Online Appendix

"Time to Accumulate: The Great Migration and the Rise of the American South"
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A Simple Framework Appendix

A.1 Additional factor of production and labor-saving development

In this section, I introduce additional theoretical results by introducing an additional fixed factor of production, denoted land T. The purpose here is to discuss the additional theoretical characterization that the presence of the fixed factor can produce. Then, I discuss how much this addition is relevant to the baseline setting in the paper.

Consider a CES production function for agriculture with three factors of production:

$$Y = [\rho(Z_L L)^{\frac{\sigma-1}{\sigma}} + (1-\rho)(Z_K K)^{\frac{\sigma-1}{\sigma}}]^{\frac{\gamma\sigma}{\sigma-1}} \sigma T^{1-\gamma}, \tag{OA1}$$

where Z_L and Z_K represent factor-augmenting technologies as in the main text. Industry superscript for agriculture is dropped. The new parameter $\gamma \in (0,1)$ measures the labor-capital composite share of production in agriculture. Hence, agriculture exhibits decreasing returns to labor and capital when land is held constant.

By following Acemoglu (2010), I define the strong labor-saving economic development:

Definition 1 (Labor-saving economic development)**.** *Economic development is* ***strongly labor-saving*** *if the marginal product of labor decreases when the level of technology or capital stock increases. In particular,*

$$\frac{\partial(\partial Y/\partial L)}{\partial Z} < 0 \quad or \quad \frac{\partial(\partial Y/\partial L)}{\partial K} < 0. \tag{OA2}$$

Given the stated production function, whether the development is strongly labor-saving depends on the values of parameters (Acemoglu, 2010). For technology to be strongly labor-saving, three conditions are needed: (1) $\gamma < 1$; (2) $\sigma > 1$; and (3) $1-\gamma > 1/\sigma$ with capital augmenting technology. The opposite parametric restriction on (3) should hold with labor-augmenting technology. Given $\sigma > 1$ estimated in the literature (Herrendorf et al., 2015; Boppart et al., 2023), I focus on the former case. The condition suggests that decreasing return to scale of labor-capital composite and high elasticity of substitution between the two are required for capital augmenting technology or capital accumulation to yield strongly labor-saving development.

With the value of $\sigma = 1.58$ (Herrendorf et al., 2015), the land share of production should be greater than 0.63 to satisfy the third condition. However, labor share in agriculture is calculated to be 0.34 using the long-run averages of factor payment share to labor using *USDA Farm Income and Wealth Statistics* (Yang, 2024). Hence, agriculture is unlikely to have been strongly labor-saving during the 20th-century United States setting within the reasonable range of parameter values.

A.2 Proof and discussion for Predictions

Predictions 1 and 2.

The proofs for Predictions 1 and 2 follow Proposition 1 of Alvarez-Cuadrado et al. (2017). This subsection outlines the key ideas of the proof. Let consumption share on non-agriculture ("m") be $0 < \gamma < 1$ in the Cobb-Douglas consumption allocation. Then, with total output Y and price index P, the economic allocation is given as:

$$Y^a = (1-\gamma)\frac{P}{p^a}Y \quad \text{and} \quad Y^m = \gamma\frac{P}{p^m}Y, \tag{OA3}$$

where the subscript indexes sector. The price index P is normalized to one:

$$P = p^a\frac{Y^a}{Y} + p^m\frac{Y^m}{Y} = (1-\gamma)p^a + \gamma p^m \equiv 1. \tag{OA4}$$

At any point in time, free mobility of capital and labor implies the equalization of the marginal value products across sectors within the region:

$$p^a\rho\Big(\frac{Y^a}{K^a}\Big)^{1/\sigma^a} = p^m\rho\Big(\frac{Y^m}{K^m}\Big)^{1/\sigma^m} = R, \tag{OA5}$$

$$p^a(1-\rho)\Big(\frac{Y^a}{K^a}\Big)^{1/\sigma^a}A^{\frac{\sigma^a-1}{\sigma^a}} = p^m(1-\rho)\Big(\frac{Y^m}{L^m}\Big)^{1/\sigma^m}A^{\frac{\sigma^m-1}{\sigma^m}} = w. \tag{OA6}$$

In order to obtain analytical results, I restrict non-agriculture to Cobb-Douglas by setting $\sigma_A = \sigma > 1$ and $\sigma_M = 1$. By combining Equations (OA3), (OA4), (OA5), and (OA6), the share of labor in agriculture, λ, and capital, κ, are each governed by the equilibrium relationships:

$$\lambda - (1-\lambda)^{1/\sigma}A^{\frac{1-\sigma}{\sigma}}K^{\frac{\sigma-1}{\sigma}}\frac{\kappa}{(1-\kappa)^{1/\sigma}} = 0, \tag{OA7}$$

$$\kappa - (1-\kappa)^{1-\sigma}\frac{\gamma}{1-\gamma}\Big(\frac{Y^a}{K}\Big)^{\frac{\sigma-1}{\sigma}} = 0, \tag{OA8}$$

where

$$\Big(\frac{Y^a}{K}\Big)^{\frac{\sigma-1}{\sigma}} = (1-\alpha)\Big(\frac{(1-\lambda)A}{K}\Big)^{\frac{\sigma-1}{\sigma}} + \alpha(1-\kappa)^{\frac{\sigma-1}{\sigma}}.$$

Combining Equations (OA7) and (OA8) yields the following relationship between the shares:

$$\lambda = \lambda(\kappa) = \frac{\gamma(1-\alpha)\kappa}{\kappa - \alpha\gamma} \text{ with } \frac{d\lambda}{d\kappa} = -\Big(\frac{\alpha}{1-\alpha}\Big)\Big(\frac{\lambda(\kappa)}{\kappa}\Big) < 0, \tag{OA9}$$

which states that the share of labor and capital allocated to agriculture exhibits the opposite sign

from a common shock.

Finally, manipulating Equations (OA7) and (OA9) and taking logarithms gives:

$$\frac{1-\sigma}{\sigma}\ln K = \frac{1}{\sigma}\ln\Big(1-\lambda(\kappa)\Big) - \ln\Big(\lambda(\kappa)\Big) + \frac{1-\sigma}{\sigma}\ln A + \ln\kappa - \frac{1}{\sigma}\ln(1-\kappa). \tag{OA10}$$

The result for the capital share is obtained by totally differentiating Equation (OA10):

$$\frac{\partial\kappa}{\partial k} = \frac{(1-\sigma)}{\sigma G(\kappa)k} > 0,$$

where $G(\kappa) \equiv \left[\frac{1}{\sigma(1-\lambda(\kappa))} + \frac{1}{\lambda(\kappa)}\right]\left(\frac{\lambda(\kappa)}{\kappa}\right)\left(\frac{\alpha}{1-\alpha}\right) + \left[\frac{1}{\kappa} + \frac{1}{\sigma(1-\kappa)}\right]$. Hence, the capital share on agriculture rises as the regional capital-to-labor ratio, k, increases. The result for the labor share follows from Equation (OA9).

Prediction 3.

