Received: 21 July 2022 | Revised: 19 June 2023 | Accepted: 5 July 2023

DOI: 10.1111/ajps.12870

AJPS AMERICAN JOURNAL of POLITICAL SCIENCE

ARTICLE

Trains, trade, and transformation: A spatial Rogowski theory of America's 19th-century protectionism

Kenneth Scheve[1] | **Theo Serlin**[2]

[1]Department of Political Science, Yale University, New Haven, Connecticut, USA

[2]Department of Political Science, Stanford University, Stanford, California, USA

Correspondence
Kenneth Scheve, Department of Political Science, Yale University, 115 Prospect Street, New Haven, CT, 06520, USA.
Email: kenneth.scheve@yale.edu

Abstract

We study the effect of expanding trade on societal coalitions through its impact on development. We combine a majoritarian political model with a spatial model of trade to argue that trade-induced economic change—by bringing new workers to locations closer to world markets—can lead to losses rather than gains in political power for the factors of production advantaged by increased trade. We study how this phenomenon explains rising protectionism in the United States from 1880 to 1900. Using county-level changes in transportation costs induced by railroad expansion, our estimates indicate that falling costs increased population and farm values but reduced the proportion of farmers. Reduced transportation costs caused a reduction in vote shares for the Democratic Party, which favored liberal trade policies, and an increase in an original newspaper-based measure of protectionist sentiment. Expanding trade alters not only political interests but also the geographic distribution of those interests.

In the late 19th century, falling transportation costs integrated US agriculture into the global economy. Steam-powered railways and ships made it possible for American farmers to export to Europe, and collapsed price spreads between European and American markets. These developments brought profound economic and political change to Europe, but their apparent effects on American politics were counterintuitive (Gourevitch, 1977). While falling trade costs should have benefitted farmers and other supporters of free trade, those elements were politically marginalized. The Republican Party, which was committed to high tariffs, became increasingly dominant over the period. This fact is counterintuitive because a large body of work in political science and economics works from the assumption that economic changes that make a group richer, also make it more powerful and increase the likelihood that it will be able to implement its preferred policy. Rogowski (1987, p. 1123) assumes "those who enjoy a sudden increase in (actual or potential) wealth and income will thereby be enabled to expand their political influence." Acemoglu et al. (2005) and Puga and Trefler (2014) both consider cases in which expanding international trade increased the power of merchants and enabled them to change political institutions.

This article asks why falling transportation costs, and an associated export boom (see Figure 1), empowered protectionist elements in the United States. We use county-level data on transportation costs, economic change, and voting, and develop a new measure of protectionism from newspapers. It was not just at the national level that the success of protectionists accompanied falling transportation costs. Counties that experienced decreases in the cost of accessing ports due to the expansion of the rail network shifted toward the Republican Party, and their newspapers became more protectionist. Our focus on county-level transportation costs allows us to rule out simpler solutions to the puzzle of rising protectionism. A theory in which the negative effects of import competition drive protectionism cannot explain why areas that saw large increases in land prices and population due to trade shifted toward protectionism. These positive economic effects also rule out a theory in which the economic rents from export opportunities are entirely

Verification Materials: The materials required to verify the computational reproducibility of the results, procedures, and analyses in this article are available on the *American Journal of Political Science* Dataverse within the Harvard Dataverse Network, at: https://doi.org/10.7910/DVN/PLKWUL.

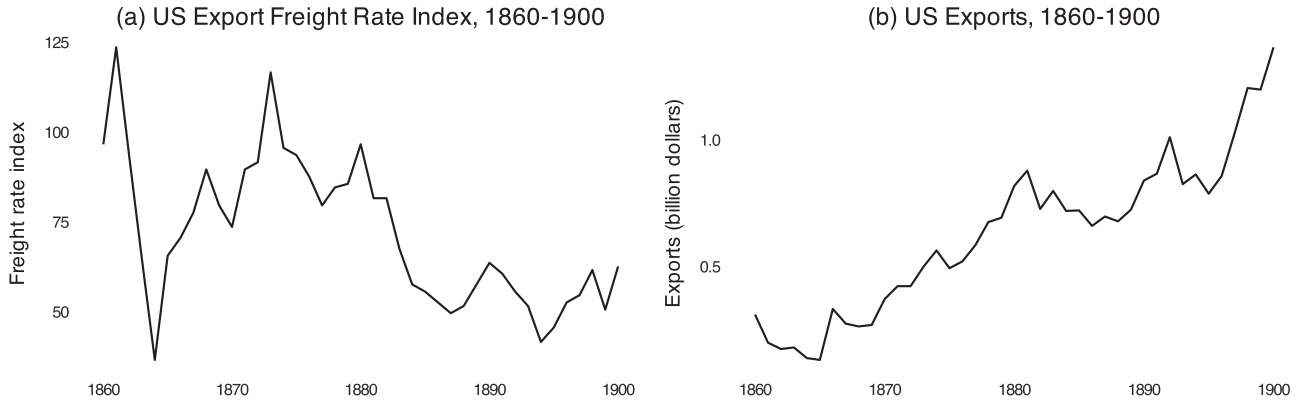

FIGURE 1 Late 19th-century decline in shipping costs and expansion of exports. *Note*: The left panel plots a measure of the cost of transportation from North (1958); the right panel plots US exports over time from Carter et al. (2006).

captured by intermediaries. Though developments unrelated to trade may have driven voters toward the Republican Party, there is no reason to expect these developments to be correlated with changing access to world markets, or with protectionism.

We argue that trade altered the spatial distribution of economic activity, economic factors, and economic interests. We develop a spatial equilibrium trade model with two factors of production: land and labor. We assume that labor is mobile between regions, and so interregional differences in real wages are arbitraged away by migration. As US exports were land-intensive, workers had an economic interest in protectionism. Decreases in transportation costs increase the price received by agricultural exporters, increasing labor demand and migration in the agricultural hinterland. The in-migration of protectionist workers dilutes the political power of landowners.

Our argument draws on Rogowski's (1987, 1990) seminal model of the effect of changing exposure to trade on political cleavages. Rogowski combines a Heckscher–Ohlin trade model in which factors of production are mobile across sectors, with a model of politics in which wealth and income increase political power. The Heckscher–Ohlin model generates the sharp prediction that relatively abundant factors will favor trade, and relatively scarce factors will oppose it. Rogowski argues that in periods of rising international trade, conflict between trade's domestic winners and losers should become more important to domestic politics, and that the power of the winners should increase. While our account shares Rogowski's assumptions about the interests of different actors, the spatial dimension of our theory suggests a different set of results.

Our findings are relevant to scholarship on the effects of trade on domestic politics. Some scholars have extended Rogowski's framework by adopting alternative assumptions about the economic model that describes who wins and loses from increased trade. In an important alternative economic model, variation in intersectoral factor mobility determines whether political cleavages over trade fall along factor or industry lines (Hiscox, 2002; Ladewig, 2006). Another perspective holds that heterogeneity in productivity among firms generates intraindustry divisions over trade (Kim, 2017; Kim & Osgood, 2019). Others have studied how variation in political institutions influences both the importance of trade to broader political cleavages in a society and the way trade interests influence policy outcomes (Alt & Gilligan, 1994; Milner & Kubota, 2005).

