + \beta_1^N \Delta \ln \frac{Y_i/P_i}{\pi_i^B} \times \text{North}_i + \beta_1^S \Delta \ln \frac{\pi_i^S}{\pi_i^B} \times \text{South}_i + \epsilon_i,
\]

\[
\Delta \ln \frac{Y_i/P_i}{\pi_i^B} = \gamma \left( \log(P_j^{1-\sigma,1860}) - \log(P_j^{1-\sigma,1840}) \right) + \epsilon_i^N
\]

\[
\Delta \ln \frac{\pi_i^S}{\pi_i^B} = \Gamma(DistanceFreedom_{i,1860} - DistanceFreedom_{i,1840}) + \epsilon_i^S
\]
## Estimating Model Parameters

### Regression coefficients

<table>
<thead>
<tr>
<th></th>
<th>(1) OLS</th>
<th>(2) IV</th>
<th>(3) OLS</th>
<th>(4) IV</th>
<th>(5) OLS</th>
<th>(6) IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change in ratio of Real Output to Labor Share of Free Blacks in the North</strong></td>
<td>0.799***</td>
<td>0.138</td>
<td>0.791***</td>
<td>0.978***</td>
<td>0.784***</td>
<td>0.884***</td>
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<tr>
<td><strong>Change in ratio of Labor Shares of Slaves to Free Blacks in the South</strong></td>
<td>0.823***</td>
<td>0.703***</td>
<td>0.807***</td>
<td>0.550***</td>
<td>0.821***</td>
<td>0.644***</td>
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### Implied elasticities

<table>
<thead>
<tr>
<th></th>
<th>(θ)</th>
<th>(ρ)</th>
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</thead>
<tbody>
<tr>
<td><strong>Migration elasticity</strong></td>
<td>0.799***</td>
<td>0.138</td>
</tr>
<tr>
<td><strong>EoS: Slave vs. Free labor</strong></td>
<td>1.139***</td>
<td>2.904***</td>
</tr>
<tr>
<td><strong>Change in ratio of labor shares of slaves to free blacks in the South</strong></td>
<td>0.823***</td>
<td>0.703***</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>(0.031)</th>
<th>(0.174)</th>
<th>(0.036)</th>
<th>(0.108)</th>
<th>(0.037)</th>
<th>(0.108)</th>
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<tr>
<td><strong>Fixed Effect</strong></td>
<td>None</td>
<td>None</td>
<td>Census division</td>
<td>Census division</td>
<td>Census division</td>
<td>Census division</td>
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<tr>
<td><strong>Lat Long Control</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>First-stage F-test</strong></td>
<td>7.200</td>
<td>15.350</td>
<td>15.350</td>
<td>12.921</td>
<td>12.921</td>
<td></td>
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<tr>
<td><strong>R-squared</strong></td>
<td>0.757</td>
<td>0.531</td>
<td>0.778</td>
<td>0.737</td>
<td>0.785</td>
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<tr>
<td><strong>Observations</strong></td>
<td>1599</td>
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<td>1599</td>
<td>1590</td>
<td>1599</td>
<td>1590</td>
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## Model Parameters (for now!)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Notation</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity heterogeneity</td>
<td>$\theta$</td>
<td>1.05</td>
<td>“Estimation”</td>
</tr>
<tr>
<td>Elasticity of substitution of sectors</td>
<td>$\rho$</td>
<td>0.2</td>
<td>”Estimation”</td>
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<tr>
<td>Elasticity of substitution for goods</td>
<td>$\sigma$</td>
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<td>Donaldson and Hornbeck (2014)</td>
</tr>
<tr>
<td>Relative productivity heterogeneity</td>
<td>$\nu$</td>
<td>1</td>
<td>Assumption</td>
</tr>
<tr>
<td>Share of labor in the production function</td>
<td>$\alpha$</td>
<td>0.32</td>
<td>Gallman-Parker production function estimation</td>
</tr>
<tr>
<td>Average relative productivity of plantation workers</td>
<td>$E[\mu_i]$</td>
<td>1.85</td>
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</tr>
</tbody>
</table>
Step #2: Recover unobserved geography

Proposition

For any set of model parameters \((\theta, \rho, \nu, \sigma, \kappa, \alpha, E[\mu_i])\), trade frictions \((\{\tau_{ij}\})\), and observed data \((\{Y_i, H_i, L_i^W, L_i^B, L_i^S\})\), there exists a unique (to-scale) set of location fundamentals \((A_i, \mu_i, u_i, \lambda_i)\).
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▶ (Loose) intuition:

▶ TFP \(A_i\) higher if \(Y_i\) is higher, conditional on \(L_i\) and \(H_i\).

▶ Relative slave productivity \(\mu_i\) higher if \((L_i^S, L_i^W)\) is higher, conditional on \(Y_i\).

▶ Amenity \(u_i\) is higher if \(L_i^W\) is higher, conditional on \(P_i\) and \(Y_i\).