The classical proof using factor price equalization is first explained below. Consider unit costs and production constraints using input coefficients:

$$\begin{aligned} a_L^a w + a_K^a r &= p^a, \\ a_L^m w + a_K^m r &= p^m, \end{aligned} \tag{OA11}$$

and

$$\begin{aligned} a_L^a A + a_K^a M &= L, \\ a_L^m A + a_K^m M &= K, \end{aligned} \tag{OA12}$$

where the first two conditions are derived from the zero profit condition, and the last two are derived from the full employment assumption. The coefficient a_k^s is a derivative of unit cost functions with respect to factor prices and measures factor content of k on industry s at the initial equilibrium. The agriculture is more capital intensive if

$$\frac{a_K^a}{a_L^a} > \frac{a_K^m}{a_L^M}. \tag{OA13}$$

The following derivation relies on the assumption that factor intensity is not reversed.

By taking derivatives of Equation (OA12) with respect to labor,

$$\begin{aligned} a_L^a \frac{\partial A}{\partial L} + a_K^a \frac{\partial M}{\partial L} &= 1, \\ a_L^m \frac{\partial A}{\partial L} + a_K^m \frac{\partial M}{\partial L} &= 0, \end{aligned} \tag{OA14}$$

and applying the Cramer's rule yields:

$$\begin{aligned} \frac{\partial A}{\partial L} &= \frac{a_K^m}{a_L^a a_K^m - a_L^m a_K^a}, \\ \frac{\partial M}{\partial L} &= \frac{a_K^a}{a_L^a a_K^m - a_L^m a_K^a}. \end{aligned} \tag{OA15}$$

Under the assumption that agriculture is labor intensive and the South is labor abundant, $\frac{\partial A}{\partial L} > 0$ and $\frac{\partial M}{\partial L} < 0$ should hold from Equation (OA15). In other words, out-migration contracts agriculture and expands non-agriculture production. Note that Equation (OA14) uses factor price equalization result where factor prices only depend on output prices, which is assumed to be constant. As long as the number of goods and the number of factors are equal, the same logic can be applied to an arbitrary number of goods and factors where an increase in endowment of one factor decreases the output of one good and increases the output of the others (Jones and Scheinkman, 1977).

Nonetheless, the factor price equalization is unlikely to hold in the real world. Romalis (2004), instead, lays out a model of two factors of production, multiple countries with continuous industries that differ in factor intensity. He derives the quasi-Rybczynski Theorem without the factor price equalization but with the introduction of trade costs and monopolistic competition, allowing regional differences in production costs. The quantitative model is closer to his formulation by incorporating the CES cost function into the Eaton and Kortum (2002) setting.

A.3 Further division within non-agriculture.

Here, I point out that the out-migration would not necessarily have affected every corner of the economy by conceptualizing a sector that is not covered by the simple framework. I introduce a third sector that only uses labor and is nontradable, denoting it as a human capital-intensive non-agriculture task.

$$\text{human capital-intensive non-agricultural task: } Y^S = Z_L^S L^S,$$

which can be derived by setting $\rho \to 1$ and $\sigma \to 0$.

The division between the baseline non-agriculture and the human capital-intensive task resem-

bles the classification between manufacturing and services. However, the distinction here aims to highlight the differences arising from factor usage rather than the consumption characteristics of industries.[1] In real life, both manufacturing and services use labor and capital. Instead, depending on their primary factor usage, subsectors in non-agriculture can be classified as human capital-intensive. For instance, retail and wholesale are closer to the baseline non-agriculture that uses both labor and capital, while business services and education are better described as human capital-intensive because they primarily rely on (skilled) human labor.

How are the predictions affected by the introduction of the third sector? Since it does not use capital, the introduction of the new sector does not affect the closed-economy results of capital reallocation. The labor share in the human capital-intensive sector is not directly affected, either.[2] In other words, this component of the economy represents the portion that is expected to be not much affected by the changes from the Great Migration. If they are tradable, they would experience a decrease in comparative advantage as it has the highest share of labor.

B Data Appendix

B.1 Dependent variables

Agriculture

Unless mentioned otherwise, agriculture variables are from Agriculture Census compiled by Haines et al. (2018).

- Agricultural employment: Number of employed in agriculture. 1940-2012. The values between 1940 and 1997 are from HDES (Haines et al., 2010) ("Number of employed in agriculture"), while the values between 2002 and 2012 are from Census Bureau (2023b) ("Farm employment").
- Number of farms: Farms, number. 1940-2012.
- Acres in farmland: Land in farms, acres, including cropland, pasture, and woodland. 1940-2012.
- Number of tractors: Tractors, number. 1940-2012.

[1] This approach is in line with the value-added classification of industries, compared to the final expenditure classification (Herrendorf et al., 2013).

[2] The general equilibrium effects through changes in income and relative changes in factor prices are relatively small for a reasonable range of parameter values, and hence, the main implication in terms of labor reallocation would be maintained.

- Number of combines: Grain combines, number. 1950-2010.
- Farm output: Crop revenue and animal revenue. The sum of the value of all crops sold and the value of all animal products sold and animals sold. 1940-2012.
- Farm value per acre: The value of farmland, including buildings and improvements attached to the land (excluding implements and machinery). 1940-2012.

Manufacturing

The values for 1940-2000 (until 2002) are from HDES, while the values for 2010 (2007 and 2012) are from Census Bureau (2013), using "NAICS Sector 31- Manufacturing."

- Manufacturing employment: Manufacturing employees. 1940-2012.
- Number of establishment: Number of manufacturing establishments. 1940-2012.
- Capital spending: Manufacturing capital spending. 1954, 1958, 1963, 1967, 1972, 1982, 2002, 2007, and 2012.
- Manufacturing Value added: Manufacturing value added. 1940-2012.
- Manufacturing Annual payroll: Total manufacturing wages (workers). 1940-2012.

Services

Unless mentioned otherwise, the values for 1940-2000 (until 2002) are from HDES, while the values for 2010 (2007 and 2012) are from Census Bureau (2013), using "NAICS Sector 42- Wholesale Trade" and "Retail Trade (NAICS Sector 44)."

- Wholesale employment: Average annual employees of wholesale stores or paid employment in the week including March 12. 1940-2012.
- Wholesale establishments: Number of wholesale establishments. 1940-2012.
- Wholesale sales: Total sales in wholesale establishments. 1940-2012.
- Wholesale annual payroll: Total payroll in wholesale establishments. 1940-2012.
- Retail employment: Average annual employees in retail stores or paid employment in the week including March 12. 1940-2012.
- Retail establishments: Number of retail establishments. 1940-2012.
- Retail sales: Total sales in retail stores. 1940-2012.

- Retail annual payroll: Total payroll in retail stores. 1940-2012.
- Consumer services employment: HDES does not report detailed information on the services sector. Instead, I use the County Business Patterns. Wholesale Trade (NAICS 42), Retail Trade (NAICS 44-45), Transportation and Warehousing (NAICS 48-49), Finance and Insurance (NAICS 52), Real Estate and Rental and Leasing (NAICS 53), Health Care and Social Assistance (NAICS 62), Arts, Entertainment, and Recreation (NAICS 71), Accommodation and Food Services (NAICS 72). Educational Services (NAICS 61) are excluded and examined separately. 1980-2010. Corresponding industry employments in 1940 and 1950 from the full count population Census (using "IND1950") are used as the base. Source: Census Bureau (2023a) and Ruggles et al. (2024).
- Producer services employment: Information (NAICS 51), Professional, Scientific, and Technical Services (NAICS 54), Management of Companies and Enterprises (NAICS 55). 1980-2010. Corresponding industry employments in 1940 and 1950 from the full count population Census (using "IND1950") are used as the base. Source: Census Bureau (2023a) and Ruggles et al. (2024).