This research does not address how in most countries conflict over trade is fought across space as well as across factors, industries, and firms. Broz et al. (2021) argue that how trade affects communities may be most consequential for how it is politicized and how it influences national politics. Research on the geography of trade politics generally takes the spatial distribution of economic activity as given and investigates how a given change in exposure to trade differentially affects political outcomes across locations. This approach is well represented in the large literature on the political consequences of China's integration into the world economy (Autor et al., 2020; Ballard-Rosa et al., 2021; Che et al., 2022; Colantone & Stanig, 2018; Feigenbaum & Hall, 2015; Milner, 2021). Other scholars have emphasized how the geographic distribution of economic activity affects the ability of firms in industries to solve collective action problems and influence politics, and how the spatial distribution of trade interests interacts with political institutions to determine the effect of trade on national politics (Busch & Reinhardt, 1999, 2000; McGillivray, 2004; Rickard, 2018).

While this broad approach to the political economy of geography in trade politics provides important insights into how the spatial distribution of economic activity affects national politics and policy

outcomes, it does not address a consequential adjustment mechanism to changing exposure to trade: the geographic locations of workers. A large literature in trade and urban economics has emerged over the last two decades that provides a theoretical and empirical framework for understanding how space influences the geographic distribution of economic activity (Donaldson & Hornbeck, 2016; Donaldson, 2018; Fajgelbaum & Redding, 2022). One key element of this framework is that the gravity dynamics that shape international trade and migration also apply within countries. While this research has explored how migration affects the impact of trade on the economy, it has not investigated its consequences for the effect of trade on political cleavages and policymaking.

In this article, we take steps in this direction by adopting a spatial model of international trade in which workers are mobile across regions within a country. The model's core insight is that increased exposure to trade in the agricultural hinterland induces economic development and, in doing so, alters the composition of those who gain and lose from free trade across regions and countries. Trade, development, and mobility combine to alter not only the interests of different economic actors but also their spatial distribution.

We argue that decreased trade costs induced new workers to move to regions growing because of greater trade. While falling internal transportation costs increased labor demand in the agricultural periphery, high tariffs increased labor demand in the industrial core, and so the workers who migrated into the periphery still favored protectionism. Furthermore, economic expansion due to falling internal transportation costs induced immigration to the United States, increasing the share of protectionist workers in the electorate at large. Development and mobility explain why trade can lead to the loss of political power by the factors of production most advantaged by increased trade, in this case landowners and the Democratic Party.

To test our argument empirically, we primarily study two political outcome variables: the two-party vote for the Democrats and support for protectionism. For the latter, we develop a new county-by-decade measure using data from 5601 newspapers in 1246 counties, from the Newspapers.com database over the 1860 to 1900 period. The measure is based on the frequency of terms predictive of support for protectionism, which we identify by comparing texts of known protectionist and free trade publications.

Our model also predicts that increasing exposure to trade in agricultural regions will increase population, farm values, and agricultural production, and reduce the share of landowners. We construct county-level measures of these variables from the US population census and census of agriculture, proxying for landowners with farmers.

The key independent variable in both our theoretical and empirical analysis is log port access, defined as the natural log of one over the iceberg cost of transportation to the nearest port. We compute this measure at 10-year intervals, using the transportation network database created by Donaldson and Hornbeck (2016) and updated by Hornbeck and Rotemberg (2019). This variable measures exposure to trade for each county and changes in this measure over time are driven by the expansion of the US rail network.

Following Donaldson and Hornbeck (2016), we estimate the effect of changes in the rail network in a difference-in-differences framework. We regress each outcome variable on log port access with county and state-by-year fixed effects. We also control flexibly for the length of railway within 40 miles of the county centroid. This means that our estimates of the effect of port access depend on changes in the network distant from and likely unrelated to the counties affected. This increases the plausibility of the parallel trends assumption necessary for a causal interpretation.

We find that falling transportation costs increased farm output, farm values, population density, and the number of immigrants, but reduced the share of farmers in the population. We show that reduced transportation costs caused a reduction in county vote shares for the Democratic Party, which at this time represented the interests of agriculture and advocated liberal trade policies, and caused an increase in support for protectionism. This pattern of results is consistent with our model that emphasizes the importance of trade attracting new workers and changing the spatial composition of societal actors for and against protectionism.

Our model generates predictions about both the interests and spatial distribution of different actors that together explain the local and national strength of protectionists in the late 19th-century United States. We note, however, that the most important theoretical insight is that geographic mobility influences political adjustment to economic change. Had voters who were Republicans or protectionists for other reasons moved to growing regions newly connected to global markets, development and mobility would still explain the puzzle of late 19th-century American protectionism. We find mixed evidence in this case for a number of possible cultural explanations of the preferences of the in-migrants, but such preferences can be accommodated in our framework.

Our analysis of the puzzle of America's 19th-century protectionism links to foundational scholarship on the topic. Goldstein (1993) argues that the Republican Party's intellectual commitment to the tariff explains the persistence of protectionism even as