▶ Relative black amenity \(\lambda_i\) is higher if \((L_i^B, L_i^W)\) is higher.
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Checking Stylized Facts

(a) Agricultural productivity and TFP $A_i$

(b) Relative cotton productivity and relative slave productivity $\mu_i$
Checking Stylized Facts (ctd)

(a) Malaria and amenity $u_i$

(b) Democratic vote share and relative black amenity $\lambda_i$
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We consider 5 counterfactuals that progressively eliminate specific institutional features of slavery:

1. Paying slaves their marginal product (setting $s = q_i^S$). Pure transfer.
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We consider 5 counterfactuals that progressively eliminate specific institutional features of slavery:

1. Paying slaves their marginal product (setting \( s = q^S_i \)). Pure transfer.

2. ... + Eliminating productivity advantage in plantation sector (\( E[\mu_i] = 1 \), “Equal labor inputs”).
Counterfactuals

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3. ... + Allowing enslaved people to choose which tasks to work in (“No plantation tasks”).

4. ... + Eliminating productivity advantage in plantation sector ($E[\mu_i] = 1$, “Equal labor inputs”).

5. ... + Allowing enslaved people to choose where to work and live (”Emancipation”).

6. ... + Eliminating racial differences in amenities across locations ($E[\lambda_i] = 1$, “No racial disamenity”).
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Counterfactuals

We consider 5 counterfactuals that progressively eliminate specific institutional features of slavery:

1. Paying slaves their marginal product (setting $s = q_i^S$). Pure transfer.

2. ... + Eliminating productivity advantage in plantation sector ($E[\mu_i] = 1$, “Equal labor inputs”).

3. ... + Allowing enslaved people to choose which tasks to work in (“No plantation tasks”).

4. ... + Allowing enslaved people to choose where to work and live (“Emancipation”).

5. ... + Eliminating racial differences in amenities across locations ($E[\lambda_i] = 1$, “No racial disamenity”).
Counterfactual Change in Enslaved Population

(a) % Change: Same Tasks Amenities

(b) % Change No Plantation
Counterfactual Change in Total Black Population

(a) % Change: Same Tasks Amenities

(b) % Change No Plantation

(c) % Change Emancipation

(d) % Change No Racial Disamenity
Aggregate Output Falls With Emancipation

Figure: Counterfactual % changes in aggregate real output relative to 1860 baseline
Welfare Effects of Emancipation for Enslaved People

**Figure:** Counterfactual changes in welfare relative to 1860 baseline
Welfare Effects of Emancipation for Free White Workers
Outline of Talk

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Historical Background

A General Equilibrium Spatial Model of Slavery
  Setup
  Equilibrium

Taking the model to the data

The economic geography of American slavery

Actual vs Predicted Emancipation

Conclusion and next steps
Emancipation: Counterfactual vs. observed

(a) Change in black population
(b) Change in white population
(c) Change in output
Why is the fit so bad?

- Preliminary!
  - But well known historical puzzle that black outmigration does not happen for a long time.
  - Jim Crow might indeed have restricted black mobility so that emancipation's reallocation didn’t happen.
  - Or model misspecification!
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  ▶ Document differential spatial sorting patterns for enslaved, free blacks, free whites in Antebellum South.
  ▶ Develop a GE spatial model consistent with patterns that incorporates multiple facets of slavery.
  ▶ Conduct counterfactual analyses to decompose welfare impact of different aspects of slavery.

▶ Next steps:
  ▶ Ideally improve instruments and use microdata more.
  ▶ Have linked censuses, slave occupations, wealth distribution data to work with.
  ▶ Target land value changes after emancipation as a out-of-sample moment.
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Free Black Population Sorts Away from Malaria

Binned Scatter of Fraction Free Black 1860 and Malarial Index conditional on ag. and cotton productivity
Model Setup: Tasks Under Coercion

- Think of labor as a composite of tasks, indexed 0 to 1:
  \[ L_i = \left( \int_0^1 l(s) \frac{\rho - 1}{\rho} ds \right)^{\frac{\rho}{\rho - 1}} \]

- Labor linear in free and slave labor:
  \[ l(s) = l_f(s) + A l_s(s) \]

- Enslaved people work more intensely: \( A > 1 \)

- Tasks are differentiated by “amenities”:
  \( a(s) \in (0, 1), \ a'(s) > 0 \)

- Have to pay free labor in county \( i \) higher wage:
  \[ w_i(s) = \frac{w_i}{a(s)} \] to get labor on unpleasant tasks.
Model Setup: Tasks Under Coercion

- Given wages and slave price $p$ and additional coerced hours $A$, get cutoff $\frac{w_i}{a(l_i)} = A/p$ below which use slave labor, above which use free labor.

- Slaves both exert too much labor, and are allocated to least pleasant tasks and occupations.

- Let $\mu_i = \frac{l_i}{1-l_i}$ be share of tasks done by slaves = relative productivity of slave labor in county $i$.

- Also will be relative uncompensated disutility of work of slave vs free labor.

- Yields “endogenous” CES production function:

\[
L_i = \left( F_i \frac{\rho-1}{\rho} + \mu_i S_i \frac{\rho-1}{\rho} \right)^{\frac{\rho}{\rho-1}}
\]
Decomposing the welfare changes for the total black population

Figure: Changes in real consumption vs. re-sorting to higher amenity locations