Education

- Median school year: Median years of schooling for persons over 25. For 1940, I take an average value of males' and females' median school year, as they are reported separately. 1940, 1950, 1960, and 1970. Source: HDES.
- Share high school: Share of persons over 25 with 1-3 years of high school. 1940-2000. Source: HDES.
- Share college: Share of persons over 25 with 4 or more years of college. 1970-2000. Corresponding shares of college graduates (completed at least 16 years of school) from 1940 and 1950 from the full count population Census are used as the base. Source: Census Bureau (2023a) and Ruggles et al. (2024).
- Employment in education: Labor force employed in educational services. 1960 and 1970. Corresponding numbers of educational services ("888" in IND1950) from 1940 and 1950 from the full population census are used as the base. Source: Census Bureau (2023a) and Ruggles et al. (2024).
- Education spending: Local government's total general expenditure, multiplied by local government's percentage spending on education. 1957, 1962, 1967, 1972, 1977, and 1982. Source: HDES.

Public sector

- Federal government employment: Federal government: employment. 1962, 1970, 1975, 1981, 1984, 1990, and 2000. Source: HDES.
- Local government employment: Local governments: employees (full-time equivalent). 1962, 1967, 1972, 1977, 1982, 1990, and 2000. Source: HDES.
- Local government annual payroll: Local governments: payroll. 1962, 1967, 1972, and 1977. Source: HDES.

B.2 County characteristics (control variables)

- Time-invariant characteristics: land area, longitude, latitude, and 1940 values of log population. Source: HDES.
- 1940 agriculture conditions: share of sharecroppers, total farm acres, shares of farms in five farm-size bins (1 to 9 acres, 10 to 49 acres, 50 to 99 acres, 100 to 499 acres, 500 to 999 acres, and 1000 acres and more), and acres harvested in cotton, tobacco, corn, and hay, respectively. Source: Agriculture Census.
- New Deal variables: Per capital values of federal grants on public work ("pcpubwor") and the payments to farmers through the Agricultural Adjustment Administration ("pcaaa"). Source: Fishback et al. (2005).
- Trade exposure: Japanese trade exposure during the 1970s and 1980s ("d_ipw"). The variable is constructed using industry employment share within manufacturing, and it measures the change in import exposure faced by the average worker. Source: Batistich and Bond (2023).

C Quantitative Framework Appendix

C.1 Initial equilibrium

Before performing the counterfactual analysis, I first construct bilateral trade flows between all regional pairs using the market access term approach (Donaldson and Hornbeck, 2016; Allen and Donaldson, 2022). The bilateral trade flows between importer n and exporter i in industry k can be

expressed as a function of trade costs $\tau^s_{ni,t}$, price index $P^s_{n,t}$, expenditure $X^s_{n,t}$, and total income $Y_{n,t}$, with productivity $A^s_{i,t}$ and distance elasticity θ^k:

$$\begin{aligned} X^s_{ni,t} &= \left(\tau^s_{ni,t}\frac{w^s_{i,t}}{A^s_{i,t}}\right)^{-\theta^k}(P^s_{n,t})^{\theta^k} \times \varphi^k Y_{n,t} \\ &= T^s_{ni,t} \times \left(\frac{Y^s_{i,t}/Y_W}{(\Pi^s_{i,t})^{-\theta^k}}\right) \times \left(\frac{X^k_{n,t}/Y_W}{(P^s_{n,t})^{-\theta^k}}\right). \end{aligned} \tag{OA16}$$

World income Y_W normalizes the output and expenditure. The second line follows from introducing the outward market access term $\Pi^s_{i,t} \equiv \left(\frac{w^s_{i,t}}{A^s_{i,t}}\right)^{-1}\left(\frac{Y^s_{i,t}}{Y_W}\right)$ and the effective trade costs $T^s_{ni,t} = (\tau^s_{ni,t})^{-\theta^k}$.

The outward market access term $\Pi_{i,t}$ captures how close exporter i is to the potential importers. The price index $P_{n,t}$ represents the inward trade market access and captures how close each importer n is to exporters. Using the two market access terms, the following proposition defines the initial equilibrium for trade.

Proposition 1 (Initial Equilibrium). Given the allocation labor, $\{L_t\}$, trade costs raised to elasticity exponent, $\{T_t\}$, and consumption share, $\{\varphi^k\}$, the solution to the initial equilibrium at t is the set of market access terms and wages, $\{P_t, \Pi_t, w_t\}$. In particular, it is obtained as the solution to the following system of non-linear equations:

Outward and Inward Trade Market Access Terms:

$$(\Pi^k_{i,t})^{-\theta^s} = \sum_{j=1}^{N} T^s_{ji,t} \times X^s_{j,t} \times (P^k_{j,t})^{\theta^s}, \tag{I1a}$$

$$(P^k_{n,t})^{-\theta^s} = \sum_{j=1}^{N} T^s_{nj,t} \times Y^k_{j,t} \times (\Pi^k_{j,t})^{\theta^s}. \tag{I1b}$$

Trade Flows:

$$X^k_{ni,t} = T^k_{ni,t} \times \frac{Y^k_{i,t}}{(\Pi^k_{i,t})^{-\theta^s}} \times \frac{X^s_{n,t}}{(P^k_{n,t})^{-\theta^s}}. \tag{I2}$$

Output and Expenditure:

$$Y^s_{n,t} = w^s_{n,t}L^s_{n,t}, \quad Y_{n,t} = \sum_k Y^s_{n,t}, \quad \text{and} \quad X^k_{n,t} = \varphi^s Y_{n,t}. \tag{I3}$$

Wages:

$$w^s_{n,t}L^s_{n,t} = \sum_{j=1}^{N} X^s_{jn,t}. \tag{I4}$$

where I iterate Equations (I1a) to (I4) using wages with labor as the only factor of production. It is equivalent to assuming that capital perfectly adjusts to labor in each period. I adopt this

simplification for the purpose of calculating trade share, and the resulting wages are only used to construct the market access terms and not used outside the Initial Equilibrium.

C.2 Dynamic Exact Hat Algebra

I adopt the dynamic hat algebra approach proposed by Caliendo et al. (2019) for the counterfactual analysis. Dynamic hat algebra calculates how allocations and prices change in a counterfactual economy relative to a baseline economy across space and time. It annihilates the need to recover time-invariant fundamentals and focuses on quantifying the changes in allocations and prices, given a new sequence of fundamentals.

First, I clarify fundamentals and prices. Geographic fundamentals $\{\bar{Z}^s_{i,t}, \bar{A}^{L,s}_{i,t}, \bar{A}^{K,s}_{i,t}, B_{i,t}, \tau^s_{ni,t}, \kappa_{ni,t}\}$ consists of fundamental productivity of firm, $\bar{Z}^s_{i,t}$; fundamental efficiency of labor and capital, $\bar{A}^{L,s}_{i,t}$ and $\bar{A}^{K,s}_{i,t}$; location amenities, $B_{n,t}$; and iceberg-type trade costs and migration costs, $\tau^s_{ni,t}$ and $\kappa_{ni,t}$.

Prices and allocation $\{w^s_{i,t}, r^s_{i,t}, L_{i,t}, K_{i,t}, \mathbb{V}^L_{i,t}\}$ consists of location-sector specific factor prices: wage $w^s_{i,t}$ and rental rate of capital $r^s_{i,t}$; the measure of workers, $L_{i,t}$ and the stock of capital, $K_{i,t}$; and workers' value function, $\mathbb{V}^L_{i,t}$.