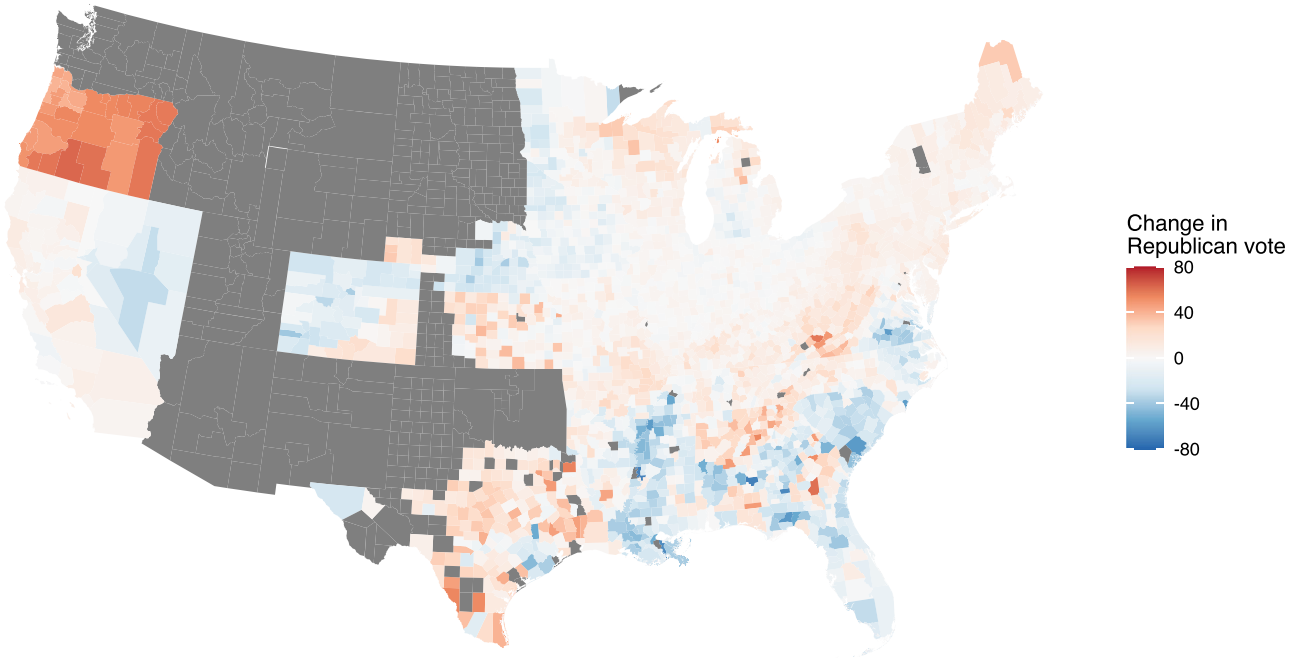

FIGURE 2 Changing geographical distribution of the Republican vote. *Note*: This figure shows the percentage point change in the Republican Party share of the two-party vote between 1880 and 1900 (Clubb et al., 1987).

the country's comparative advantage changed. Lake (1988) argues that Britain's commitment to free trade allowed exporting industries to support protectionism at home without losing export opportunities through retaliation abroad. These analyses—and others that link the success of protectionism in this context to the size and growth of import-competing manufacturing (for instance, Frieden (1988) with respect to the interwar period)—focus on the interests and attitudes of industrialists.

This article focuses mainly on agriculture, and uses within-country variation in trade costs and protectionist sentiment to explore a different puzzle: that free trade supporters in agriculture lost out politically even at the local level despite gaining economically from falling transportation costs. Mapping the county-level change in Republican votes between 1880 and 1900, we see not just an increase in the level of support for the protectionist party across the board, but that the party also made substantial inroads in agricultural parts of the South, Midwest, and West (Figure 2). This article relates more closely to Gourevitch (1977) and Rogowski (1990), who argue that while falling transportation costs should have empowered farmers, the Democrats' fusion with the Populists alienated industrial workers from that rising coalition. In relation to those analyses, this article addresses changes in voting and attitudes in the agricultural regions affected by changing trade costs, and documents stronger effects before the 1890s realignment.

The rest of the article proceeds as follows. We first outline our theoretical model and derive estimating equations. Next, we describe our data measuring port access, protectionism, and other economic and political outcomes. This section also presents our research design and estimation strategy. The following section takes the model to the data and presents our estimates for the effect of lower trade costs on our main outcomes. It further provides evidence of our preferred mechanism by showing that the results are driven by counties with relatively high levels of agricultural activity. There is no evidence that trade costs mattered in counties unlikely to export agricultural goods to the rest of the world. We conclude by discussing the role of mobility as an adjustment mechanism in other settings.

A SPATIAL ROGOWSKI THEORY OF TRADE, DEVELOPMENT, AND LATE 19TH-CENTURY AMERICAN PROTECTIONISM

This section presents a spatial equilibrium model that provides the foundation for our argument about how development and mobility influence the effect of trade on political cleavages. The model links a spatial trade model drawing on Coşar and Fajgelbaum (2016) and Fajgelbaum and Redding (2022) with a model of majoritarian politics (Mayer, 1984; Rogowski, 1987).

The model begins with an economy with multiple regions. Regions specialize in the exporting agricultural or import-competing manufacturing sector, and in these regions firms hire land and labor under perfect competition. Agriculture is sufficiently more land-intensive than manufacturing that if the country shifts production from agriculture to manufacturing, it will increase demand for labor. This difference in factor intensities between sectors generates effects analogous to Stolper–Samuelson. Reductions in international trade costs benefit agricultural landowners and harm labor.

Where the model departs from Mayer's and Rogowski's is in considering migration between multiple regions. Drawing on literature in spatial economics (Roback, 1982), we assume interregional labor migration and a spatial equilibrium condition. In equilibrium, the real wage for workers should be equalized across regions. If wages were higher in a given region, other workers would migrate there, increasing the local supply of labor and pushing wages down.

Spatial equilibrium affects the level at which policy preferences are formed. A policy that affects a given region positively but others negatively should only be supported by workers if it raises wages at the national level. If a positive shock to one region is offset by larger negative shocks to other regions, workers in the positive shock region are made worse off, as migration will equalize wages between regions.

Because workers gain from protectionism, and are mobile, reducing the cost to a region of accessing the global economy has divergent economic and political effects. Reducing trade costs benefits exporters by raising the price they receive, and so stimulates economic activity, which brings workers into the region. The increase in workers increases the share of the population supportive of protectionism, increasing the protectionist vote and the market for protectionist-leaning media.

We study the effects of changing transportation costs on economics and politics in a given region *i*. We first analyze the partial equilibrium economic effects of these changes in a region holding national-level aggregates constant, which allows us to derive "fixed effects" estimating equations. We then analyze the national-level effects of the changes on real wages and thus on immigration, and derive predictions about actors' politics. Lastly, we derive predictions about how these changes affect politics at local and national levels.

Model primitives

Each region i contains T_i units of land and a continuum of firms. Firms rent land at rental rate r_i, hire labor at wage rate w_i, and take wages, rents, and prices for the manufactured and agricultural goods P_{iM} and P_{iA} as given.

Firms produce goods using technology of the form

$$q_{ij} = z_{ij} n_{ij}^{1-\alpha_j}, j \in \{A, M\},$$

where q_{ij} is production per unit of land in region i in sector j, z_{ij} is productivity, n_{ij} is employment per unit of land, and $\alpha_j \in (0,1)$ is the land intensity of the sector. Firms choose employment to maximize profits:

$$\max_{n_{ij}} P_{ij} q_{ij} - w_i n_{ij}.$$

Solving this objective gives an expression for labor demand per unit of land in a given sector that is increasing in prices and productivity and decreasing in wages:

$$n_{ij} = \left(\frac{P_{ij} z_{ij}}{w_i}\right)^{\frac{1}{\alpha_j}} (1-\alpha_j)^{\frac{1}{\alpha_j}}.$$

In each region, there are L_i landowners who each rent $\frac{T_i}{L_i}$ units of land to firms. Perfect competition by firms ensures that rent per unit of land equals the difference between the value of output and labor costs:

$$r_{ij} = \max_{n_{ij}} P_{ij} q_{ij} - w_i n_{ij},$$

which combined with the solution for labor demand, n_{ij}, gives an expression for the ratio of rents to wages:

$$\frac{r_{ij}}{w_i} = \frac{\alpha_j}{1-\alpha_j}\left(\frac{P_{ij} z_{ij}}{w_i}\right)^{\frac{1}{\alpha_j}} \left(1-\alpha_j\right)^{\frac{1}{\alpha_j}} = \frac{\alpha_j}{1-\alpha_j} n_{ij}.$$

Individual preferences for consumption of agricultural and manufactured products (c_A and c_M) are Cobb–Douglas, with consumers spending fraction γ of their budgets on agricultural goods:

$$v(c_A, c_M) = \left(\frac{c_A}{\gamma}\right)^{\gamma} \left(\frac{c_M}{1-\gamma}\right)^{1-\gamma}.$$

These preferences imply indirect utility for workers—the real wage—increasing in wages and decreasing in prices:

$$u(w_i, P_{iA}, P_{iM}) = \frac{w_i}{P_{iA}^{\gamma} P_{iM}^{1-\gamma}}.$$

We denote national population by $\bar{N}(u^*)$. We assume that national population is an increasing function of the real wage, which would be the case if workers in other countries face heterogeneous costs of immigrating to the United States.

Equilibrium conditions

In equilibrium, the following conditions hold:

(i) Workers migrate freely to regions with higher real wages, and so if a region i has positive population, $\frac{w_i}{P_{iA}^{\gamma} P_{iM}^{1-\gamma}} = u^*$, where u^* is the national real wage.
(ii) The land market clears. Landowners rent all land to the sectors which are prepared to pay the highest rents for land, and so for all sectors j, k with positive production in region i, $r_{ij} = r_{ik}$, and for all sectors l that do not produce, $r_{il} < r_{ij}$.
(iii) Firms choose labor to maximize profits, $n_{ij} = \arg\max_{n_{ij}} P_{ij} q_{ij} - w_i n_{ij}$.
(iv) The country is open to trade, imports the manufactured good and exports the agricultural good. These trade dynamics and arbitrage ensure that the price of the agricultural good is its price in world markets P_A^*, divided by δ_i, the iceberg cost of exporting goods to world markets. To sell 1 unit of the agricultural good in world markets, a producer in region i must ship δ_i units. The price of manufactured goods is its price in world markets P_M^* multiplied by the cost of importing it from those markets, which includes both transportation costs δ_i and tariffs τ.[1]
(v) The real wage u^* and national population $\bar{N}(u^*)$ adjust so that the national labor market clears, $\bar{N}(u^*) = \sum_i n_i T_i$.

Local economic effects

Conditions (i)–(iv) characterize a small open economy. We first derive partial-equilibrium predictions of increasing trade access relying only on these conditions, which gives equations that we can estimate holding time- and place-invariant factors fixed, and then verify that these predictions hold in general equilibrium.

Given these equilibrium conditions, regions specialize in the more profitable sector. Rents in agriculture and manufacturing are functions of the wage and industry-specific productivities, prices, and labor shares. As the real wage is pinned down by mobility across regions, rents will not, except in knife-edge cases, balance across sectors. Regions with greater relative productivity in agriculture, and lower costs of accessing global markets, will specialize in the agricultural sector.

We consider the effects of decreasing transportation costs on regions specializing in agriculture. We focus on these regions because during the period we study, transportation improvements primarily served to connect the agricultural hinterland to the global economy; manufacturing-intensive regions in the Northeast already had strong transport links.[2]

While we refer to the import-competing industry as manufacturing and the exporting industry as agriculture, our model does not rely on there being two industries or on the particular identities of those industries. We would expect similar effects of increasing trade access on regions specializing in exporting manufacturing sectors.

Substituting the expressions for the real wage from (i) and for prices from (iv) into the expression for labor demand in the agricultural sector gives local employment density n_i:

$$n_i = n_{iA} = \left(\frac{z_{iA}}{u^*} \left(\frac{P_A^*}{P_M^* \tau \delta_i^2} \right)^{1-\gamma} \right)^{\frac{1}{\alpha_A}} (1-\alpha_A)^{\frac{1}{\alpha_A}}. \quad (1)$$

This expression for n_{iA} is decreasing in δ_i. Reducing trade costs raises the price received by exporters, increasing demand for labor in the region. Writing the total number of workers as $n_i T_i$ and taking logarithms gives the following estimating equation:

$$\begin{aligned} \ln \text{workers}_i = \frac{2(1-\gamma)}{\alpha_A} & \underbrace{\ln\left(\frac{1}{\delta_i}\right)}_{\text{ln Port Access}} \\ & + \underbrace{\ln\left(\left[z_{iA}(1-\alpha_A) \right]^{\frac{1}{\alpha_A}} T_i \right)}_{\text{County FE}} \\ & + \underbrace{\ln\left(\frac{1}{u^*} \left(\frac{P_A^*}{P_M^* \tau} \right)^{1-\gamma} \right)^{\frac{1}{\alpha_A}}}_{\text{Year FE}}. \end{aligned} \quad (2)$$

Holding constant region-specific productivity (z_{iA}) and land (T_i), which should be stable in a given region over time, and world prices (P_A^*, P_M^*), tariffs (τ), and

[1] This condition embeds an assumption that regions that produce more of the manufactured good than they consume can sell to locations further inland, where the higher price of the manufactured good nets out the transportation cost. Given that US manufacturing in this period was concentrated in the Northeast near major ports, this assumption should be satisfied in the context we study.

[2] In Online Appendix B.1, p. 3, we derive equivalent results for regions specializing in the import-competing sector.

real wages (u^*), which should be constant across all regions in a given period, we predict that increasing the log inverse of transportation costs—which we refer to as "log port access"—should have a positive effect on log population.

The model also implies predictions for the effects of changing transportation costs on agricultural production $P_{iA}q_{iA}$, and the value of farms (r_iT_i), both of which are increasing functions of n_{iA}, and for the log odds share of landowners, which is decreasing in n_{iA}. We derive analogous expressions to (2) for these outcomes in Online Appendix B.2, p. 5, that also imply a log-linear effect of port access.

Condition (i) assumes that real wages equalize between locations. The simplest way that this could be the case is if all workers are mobile, and so regions with higher real wages attract in-migration, pushing wages down. While this assumption is perhaps plausible given the high rates of internal mobility in the United States in this period (Ferrie, 2005), it is not necessary for real wages to equalize. If only some workers are mobile, and in equilibrium each location has some mobile workers, then the same spatial equilibrium condition must apply, or mobile workers would leave the low-wage locations. This weaker assumption is especially plausible given high rates of immigration to the United States during this period. If immigrants migrate to the places with the highest wages, then in doing so they push down wages in those places ensuring spatial equilibrium.

National economic effects

Decreasing transportation costs to the agricultural hinterland raises real wages and increases immigration. The intuition for this result is that decreasing internal transportation costs to agricultural regions increases labor demand in those regions, motivating in-migration and bidding up national wages, which in turn drives immigration to the United States. We derive this result in Online Appendix B.3, p. 7. We show in Online Appendix B.4, p. 8, that the same logic implies that the partial equilibrium results in the previous section hold accounting for the effects of port access on real wages.