Dot notation expresses a variable in terms of changes over time: $\dot{Y}_{t+1} \equiv Y_{t+1}/Y_t$. Prime denotes the values at the counterfactual economy, and the changes in the counterfactual economy can also be expressed in terms of time changes: $\dot{Y}'_{t+1} \equiv Y'_{t+1}/Y'_t$. Lastly, I define hat variables, $\hat{Y}_t \equiv \dot{Y}'_t/\dot{Y}_t$, as the counterfactual time changes relative to the baseline time changes for any variable Y.

Proposition 2 (Temporary Equilibrium). Given the allocation of the temporary equilibrium at t, $\{L_t, Y_t, \mathbb{S}_t, \varphi_t\}$, the solution to the temporary equilibrium at $t+1$ for a given change in $\dot{L}_{t+1}$, $\dot{K}_{t+1}$, and $\dot{\Theta}_{t+1}$ does not require information on the level of fundamentals at t, Θ_t or $\bar{\Theta}_t$. In particular, it is obtained as the solution to the following system of non-linear equations:

$$\dot{x}_{n,t+1} = \left((\xi^s_{i,t})(\dot{w}^s_{i,t+1})^{1-\sigma^s} + (1-\xi^s_{i,t})(\dot{r}^s_{i,t})^{1-\sigma^s}\right)^{\frac{1}{1-\sigma^s}} \quad \text{with} \quad \xi^s_{i,t} = \frac{w^s_{i,t}\tilde{L}^s_{i,t}}{w^s_{i,t}\tilde{L}^s_{i,t} + r^s_{i,t}\tilde{K}^s_{i,t}}, \tag{T1}$$

$$\dot{P}^s_{n,t+1} = \left[\sum_{i=1}^{N} \mathbb{S}^s_{ni,t}\left(\dot{\tau}^s_{ni,t+1}\dot{x}^s_{i,t+1}\right)^{-\theta^s}\right]^{-1/\theta^s}, \tag{T2}$$

$$\mathbb{S}^k_{ni,t+1} = \mathbb{S}^k_{ni,t}\left(\frac{\dot{\tau}^s_{ni,t+1}\dot{x}^s_{i,t+1}}{\dot{P}^s_{n,t+1}}\right)^{-\theta^s}, \tag{T3}$$

$$s^{L,s}_{i,t+1} = s^{L,s}_{i,t}\left(\frac{\dot{w}^s_{i,t+1}}{\dot{\bar{w}}_{i,t+1}}\right) \quad \text{and} \quad s^{K,s}_{i,t+1} = s^{K,s}_{i,t}\left(\frac{\dot{R}^s_{i,t+1}}{\dot{\bar{R}}_{i,t+1}}\right), \tag{T4}$$

$$\dot{\tilde{L}}^s_{i,t+1} = f(\dot{L}^s_{it}, \dot{K}^s_{it}) \dot{s}^{L,s}_{i,t+1} \dot{L}_{i,t+1} \quad \text{and} \quad \dot{\tilde{K}}^s_{i,t+1} = g(\dot{L}^s_{i,t}, \dot{K}^s_{i,t}) \dot{s}^{K,s}_{i,t+1} \dot{K}_{i,t+1}, \tag{T5}$$

$$E^s_{n,t+1} = \dot{w}^s_{n,t+1} \dot{\tilde{L}}^s_{n,t+1} w^s_{n,t} \tilde{L}^s_{n,t} \quad \text{and} \quad E^K_{n,t+1} = (1 - \jmath_{n,t+1}) \sum \dot{R}^s_{n,t+1} \dot{\tilde{K}}^s_{n,t+1} R^s_{n,t} \tilde{K}^s_{n,t} \tag{T6}$$

$$\varphi^k_{is,t+1} = \phi^k + \left(\varphi^k_{is,t} - \phi^k\right) \left(\frac{\dot{w}^s_{i,t+1}}{\dot{P}_{i,t+1}}\right)^{-\varepsilon}. \tag{T7}$$

$$\dot{Y}^s_{i,t+1} Y^s_{i,t} = \sum_{n=1}^{N} \mathbb{S}^s_{ni,t+1} \left(\sum_{s=1}^{S} \varphi^s_{ns,t+1} E^s_{n,t+1} + \varphi^K_{ns,t+1} E^K_{n,t+1} \right), \tag{T8}$$

$$\dot{w}^s_{n,t+1} \dot{\tilde{L}}^s_{n,t+1} w^s_{n,t} \tilde{L}^s_{n,t} = \xi^s_{i,t+1} \dot{Y}^s_{i,t+1} Y^s_{i,t} \quad \text{and} \quad \dot{r}^s_{n,t+1} \dot{\tilde{K}}^s_{n,t+1} r^s_{n,t} \tilde{K}^s_{n,t} = (1 - \xi^s_{i,t+1}) \dot{Y}^s_{i,t+1} Y^s_{i,t}. \tag{T9}$$

where ξ^s_i represents the cost share of labor, and φ^k_{is} the consumption shares of individuals in labor market *i*-*s* on sector k. The saving rate of capitalists, $\jmath_n$, is determined in the Sequential Equilibrium using the shooting algorithm. The factors of production are intra-temporarily reallocated across sectors until effective payments are equalized across sectors.

The next proposition shows how to calculate a dynamic sequence of the economy. I study how migration flows, $\mathbb{M}$, vary by the new sequence of temporary equilibrium. I define $\mathbb{V}^k_{n,t} \equiv \exp(V^k_{n,t})$.

Proposition 3 (Sequential Equilibrium). Given an initial allocation of the economy, $(L_0, \mathbb{S}_0, X_0, \mu_{-1})$, and an anticipated convergent sequence of time changes in fundamentals, $\{\dot{\Theta}_t\}_{t=1}^{\infty}$ with $\lim_{t\to\infty} \dot{\Theta}_t = 1$, the solution to the sequential competitive equilibrium in time differences does not require information in the level of fundamentals, $\{\Theta_t\}_{t=0}^{\infty}$. In particular, the changes in migration shares are obtained as the solution to the following system of non-linear equations:

$$\mathbb{M}_{in,t+1} = \frac{\mathbb{M}_{in,t} \left(\dot{\mathbb{V}}^s_{i,t+2}\right)^{\beta/\eta}}{\sum_{l=1}^{N} \mathbb{M}_{il,t} \left(\dot{\mathbb{V}}_{l,t+2}\right)^{\beta/\eta}} \tag{S1}$$

$$\dot{\mathbb{V}}^k_{n,t+1} = \dot{B}_{n,t+1} \dot{C}^k_n \left(\dot{L}_{t+1}, \dot{\Theta}_{t+1}\right) \left(\sum_{i=1}^{N} \sum_{s=1}^{K} \mathbb{M}^{ks}_{ni,t} (\dot{\mathbb{V}}^s_{i,t+2})^{\beta/\eta} \right)^{\eta}, \tag{S2}$$

$$L_{n,t+1} = \sum_{i=1}^{N} \mathbb{M}_{in,t} L_{i,t}. \tag{S3}$$

$$\dot{K}_{i,t+1} = \frac{\beta}{1+\beta} \bar{R}_{i,t}, \tag{S4}$$

where $\dot{B}_{n,t+1}$ is the changes in amenities, and the consumption indirect utility, $C^k_n(\dot{L}_{t+1}, \dot{\Theta}_{t+1})$, is

constructed from the solution of the temporary equilibrium given $\{\dot{L}_t, \dot{\Theta}_t\}_{t=1}^{\infty}$:

$$C_{n,t+1}^{k} = \frac{1}{\varepsilon}\left(\frac{\dot{w}_{n,t+1}^{s}}{\dot{P}_{n,t+1}}\frac{w_{n,t}^{s}}{P_{n,t}}\right)^{\varepsilon} - \sum_{s=1}^{K} \nu^{s} \ln \dot{P}_{n,t+1}^{s} P_{n,t}^{s},$$

where I first recover wages at $t = 1$ consistent with the initial period economic allocation. The first term in RHS is the real wage component and the second term is the non-homothetic price adjustments.