Preferences over tariff policy

The model predicts that increasing port access increases the share of workers in the population, at both the local and national levels. How that change affects trade policy and voting depends on the preferences of workers over tariff policy. In Online Appendix B.5, p. 9, we show that the real wage is increasing in the tariff if raising the tariff raises total labor demand.[3] The logic for this result is that the real wage is determined in equilibrium by labor demand from agriculture and manufacturing, and labor supply from immigration. Given that the tariff decreases labor demand in the agricultural sector and increases it in the manufacturing sector, the question is whether the latter effect will offset the former. We show that the positive effect of the tariff on manufacturing employment offsets its negative effect on agricultural employment if the following inequality holds:

$$\frac{\gamma}{1-\gamma}\frac{\alpha_A}{\alpha_M} > \frac{N_A}{N_M}.$$

Labor will be protectionist if agricultural goods are a large part of the consumer's budget (γ is large), if the exporting sector is more land-intensive than the import-competing sector ($\alpha_A > \alpha_M$), and if labor's employment in the exporting sector (N_A) is not too large relative to the import-competing sector (N_M).

Historical estimates suggest this inequality should hold in the period we study, making it plausible that workers should have favored protectionism. An 1875 survey in Massachusetts found consumers spent 62% of their budgets on food and fuel, 23% on dry goods, apparel, and sundries, and the remainder on rent (Williamson, 1967). Classifying the first group as agricultural and the second as manufactured implies $\gamma = .73$. Budd (1960) estimates labor shares of 19.3% in agriculture and 50.9% in manufacturing in 1880, implying $\alpha_A = .807, \alpha_M = .491$. Given these estimates, employment in the exporting sector would have had to be more than 4.4 times employment in the import-competing sector for workers to prefer free trade. In the 1880 census microdata, employment in agriculture was 3.6 times employment in manufacturing, and excluding farmers, many of whom would be better classified as landowners, gives a figure only 1.5 times manufacturing employment.

Voting

We have shown that increasing port access in agricultural regions should increase the share of workers in the population relative to landowners, and that in such regions workers should favor protectionism and landowners free trade.[4] During the period we study the parties were sharply divided on the issue of the tariff. Increasing the share of workers in the electorate at

[3] We also show in Online Appendix B.6, pp. 9–11, that agricultural landowners gain from free trade and manufacturing landowners lose from it.

[4] We would not expect port access to change politics in manufacturing regions, where both landowners and workers would favor protectionism.

both the local level due to economic expansion and the national level due to immigration should increase the share of the vote won by the protectionist party. This result will hold even if we relax the assumptions about factor sizes and mobilities and simply take the policy preferences of different classes as given.

We model the share voting for the free trade party as a contest function that takes as inputs the number of landowners, the number of workers, and k_i, a place-specific variable that magnifies the power of landowners:

$$s_i = \frac{(k_i L_i)^\theta}{(k_i L_i)^\theta + (n_i T_i)^\theta}.$$

The parameter θ determines how responsive changes in voting are to changes in the electorate. If all voters simply vote for the party proposing the tariff policy that benefits them the most, we should observe $\theta = 1$, though values greater than 1 are plausible if voters are themselves influenced by the composition of the electorate, perhaps if workers are wary of voting against their landlord's interests when they are numerically outnumbered.

Taking the log odds and substituting the identity for n_i from Equation (1) gives another estimating equation:

$$\ln\left(\frac{s_i}{1-s_i}\right) = -\frac{2\theta(1-\gamma)}{\alpha_A}\underbrace{\ln\left(\frac{1}{\delta_i}\right)}_{\text{ln Port Access}} - \underbrace{\theta \ln\left(\left[z_{iA}(1-\alpha_A)\right]^{\frac{1}{\alpha_A}}\frac{T_i}{k_i L_i}\right)}_{\text{County FE}} - \underbrace{\frac{\theta}{\alpha_A}\ln\left(\frac{1}{u^*}\left(\frac{P_A^*}{P_M^*\tau}\right)^{1-\gamma}\right)}_{\text{Year FE}}. \quad (3)$$

This contest function allows us to derive an estimating equation for voting that is comparable to those for the economic outcomes, but we do not take a strong stance on this functional form. Other microfoundations could generate the same qualitative prediction that increasing the share of workers increases support for the protectionist party.

In summary, the model predicts that increasing log port access in the agricultural hinterland should be associated with an increase in log population, agricultural output, and land values, and a decrease in the log odds share of landowners and vote for the free trade party. In the following section, we will directly test these predictions.

DATA AND EMPIRICAL STRATEGY

We study the effects of changes in the transportation network on county-level economic development and support for protectionism. The main predictions of our model concern the effects of log port access, the log inverse of the iceberg transportation cost to ports. We compute this measure at 10-year intervals, using the transportation network database created by Donaldson and Hornbeck (2016) and updated by Hornbeck and Rotemberg (2019). Donaldson and Hornbeck combined shapefiles of America's rivers, canals, and railroads with estimates of mode-specific transportation costs and of wagon and sea shipping routes, to estimate the cost of shipping goods between any two US counties. We focus on the cost of shipping goods from all counties to the 11 largest ports, which in 1880 accounted for 93% of US exports.[5] Changes in this measure over time are driven by the expansion of the US rail network. In the 1880–1900 period, expansion in the railway network mainly affected agricultural regions in the interior; manufacturing hubs in the Northeast already had rail connections to ports in 1880 (Figure 3, right panel). We also use the Donaldson–Hornbeck database to calculate the length of railroad within 40 miles of each county's centroid.

Our formal model predicts that increases in port access should increase population, farm values, and agricultural output in agricultural counties. We use county-level data on these variables from the US population census and census of agriculture (Haines and Inter-University Consortium For Political And Social Research, 2005), which we harmonize to 1890 boundaries following Hornbeck (2010). The model also predicts that port access should decrease the log odds share of landowners. We proxy for the share of landowners with the share of farmers, which we calculate using the complete-count data from the 1880 and 1900 censuses (Ruggles et al., 2021).[6]

Our primary dependent variable is the share of the two-party vote won by the Democratic Party. The parties were sharply polarized on the issue of the tariff, with the Republicans advocating for protectionism and the Democrats free trade (Epstein & O'Halloran, 1996). We use county-level presidential election returns from Clubb et al. (1987). We begin our analyses in 1880, after the end of Reconstruction, in order to avoid accidentally capturing changes in voting patterns related to the Civil War. We end our analyses in 1900 as US comparative advantage began to shift away from agriculture, and comparative

[5] These ports are Baltimore, Boston, Charleston, Galveston, New Orleans, New York, Norfolk, Philadelphia, Portland ME, San Francisco, and Savannah (*Statistical Abstract of the United States 1892*, 1893, 66).
[6] The 1890 records were destroyed in a fire.

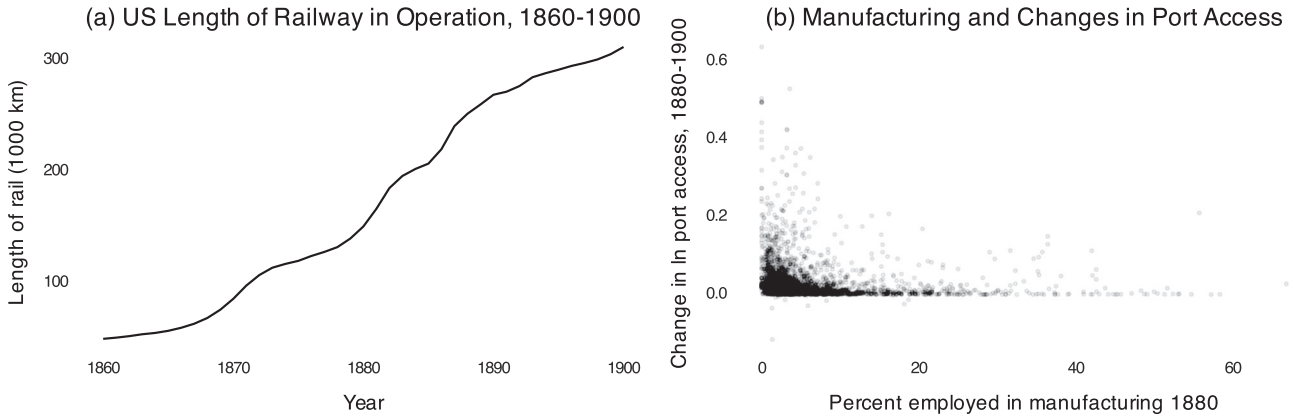

FIGURE 3 US railroad expansion: the variance of the change in port access between 1880 and 1900 was larger in less-industrialized regions. *Note*: The left panel shows the total length of US rail in operation 1860–1900 (Palgrave Macmillan Ltd, 2013); the right panel plots the change in log port access between 1880 and 1900 against the share of the population employed in manufacturing in 1880.

advantage in agriculture is a necessary condition for our theory.

In the model, areas shift toward the Republicans as they develop because the local share of workers, who gain from protectionism, increases. We use two measures of protectionism from newspapers to test whether areas became more protectionist as well as more Republican. We develop our primary measure following scholarship on media bias (Gentzkow & Shapiro, 2010; Martin & Yurukoglu, 2017), by creating a data set of newspapers known to be more protectionist, which we pair with others published in the same city at the same time. We train a Lasso model to predict whether a newspaper in this data set is protectionist based on the frequency of specific terms in articles on trade, and then use the coefficients from the Lasso to predict protectionism in other newspapers. We detail the construction and validation of this measure in Online Appendix A, pp. 1–3. As an alternative measure, we use the relative frequencies of terms associated with the protectionist and free trade causes as listed by Hirano and Snyder (2024). Each measure addresses the other's limitations. The Hirano–Snyder measure is intuitive and transparent, but relies on the ad hoc choice of terms; the Lasso measure provides a data-driven but less transparent alternative.

Our preferred empirical specification is of the form

$$Y_{ist} = \beta \ln(\text{port access})_{ist} + f(\text{rail length}_{ist}) + \gamma_{is} + \delta_{st} + \varepsilon_{ist},$$

where Y_{ist} is an outcome of interest for county i in state s at time t, log port access is defined as above, $f(\text{rail length}_{ist})$ is a third-degree polynomial in the length of railway within 40 miles of the country centroid, γ_{is} is a county fixed effect, and δ_{st} is a state-by-year fixed effect.

If the dependent variable is log population, this estimating equation is an almost direct analog to Equation (2). If the dependent variable is the log odds Democrat share of the vote, it is analogous to Equation (3).

The coefficient β identifies the causal effect of port access on Y_{ist} provided that counties that experienced greater increases in port access in a given year were not otherwise following different trajectories to counties in the same state, which experienced smaller changes in port access. Flexibly controlling for local railroad access, following Donaldson and Hornbeck (2016) and Hornbeck and Rotemberg (2019), makes this identification assumption more plausible. While local changes in railroad access are likely endogenous to economic and political developments, distant changes in the transport network, which increase access for some counties but not others, are less plausibly related to the counties affected.

In addition to these controls, we employ traditional difference-in-differences checks, examining whether 1880–1900 changes in port access correlate with trends in voting over the 1860–1880 period, estimating models controlling for county time trends, and controlling for a range of plausible confounding factors interacted with year indicators.

RESULTS

Economic effects

Table 1 documents the effects of expanding port access on economic change. Consistent with the predictions of the model, we find large positive effects on log

TABLE 1 Effects of port access on population and agriculture, 1880–1900.

	ln population	ln farm output	ln farm value	ln odds farmers	ln immigrants
	(1)	(2)	(3)	(4)	(5)
ln port access	.85**	2.06*	1.61*	−1.10†	3.03**
	(.30)	(.78)	(.69)	(.55)	(.83)
Dependent variable mean	9.43	13.19	14.54	−.64	5.82
R^2	.99	.95	.96	.98	.99
N	7776	7754	7754	5168	7775

Note: This table shows the results of regressions of county-level economic variables on port access, defined as the log of the inverse of transportation costs to the nearest major port. All models include county and state-by-year fixed effects and control for a third degree polynomial in the length of railroad within 40 miles of the county centroid. In model (1) the dependent variable is log population, in (2) the log value of agricultural output, in (3) the log value of farms, in (4) the log odds share of farmers in the population, and in (5) the log number of foreign-born residents. Models are weighted by 1880 population. Standard errors clustered by state in parentheses.
† $p < .10$; * $p < .05$; ** $p < .01$.

population (1), farm output (2), and farm values (3), and a negative effect on the log odds share of farmers (4). A 1% increase in port access, is associated with a .85% increase in population, and has larger effects still on agricultural production and farm values. These results make sense if improved transportation infrastructure made it possible for farmers to participate in global markets, creating incentives for increased production, bidding up land values and increasing labor demand. Our estimates are close to the elasticities predicted by the model given historical data on the theoretical parameters. The model calibrated at the historical parameters $\gamma = .73, \alpha_A = .807$ would predict coefficients in models (1)–(4) of .67, 1.13, 1.30, and −.67. In all cases, the theoretical prediction falls in the 90% confidence interval of the estimate, implying that our theoretical model can account for the empirical results.

Model (5) indicates that expanding port access was associated with an increase in the immigrant population disproportionate to the population increase. While this result is not a direct prediction of the model, it is relevant to the model in three ways. First, the model predicts that falling internal transportation costs should motivate immigration to the United States. Much scholarship in labor economics finds that immigrants' location decisions are more responsive to local economic changes, and so we might expect people migrating to the United States because of economic growth in the agricultural hinterland to locate in the regions growing (Cadena & Kovak, 2016). Second, the existence of large numbers of immigrants moving to rapidly growing regions and thus equilibrating wages makes the spatial equilibrium assumption underpinning our analysis of actors' preferences more plausible, even if the native-born population was not perfectly mobile.[7] Third, we would expect, and indeed find in Table A-16, Online Appendix, p. 20, that immigrants were less likely to own real estate, and so increasing the share of immigrants should decrease the share of landowners.