Stationary Equilibrium. A stationary equilibrium is a sequential competitive equilibrium such that $\{\mathbf{L}_t, \mu_t, \mathbf{V}_t, \mathbf{w}_t\}_{t=0}^{\infty}$ is constant for every t. A stationary equilibrium in this economy is a situation in which no aggregate variables change over time. It requires fundamentals to be constant for all t. In a stationary equilibrium, individuals continually move from one market to another, but inflows and outflows balance.

C.3 Capitalists' problem with non-homothetic preference

This section extends the baseline model by introducing the PIGL preference to capitalists. As in the baseline model, capitalists of measure one in each location choose their consumption and investment to maximize the expected present discounted value of their flow consumption utility:

$$v_{i,t}^{K} = \mathbf{E}_t \sum_{t=0}^{\infty} \beta^{t} C(E_{i,t}^{K}, P_{i,t}), \tag{OA17}$$

where now the consumption utility is defined the same as workers. Note that they are assumed to be geographically immobile, and local amenity terms are ignored. They choose the path of consumption expenditure and regional capital, $\{E_{i,t}^{K}, K_{i,t+1}\}_{t=0}^{\infty}$, subject to their budget constraint:

$$\bar{r}_{i,t} K_{i,t} = E_{i,t}^{K} + P_{i,t}\big(K_{i,t+1} - (1-\delta)K_{i,t}\big), \tag{OA18}$$

where $\bar{r}_{i,t}$ is the average net return on capital. The gross return on capital can be written as $\bar{R}_{i,t} \equiv 1 - \delta + \bar{r}_{i,t}/P_{i,t}$ with the depreciation rate δ. The capital is geographically immobile once installed and depreciates gradually at a constant rate δ. The investment goods combine goods from all sectors with the asymptotic consumption share.

The augmented capitalists' problem can be separated into the intratemporal problem of allocating consumption expenditure across sectors and intertemporal investment decisions. The solution to the intratemporal problem follows the same structure as workers given expenditure $E_{i,t}^{K}$. The intertemporal problem maximizes the intertemporal utility subject to the budget constraint. The

resulting Euler equation is given as:

$$\left(\frac{E^K_{i,t+1}/P_{i,t+1}}{E^K_{i,t}/P_{i,t}}\right)^{1-\varepsilon} = \beta \mathbf{E}_t[1-\delta+\bar{r}_{i,t+1}/P_{i,t+1}] = \beta \mathbf{E}_t[\bar{R}_{i,t+1}], \tag{OA19}$$

which, along with the transversality condition, governs the dynamic conditions of capitalists.

In each region, transition paths of capital and expenditure are determined by a shooting algorithm with initial values of capital and initial guesses of expenditure. Given the rental rate of capital determined in temporary equilibrium, I construct the flow of capital and expenditure with the Euler equation and capitalists' budget constraint. If the obtained path for capital converges to the steady state, the algorithm is terminated; otherwise, the guess on initial expenditure is updated.

For the model calculation, Equation S4 in the sequential equilibrium is changed to:

$$\left(\dot{E}^K_{i,t+1}/\dot{P}_{i,t+1}\right)^{1-\varepsilon} = \beta \mathbf{E}_t[1-\delta+(\dot{\bar{r}}_{i,t+1}\bar{r}_{i,t})/(\dot{P}^s_{i,t+1}P^s_{i,t})] \text{ and } K_{i,t+1} = I^K_{i,t+1} - E^K_{i,t+1} + \delta K_{i,t}. \tag{S4}$$

D Additional Results

D.1 Instrument validity check

Apart from the pretend tests in the main text, Tables OA2 to OA15 further assess the validity of the SSIV strategy in terms of overidentification tests (Tables OA2 and OA3), and placebo tests (Tables OA4 and OA5).

Overidentification tests examine the null hypothesis of constant effects between instruments, and the test requires that the number of excluded instruments to exceed the number of endogenous regressors. The rejection implies that the coefficients estimated between instruments are statistically different. In Tables OA2 and OA3, the values of heteroskedasticity robust Sargan-Hansen J statistics and associated p-values are reported for two sets of migration shares, respectively. In Table OA2, I use a matched migration matrix between 1910 and 1940 Buckles et al. (2023) and 1935-1940 share using information of county of residence five years ago ("MIGCOUNTY"). Among the reported estimates, 13 out of 20 variables are not statistically different at the 5% significance level. The rejections are mainly driven by less precise estimates from using the 1935-1940 share, further explained in Section D.2.

Table OA3 tests whether out-migration from Black and White led to similar changes in the economic outcomes. Tables OA9 and OA10 further report the results separately for Black and White out-migration. While there is no systematic difference between the impacts of Black and White out-migration, as evidenced by the same signs of the estimates, the estimated size tends to

be bigger for the Black out-migration compared to White.

I document placebo tests in terms of shift (Table OA4) and share (Table OA5). For the shift, I assign a random number of immigrants in the North and reallocate them back to the South. For the share, I randomly reallocate the migration cell. Both experiments lead to statistically insignificant estimates, with the signs of coefficients replicating the OLS estimates.

D.2 Robustness check

Tables OA6 to OA15 estimate the main results using alternative empirical strategies and document how the results change or stay similar in each case. First, Table OA1 replicates the main outcomes in Tables 1 and 2, Panel D, and Table 3, Panels A and B for comparison. Then, I document the following robustness checks: (1) adopting alternative approaches for in-migration prediction (actual number of in-migrants in Table OA6 and random forest method in Table OA7), (2) the alternative share based on 1935-1940 migration matrix using 1935 locations in the 1940 Census (Table OA8), (3) separately estimating by race (Tables OA9 and OA10), (4) limiting sample to former confederate states (Table OA11), (5) dropping the time-varying controls (contemporaneous population and net migration rate) (Table OA12), and (6) including 1960 in base years (1940, 1950, and 1960) (Table OA13), (7) limiting sample counties to be balanced for all variables (Table OA14), and (8) using 1940 population-weighted regression (Table OA15).

I mainly discuss the cases when the results differ from the baseline results. Table OA8 reports the estimates using the alternative migration share between 1935 and 1940. As demonstrated in Table OA2, the baseline migration share and the alternative 1935-1940 share tend to produce similar results. However, there are notable differences for manufacturing, mainly because the manufacturing results using the 1935-1940 share are not precisely estimated. This could be due to more sparse migration cells in the 1935-1940 share. As pointed out in the main text, the Census Tree approach generates 1,748,472 (18.2%) non-zero migration cells among all possible flows, while the 1940 Census approach between 1935 and 1940 generates 830,892 (8.6%) non-zero cells. When the two types of migration shares are jointly used as multiple instruments, the resulting manufacturing estimates follow the Census tree approach results (Table OA1 versus Table OA2).