While we focus mainly on agricultural expansion, the predictions of our model should also hold for other exporting industries. In Table A-5, Online Appendix, p. 12, we document a positive association between log port access and the log share in manufacturing and manufacturing output. Decomposing the effect by industry, we find the growth in the manufacturing employment share is entirely driven by the wood industry—logging and sawmills—implying that port access led to an expansion of resource-intensive exporting sectors, and not manufacturing in general.

Political effects

We then move to study the effects of these economic changes on voting behavior. Table 2 shows the results of regressions of the Democratic share of the two-party vote on port access. As the dependent variable, we use both the log odds of this share, which is consistent with our model, and the raw percentage, which is easier to interpret and less sensitive to values near 0 and 100.[8] Models (1) and (2) implement our base specification—with fixed effects and controls for local railroad access in (2)—and find that a 1% increase in port access is associated with around a half percentage point reduction in the Democratic vote. Model (3) controls for log market access to counties within 50 miles, defined as in Donaldson and Hornbeck (2016) as a weighted sum of county populations, weighted by the inverse of transportation costs. This variable controls for railroad connections to close internal markets. Model (4)

[7] The labor economics literature documents falling rates of internal migration in the United States since the 1980s, and little migration in response to economic shocks like the China shock and recession. However, locations with large immigrant populations experience stronger migration responses and weaker wage responses to economic changes (Cadena & Kovak, 2016).

[8] To calculate the log odds, we cap the Democratic voteshare at 2.5% and 97.5%.

TABLE 2 Effects of port access on voting Democrat, 1880–1900.

	Democrat (%)				ln odds	
	(1)	(2)	(3)	(4)	(5)	(6)
ln port access	−59.48**	−51.45**	−36.74*	−20.78*	−2.92**	−1.21*
	(12.14)	(11.47)	(14.94)	(8.05)	(.67)	(.57)
Railroad controls		x	x	x	x	x
ln MA within 50 miles			x			
1880 % White × election				x		x
1880 ln density × election				x		x
Dependent variable mean	53.75	53.75	53.75	53.75	.23	.23
R^2	.90	.90	.91	.92	.89	.91
N	9878	9878	9878	9878	9878	9878

Note: This table shows the results of regressions of county-level presidential voting on port access, defined as the log of the inverse of transportation costs to the nearest major port. All models include county and state-by-election fixed effects. In models (1)–(4), the dependent variable is the Democratic Party's share of the two-party vote, in (5)–(6) the log odds of that share. Models (2)–(6) control for a third degree polynomial in the length of railroad within 40 miles of the county centroid, (3) controls for log market access to counties within 50 miles of the county centroid, (4) and (6) control for 1880 % White and 1880 log population density interacted with election fixed effects. Models are weighted by 1880 population. Standard errors clustered by state in parentheses.
$^{\dagger}p < .10$; $^{*}p < .05$; $^{**}p < .01$.

controls for the percentage of White inhabitants in 1880 and log population density in 1880, interacted with year indicators. While we start our analyses after the end of Reconstruction, it is possible that changes in voting patterns related to the disenfranchisement of African Americans correlate with changes in port access. One might also be concerned that differential trends related to initial density, which might influence which counties gained port access and experienced growth in population density, account for our results. Controlling for race and density attenuates our coefficients the most, but they remain substantively large and statistically significant. When we examine the log odds specifications, we find broadly similar patterns. In the more restrictive specification in model (6), our estimated elasticity is fairly close to our estimated effects of port access on population and the log odds share of farmers, which we would expect if port access influenced voting by directly changing the composition of the electorate.

Our results are not sensitive to the particular choice of period, and satisfy difference-in-differences robustness checks. We find similar magnitudes and patterns of significance for the 1860–1900 period (Table A-7, Online Appendix, p. 13), and note that those results are robust to the inclusion of county time trends, which increases our confidence that differential trends do not account for our results. We also find no evidence of an effect of 1880–1900 changes in port access on voting in the 1860–1880 period (Table A-8, Online Appendix, p. 13), which provides additional evidence against parallel trend violations. Our results are also robust to dropping any single year from the 1880–1900 period (Table A-9, Online Appendix, p. 14). This robustness check should also address concerns related to negative weights in multiperiod difference-in-differences designs, which do not apply to two-period models.

TABLE 3 Effects of port access on newspaper protectionism, 1880–1900.

	Two-step lasso		Hirano–Snyder	
	(1)	(2)	(3)	(4)
ln port access	37.78*	44.48**	34.15*	35.42†
	(15.94)	(16.47)	(14.63)	(19.55)
Railroad controls		x		x
Dependent variable mean	43.74	43.74	63.91	63.91
R^2	.84	.84	.83	.83
N	6776	6776	5945	5945

Note: This table shows the results of regressions of newspaper-level protectionism on county-level port access, defined as the log of the inverse of transportation costs to the nearest major port. All models include newspaper and state-by-year fixed effects. Models 2 and 4 control for a third-degree polynomial in the length of railroad within 40 miles of the county centroid. In models 1 and 2, the dependent variable is a data-driven measure of protectionism based on terms predictive of protariff newspapers, in 3 and 4 the measure proposed by Hirano and Snyder (2024), which compares the usage of pro- and antitariff terminology. Standard errors clustered by state in parentheses.
$^{\dagger}p < .10$; $^{*}p < .05$; $^{**}p < .01$.

Port access did not just increase support for the protectionist Republican Party; it also increased protectionism in newspapers. Table 3 shows the results of regressions of newspaper-level protectionism on port access. Increasing log port access by .1 units—around a standard deviation—was associated with a 4.5 percentage point increase in our Lasso measure of protectionism, equivalent to around .2 standard deviations. We find similar magnitudes and patterns of significance using the measure based on pro- and antitariff terminology. This evidence makes it less

TABLE 4 Moderating effects of 1880 agricultural employment.

	ln population		ln odds farmers		Democrat (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
ln port access	.14	1.10**	−.48	−1.17**	−7.90	−63.80**
	(.63)	(.23)	(1.05)	(.43)	(20.19)	(12.64)
1880 agriculture	1H	2H	1H	2H	1H	2H
Dependent variable mean	9.63	9.26	−1.01	−.28	52.74	54.72
R^2	.99	.97	.98	.89	.85	.89
N	3867	3870	2578	2578	4921	4924

Note: This table shows the results of regressions of county-level log population, log odds share of farmers, and Democratic share of the two party vote, subset according to whether the county fell in the bottom or top half of the state in the percent employed in agriculture in 1880. So that the two subsets are equally sized, we standardize the share in agriculture relative to the state mean and variance and subset by whether that state-standardized variable is above the median. Models 1, 3, and 5 are restricted to less agricultural counties, 2, 4, and 6 to more agricultural ones. All models include county and state-by-year fixed effects, and control for a third-degree polynomial in the length of railroad within 40 miles of the county centroid. Models are weighted by 1880 population. Standard errors clustered by state in parentheses.
$^{\dagger}p < .10$; $^{*}p < .05$; $^{**}p < .01$.

plausible that factors unrelated to the tariff account for the shift away from the Democrats.