Table OA12 drops the time-varying controls (contemporaneous population and net migration rate). While the agricultural estimates tend to be maintained (Panel A), the sizes of non-agricultural coefficients (Panels B and C) tend to be reduced. All estimates show the same signs. This pattern is mainly driven by the contemporaneous population variable that controls the size of the counties. More out-migrated counties tend to be smaller in size. However, the baseline results, using the contemporaneous variables, take into account the differences resulting from the changes in sizes and compare the outcome between counties with similar sizes.

The results are similar in the other scenarios: adopting alternative approaches for in-migration prediction, limiting the sample to former confederate states, using 1940 population-weighted regression, and including 1960 in base years (1940, 1950, and 1960), and limiting sample counties to be balanced for all variables.

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E Additional Tables and Figures

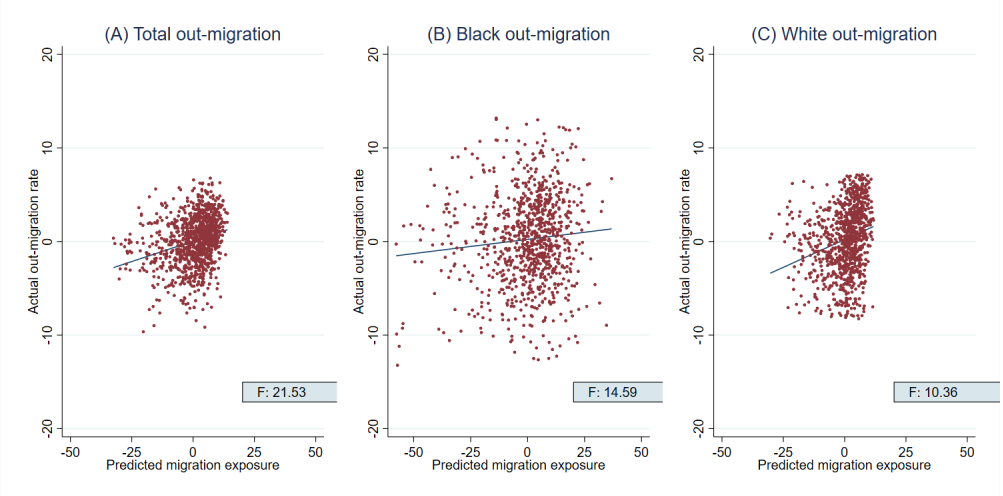

Figure OA1: Scatter plot of the First-Stage.

Note: The figure presents first-stage regression results, with residualized F-statistics on the square box at the bottom right. The y-axis plots the net migration rates between 1940 and 1970 in Southern counties, and the x-axis is the migration exposure measure for years between 1940 and 1970, constructed using the 1935-1940 migration share. The net migration rates are from Gardner and Cohen (1992) and Bowles et al. (2016).

Table OA1: Robustness - Baseline.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.074***	-0.014	-0.043**	0.066***	0.039	-0.016	-0.016
	(0.026)	(0.014)	(0.018)	(0.024)	(0.168)	(0.024)	(0.013)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	14.76	14.99	14.99	15.03	8.56	14.99	14.99
Counties	1,148	1,148	1,148	1,148	1,103	1,148	1,148

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.097**	0.059***	0.199**	0.116*	0.135**
	(0.041)	(0.022)	(0.094)	(0.065)	(0.056)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	14.19	14.37	10.16	13.05	13.63
Counties	1,148	1,148	1,115	1,148	1,148

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.108***	0.074**	0.090*	0.092**	0.046**	0.021*	0.033**	0.056***
	(0.036)	(0.030)	(0.048)	(0.046)	(0.020)	(0.011)	(0.015)	(0.021)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	16.08	15.57	15.83	14.89	14.97	14.99	14.97	14.96
County	1,135	1,148	1,138	1,138	1,148	1,148	1,148	1,148

Note: The table reports estimation results using Equation (3). Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA2: Exclusion restriction - Overidentification tests using shares.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.073***	-0.016	-0.043**	0.065***	0.042	-0.016	-0.016
	(0.026)	(0.014)	(0.018)	(0.023)	(0.154)	(0.024)	(0.013)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	7.34	7.45	7.45	7.48	4.45	7.45	7.45
Counties	1,148	1,148	1,148	1,148	1,103	1,148	1,148
Sargan-Hansen J	2.90	34.59	0.02	3.36	0.02	0.21	0.68
Sargan-Hansen p-value	0.09	0.00	0.88	0.07	0.88	0.65	0.41

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.092**	0.052**	0.197**	0.109*	0.122**
	(0.040)	(0.021)	(0.091)	(0.062)	(0.054)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	7.01	7.06	5.14	6.45	6.72
Counties	1,148	1,148	1,115	1,148	1,148
Sargan-Hansen J	3.66	24.42	0.01	0.93	7.33
Sargan-Hansen p-value	0.06	0.00	0.91	0.33	0.01

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.081**	0.068**	0.077*	0.073*	0.045**	0.020*	0.033**	0.056***
	(0.032)	(0.028)	(0.047)	(0.043)	(0.019)	(0.011)	(0.015)	(0.021)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	8.02	7.67	7.94	7.50	7.44	7.45	7.43	7.42
County	1,135	1,148	1,138	1,138	1,148	1,148	1,148	1,148
Sargan-Hansen J	26.78	9.95	1.33	4.92	3.28	4.23	0.56	0.92
Sargan-Hansen p-value	0.00	0.00	0.25	0.03	0.07	0.04	0.46	0.34

Note: The table reports estimation results using Equation (3) with two instruments from 1910-1940 migration from matched Census (Ruggles et al., 2024; Buckles et al., 2023) and 1935-1940 migration from 1940 Census. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Heteroskedasticity-robust Sargan-Hansen J statistics under the null of constant effects and related p-values are added. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA3: Exclusion restriction - Overidentification tests by race.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.061***	-0.023**	-0.054***	0.086***	0.193***	-0.037**	0.018**
	(0.020)	(0.010)	(0.014)	(0.021)	(0.072)	(0.017)	(0.009)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	12.69	12.34	12.34	12.33	9.43	12.42	12.13
Counties	1,020	1,020	1,020	1,020	980	1,020	1,020
Sargan-Hansen J	0.68	21.37	8.43	4.08	0.44	4.12	0.46
Sargan-Hansen p-value	0.41	0.00	0.00	0.04	0.51	0.04	0.50

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.035	0.030**	0.182***	0.029	0.064*
	(0.027)	(0.013)	(0.052)	(0.039)	(0.036)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	11.47	11.94	10.39	10.98	11.50
Counties	1,020	1,020	998	1,020	1,020
Sargan-Hansen J	1.08	0.84	1.85	4.06	1.49
Sargan-Hansen p-value	0.30	0.36	0.17	0.04	0.22

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.104***	0.066**	0.072**	0.096***	0.029**	0.014**	0.019*	0.031**
	(0.031)	(0.026)	(0.034)	(0.036)	(0.014)	(0.007)	(0.011)	(0.014)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	11.78	12.31	11.51	10.30	12.31	12.34	12.32	12.28
County	1,007	1,020	1,010	1,010	1,020	1,020	1,020	1,020
Sargan-Hansen J	0.59	0.69	0.28	0.04	6.21	2.16	3.18	5.42
Sargan-Hansen p-value	0.44	0.41	0.60	0.85	0.01	0.14	0.07	0.02

Note: The table reports estimation results using Equation (3) with two instruments from Black migration and White migration, separately. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Heteroskedasticity-robust Sargan-Hansen J statistics under the null of constant effects and related p-values are added. Stars represent: $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Table OA4: Placebo test - Random shift.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.135	-0.210	-0.086	-0.171	-0.226	-0.184	0.180
	(0.197)	(0.187)	(0.091)	(0.179)	(0.477)	(0.188)	(0.169)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	0.67	1.28	1.28	1.22	0.77	1.28	1.28
Counties	1,148	1,148	1,148	1,148	1,103	1,148	1,148

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	-0.372	-0.181	0.096	-0.288	-0.164
	(0.351)	(0.144)	(0.160)	(0.299)	(0.205)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	1.42	1.60	2.70	1.83	1.81
Counties	1,148	1,148	1,115	1,148	1,148

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	-0.075	-0.064	-0.145	-0.076	-0.217	-0.118	-0.161	-0.247
	(0.097)	(0.072)	(0.167)	(0.121)	(0.194)	(0.102)	(0.142)	(0.227)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	2.80	1.92	2.59	3.29	1.27	1.28	1.27	1.25
County	1,135	1,148	1,138	1,138	1,148	1,148	1,148	1,148

Note: The table reports estimation results using Equation (3) using random in-migration prediction. Specifically, I assign a random number of in-migration to Northern counties for instrument construction. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA5: Placebo test - Random share.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.018	-0.046	-0.028	0.070	0.728	-0.081	0.014
	(0.061)	(0.043)	(0.039)	(0.061)	(2.829)	(0.077)	(0.030)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	2.14	2.11	2.11	2.09	0.07	2.11	2.11
Counties	1,106	1,106	1,106	1,106	1,061	1,106	1,106

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.063	0.049	-0.017	0.081	0.153
	(0.102)	(0.061)	(0.224)	(0.136)	(0.138)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	2.03	2.13	1.19	2.08	2.30
Counties	1,106	1,106	1,074	1,106	1,106

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	-0.014	0.028	0.065	0.113	0.026	-0.001	0.006	0.027
	(0.068)	(0.049)	(0.129)	(0.150)	(0.035)	(0.015)	(0.024)	(0.040)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	1.90	2.01	1.81	1.56	2.10	2.11	2.10	2.07
County	1,093	1,106	1,096	1,096	1,106	1,106	1,106	1,106

Note: The table reports estimation results using Equation (3) using random in-migration prediction. Specifically, I randomly shuffle the number of migrants (1910-1940) between the origin-destination pair for instrument construction. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA6: Robustness - Alternative shift (actual number of in-migrants).

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.086**	0.024	-0.037	0.061	0.020	0.005	-0.016
	(0.037)	(0.017)	(0.025)	(0.038)	(0.149)	(0.035)	(0.019)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	8.77	8.12	8.12	8.27	6.14	8.12	8.12
Counties	1,148	1,148	1,148	1,148	1,103	1,148	1,148

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.124**	0.114**	0.206	0.145	0.214**
	(0.063)	(0.051)	(0.154)	(0.108)	(0.096)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	7.51	7.00	4.24	6.71	7.08
Counties	1,148	1,148	1,115	1,148	1,148

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.222***	0.118**	0.167	0.180*	0.056*	0.032	0.035	0.059*
	(0.084)	(0.052)	(0.102)	(0.095)	(0.030)	(0.020)	(0.023)	(0.032)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	8.37	7.45	7.99	7.79	8.10	8.12	8.08	8.05
County	1,135	1,148	1,138	1,138	1,148	1,148	1,148	1,148

Note: The table reports estimation results using Equation (3) using the actual number of in-migrants, rather than the predicted number of in-migrants, for instrument construction. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA7: Robustness - Alternative shift (random forest prediction).

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.096***	0.018	-0.044*	0.087**	0.049	-0.011	-0.022
	(0.036)	(0.016)	(0.025)	(0.036)	(0.138)	(0.033)	(0.018)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	10.83	10.68	10.68	10.81	7.13	10.68	10.68
Counties	1,148	1,148	1,148	1,148	1,103	1,148	1,148

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.139**	0.112**	0.208	0.161	0.220**
	(0.061)	(0.047)	(0.145)	(0.106)	(0.094)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	9.18	9.20	5.04	8.00	8.57
Counties	1,148	1,148	1,115	1,148	1,148

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.214***	0.113**	0.138	0.167*	0.060**	0.032*	0.038*	0.065**
	(0.081)	(0.050)	(0.094)	(0.088)	(0.029)	(0.018)	(0.022)	(0.030)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	9.67	9.54	9.24	8.92	10.64	10.68	10.62	10.58
County	1,135	1,148	1,138	1,138	1,148	1,148	1,148	1,148

Note: The table reports estimation results using Equation (3) using the alternative predicted number of in-migrants, predicted by the random forest algorithm. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Table OA8: Robustness - Alternative share (1935-1940 migration).

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.059**	-0.028	-0.057**	0.075**	0.323	-0.023	0.008
	(0.029)	(0.018)	(0.024)	(0.033)	(0.209)	(0.027)	(0.011)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	8.77	7.87	7.87	7.84	2.84	7.87	7.87
Counties	1,145	1,145	1,145	1,145	1,101	1,145	1,145

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	-0.038	0.041*	0.182	0.010	-0.011
	(0.032)	(0.023)	(0.126)	(0.058)	(0.042)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	9.96	8.38	5.83	8.51	9.09
Counties	1,145	1,145	1,112	1,145	1,145

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.145***	0.095***	0.179**	0.144**	0.031*	0.027**	0.025*	0.034*
	(0.047)	(0.036)	(0.082)	(0.059)	(0.018)	(0.014)	(0.015)	(0.021)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	11.01	8.92	10.39	10.40	7.87	7.87	7.88	7.86
County	1,132	1,145	1,135	1,135	1,145	1,145	1,145	1,145

Note: The table reports estimation results using Equation (3) using the alternative share based on "location 5 years ago" recorded in 1940 Census (Ruggles et al., 2024). Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA9: Robustness - Black migration.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.048*	0.014	-0.023	0.116***	0.168**	-0.009	0.023*
	(0.027)	(0.018)	(0.017)	(0.038)	(0.080)	(0.028)	(0.013)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	12.75	11.58	11.58	11.60	10.26	11.58	11.58
Counties	1,021	1,021	1,021	1,021	981	1,021	1,021

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.057	0.018	0.255***	0.097	0.099*
	(0.041)	(0.020)	(0.099)	(0.060)	(0.058)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	9.71	10.84	10.36	9.45	10.05
Counties	1,021	1,021	999	1,021	1,021

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.082**	0.080***	0.049	0.084	0.054**	0.022**	0.034**	0.057**
	(0.041)	(0.028)	(0.051)	(0.063)	(0.022)	(0.010)	(0.017)	(0.024)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	9.76	11.29	9.99	7.72	11.57	11.58	11.57	11.56
County	1,008	1,021	1,011	1,011	1,021	1,021	1,021	1,021

Note: The table reports estimation results using Equation (3) using the alternative share only using Black migration. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA10: Robustness - White migration.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.095**	-0.039**	-0.066**	0.057**	0.147	-0.041	0.008
	(0.037)	(0.018)	(0.026)	(0.025)	(0.103)	(0.027)	(0.014)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	9.44	10.72	10.72	10.69	8.11	10.72	10.72
Counties	1,147	1,147	1,147	1,147	1,102	1,147	1,147

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.039	0.041**	0.145*	0.030	0.079
	(0.040)	(0.021)	(0.077)	(0.063)	(0.054)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	10.63	10.46	8.78	9.77	10.17
Counties	1,147	1,147	1,114	1,147	1,147

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.132***	0.073*	0.078*	0.108**	0.014	0.002	0.006	0.017
	(0.046)	(0.038)	(0.047)	(0.050)	(0.016)	(0.008)	(0.013)	(0.017)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	12.32	11.18	11.23	12.02	10.68	10.72	10.67	10.60
County	1,134	1,147	1,137	1,137	1,147	1,147	1,147	1,147

Note: The table reports estimation results using Equation (3) using the alternative share only using White migration. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA11: Robustness - Subsample (former confederate).

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.070***	0.018	-0.015	0.058**	0.066	0.006	-0.025
	(0.027)	(0.013)	(0.015)	(0.024)	(0.178)	(0.024)	(0.016)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	13.86	14.14	14.14	14.23	11.60	14.14	14.14
Counties	906	906	906	906	878	906	906

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.109**	0.052**	0.162*	0.100	0.161**
	(0.046)	(0.022)	(0.088)	(0.072)	(0.066)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	12.35	13.34	8.63	11.62	11.85
Counties	906	906	881	906	906

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.112***	0.062**	0.041	0.080	0.043**	0.012	0.027**	0.052***
	(0.039)	(0.028)	(0.037)	(0.049)	(0.018)	(0.009)	(0.014)	(0.020)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	12.99	13.44	12.82	12.61	14.11	14.14	14.11	14.08
County	897	906	898	898	906	906	906	906

Note: The table reports estimation results using Equation (3) by limiting the sample to former Confederate states (Texas, Arkansas, Louisiana, Tennessee, Mississippi, Alabama, Georgia, Florida, South Carolina, North Carolina, and Virginia). Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.

Table OA12: Robustness - No contemporaneous controls.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.066**	-0.014	-0.035*	0.055**	0.037	-0.013	-0.015
	(0.026)	(0.011)	(0.020)	(0.024)	(0.162)	(0.021)	(0.011)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	6.21	8.57	8.45	7.97	2.73	8.49	8.41
Counties	1,244	1,244	1,244	1,244	1,185	1,244	1,244

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.061	0.034	0.133	0.064	0.084
	(0.040)	(0.030)	(0.088)	(0.057)	(0.052)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	7.68	7.03	7.26	7.47	7.81
Counties	1,148	1,148	1,115	1,148	1,148

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.065*	0.044	0.044	0.050	0.025	0.007	0.013	0.033
	(0.037)	(0.040)	(0.048)	(0.043)	(0.033)	(0.021)	(0.028)	(0.035)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	9.56	7.50	9.33	8.84	6.79	6.81	6.79	6.78
County	1,135	1,148	1,138	1,138	1,148	1,148	1,148	1,148

Note: The table reports estimation results using Equation (3) by dropping total population and contemporaneous net migration rate controls. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Table OA13: Robustness - Base year extension (1940, 1950, and 1960).

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.074***	-0.014	-0.043**	0.066***	0.039	-0.016	-0.016
	(0.026)	(0.014)	(0.018)	(0.024)	(0.168)	(0.024)	(0.013)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	14.76	14.99	14.99	15.03	8.56	14.99	14.99
Counties	1,148	1,148	1,148	1,148	1,103	1,148	1,148

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.097**	0.059***	0.199**	0.116*	0.135**
	(0.041)	(0.022)	(0.094)	(0.065)	(0.056)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	14.19	14.37	10.16	13.05	13.63
Counties	1,148	1,148	1,115	1,148	1,148

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.108***	0.074**	0.090*	0.092**	0.046**	0.021*	0.033**	0.056***
	(0.036)	(0.030)	(0.048)	(0.046)	(0.020)	(0.011)	(0.015)	(0.021)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	16.08	15.57	15.83	14.89	14.97	14.99	14.97	14.96
County	1,135	1,148	1,138	1,138	1,148	1,148	1,148	1,148

Note: The table reports estimation results using Equation (3). Compared to the baseline estimates, the results include 1960 values as the base. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940, 1950, and 1960. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Table OA14: Robustness - Balanced sample counties.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.069***	0.007	-0.028	0.081***	0.043	-0.002	-0.024*
	(0.027)	(0.013)	(0.017)	(0.026)	(0.173)	(0.025)	(0.014)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	13.02	13.14	13.14	13.18	8.16	13.14	13.14
Counties	1,063	1,063	1,063	1,063	1,063	1,063	1,063

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.131**	0.063**	0.210**	0.120*	0.146**
	(0.051)	(0.026)	(0.106)	(0.073)	(0.064)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	11.32	12.51	8.48	11.09	11.62
Counties	1,063	1,063	1,063	1,063	1,063

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.127***	0.082**	0.097*	0.105**	0.052**	0.024*	0.038**	0.065**
	(0.042)	(0.036)	(0.055)	(0.053)	(0.024)	(0.014)	(0.018)	(0.026)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	13.57	13.16	13.54	12.51	13.13	13.14	13.14	13.14
County	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063

Note: The table reports estimation results using Equation (3) by limiting the sample to balanced counties for all of the main variables. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

Table OA15: Robustness - 1940 population weighted regression.

Panel A. Agriculture

	(1) Employment	(2) Number of farms	(3) Acres in farmland	(4) Number of tractors	(5) Number of combines	(6) Farm output	(7) Farm value per acre
Out-migration rate	-0.072***	-0.016	-0.046***	0.066***	0.024	-0.019	-0.016
	(0.025)	(0.014)	(0.018)	(0.023)	(0.180)	(0.023)	(0.012)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	14.89	15.22	15.22	15.26	7.91	15.22	15.22
Counties	1,148	1,148	1,148	1,148	1,103	1,148	1,148

Panel B. Manufacturing

	(1) Employment	(2) Number of establishment	(3) Capital spending	(4) Value added	(5) Annual payroll
Out-migration rate	0.091**	0.060***	0.184**	0.106*	0.123**
	(0.039)	(0.022)	(0.091)	(0.060)	(0.052)
Fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
First-stage F	14.30	14.65	10.26	13.20	13.79
Counties	1,148	1,148	1,115	1,148	1,148

Panel C. Wholesale and retail

	(1) Wholesale emp.	(2) Wholesale est.	(3) Wholesale sales	(4) Wholesale payroll	(5) Retail emp.	(6) Retail est.	(7) Retail sales	(8) Retail payroll
Out-migration rate	0.110***	0.076***	0.096*	0.094**	0.048**	0.023**	0.035**	0.058***
	(0.035)	(0.029)	(0.049)	(0.045)	(0.019)	(0.011)	(0.015)	(0.021)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F	16.02	15.69	15.81	14.84	15.21	15.22	15.21	15.20
County	1,135	1,148	1,138	1,138	1,148	1,148	1,148	1,148

Note: The table reports estimation results using Equation (3) with 1940 county population as the weight. Panels A to C correspond to the baseline results in Tables 1 to 3 with the full set of fixed effects and control variables. Each column reports the changes in the indicated outcome variable for the years 1970 to 2010, relative to the omitted years of 1940 and 1950. Robust standard errors are clustered by county and reported in parentheses, and the first-stage Kleibergen-Paap robust F-statistics are reported. Stars represent: $* \ p < 0.10$, $** \ p < 0.05$, $*** \ p < 0.01$.