Evidence for the mechanism

Our preferred explanation for these results is that increased trade access led to increased population density and diluted the share of farmers and landowners who gained from freer trade. A range of county- and individual-level evidence supports this interpretation.

At the county level, we show in Table 4 that both the economic effects—the increase in population density and reduced share of farmers—and the anti-Democrat voting effects are driven by more agricultural counties. We estimate null results for the effects of port access in counties with percent agricultural employment below their state's average in 1880. This finding supports our preferred mechanism in two ways. First, the economic processes driving the result, in which trade access increases opportunities for exporters, should apply mostly to agricultural areas, and so these results are consistent with our theory.[9] Second, if we found a null effect on the economic variables for some counties, and a positive effect on political outcomes in those same counties, it would imply that some mechanism other than the economic one specified is driving the results. We find no such evidence of an alternative mechanism.

The link between our theoretical and empirical analyses rests on the assumptions that population density and the share of farmers proxy for landownership, and that landowning interests tended to vote Democrat. We verify the former using county- and individual-level data from the 1870 and 1900 censuses, that recorded information on real-estate ownership and the farm and ownership status of dwellings. Higher density counties had lower rates of property ownership (Figure A-4, Online Appendix, p. 17) and farmers were indeed more likely to own land (Table A-10, Online Appendix, p. 14). We verify the latter assumption using individual-level data on partisanship from Indiana County directories (Hammarberg, 1984) and California voter registers, in Table A-11, Online Appendix, p. 15.[10]

One might be concerned that our voting results are picking up an effect distinct from our mechanism, whereby port access was associated with industrialization, and industrialization increased support for the Republican Party through some other mechanism. We address this concern in three ways. First, we note that in Table A-5, Online Appendix, p. 12, the positive association between port access and industrialization is driven by logging and sawmills, resource-intensive exporting industries that, much like agriculture, would have gained from freer trade. Second, in Table A-6, Online Appendix, p. 12, we verify that controlling for 1880 manufacturing employment interacted with year indicators leaves our voting estimates unchanged, implying that differential trends related to initial manufacturing, which may have influenced subsequent development, do not account for our results. Third, in Table A-12, Online Appendix, p. 16, we examine the association between various economic variables and the Democratic vote, conditional on county and

[9] We would expect a negative effect on population in regions specializing in import-competing manufacturing industries. However, there are relatively few such regions during this period, and those regions experienced fairly small changes in port access, and so it is likely that the odd-numbered columns in Table 4 pool data from exporting agricultural counties and perhaps some exporting industrial areas, for which the effect on population should be positive, and import-competing manufacturing counties, for which the effect should be negative.

[10] We access the California data at http://www.mariposafootprints.org/voters/Generalnew.htm, http://freepages.rootsweb.com/~npmelton/genealogy/prct.htm, and http://freepages.rootsweb.com/~shastaca/genealogy/1912voters.html.

state-by-year fixed effects. As predicted by our model, we find a negative association between population, farm output, farm values, the wood industry, and Democratic voting. However, we estimate a null relationship between voting and manufacturing employment and output. If manufacturing expansion explained our results, we would expect to see a strong negative association between manufacturing and voting Democrat. That we do not observe such a relationship suggests that statistics of aggregate manufacturing employment and output pool import-competing industries, that should have favored the protectionist Republicans, and exporting industries that should have favored the Democrats.

In-migration of immigrants could also affect politics through alternative mechanisms, if immigrants voted Republican for cultural reasons, or if they inspired an anti-immigrant backlash. Evidence of the effect on different nationalities raises doubts about either alternative explanation (Table A-13, Online Appendix, p. 16). Protestant immigrants from Britain, Germany, and Scandinavia tended to vote Republican, while Catholic immigrants from Ireland tended to vote Democrat (Higham, 1974). We find positive effects of port access on the immigration of both groups, and so do not have a clear prediction of how port access affected voting via sectarian allegiances. Anti-immigrant rhetoric in the period was targeted mostly against Italian and Jewish immigrants. While it is plausible that the in-migration of these groups would precipitate a backlash, we find a negative association between port access and the presence of these groups.

We also consider three alternative if largely complementary explanations. First, population growth in regions affected by increased port access may have caused culturally Republican voters to migrate to previously Democratic districts. Second, the increased importance of trade to local economies may have caused voters to ascribe greater importance to the gold standard, which the Republicans strongly supported. Third, agricultural exporters may have gained from trade but become more susceptible to holdup, which stoked a political backlash. In Table A-14, Online Appendix, p. 18, we do find evidence that increased port access induced in-migration from Republican-voting areas. This explanation is complementary to our argument. Areas that voted Republican were dominated by the protectionist manufacturing interests the party favored, and so migrants from those areas likely had economic interests in voting Republican. In Table A-15, Online Appendix, p. 19, we find that port access was associated with if anything less attention to the gold standard, and had no effect on a Lasso-derived measure of populism, suggesting that those factors do not explain our results. These results are consistent with the effect being stronger in the 1880–1890 decade, before the Democrats embraced populism, than after (Eichengreen et al., 2019) (see Table A-9, Online Appendix, p. 14).

CONCLUSION

During the last decades of the 19th century, US trade policy became increasingly protectionist. This outcome seems to have broadly reflected the policy opinions of voters who gave Republicans resounding electoral victories. These outcomes are puzzling because falling transportation costs integrated US agriculture into the global economy as never before and many existing accounts of the political consequences of export shocks suggest that economic winners should be able to translate those gains into policy (Acemoglu et al., 2005; Puga & Trefler, 2014; Rogowski, 1987, 1990). We show not only that protectionism triumphed at the national level, but that the places that gained the most from falling transportation costs became more protectionist.

We combine a majoritarian model of politics with a spatial model of international trade to argue that the extent to which decreased trade costs induce workers to move to locations closer to world markets can lead to the loss of political power by the factors of production advantaged by increased trade. Our article provides causal evidence that increased trade increased farm output, farm values, and population density but reduced the proportion of farmers. This economic transformation meant that there were more voters—workers—with an interest in protectionism and our article provides evidence that increased trade led to a reduction in voting for the Democratic Party, which supported free trade, and an increase in protectionist opinion, as measured by local newspapers.

Our theoretical framework suggests a number of extensions for future research. Societal coalition models of economic policymaking typically specify the economic interests and policy preferences of a fixed set of actors in a given location and then map the institutions that aggregate those preferences into policy outcomes. In assessing the consequences of economic change for politics, adjustment mechanisms are through the reallocation of economic activity among this fixed set of actors. These models have provided insights about a wide range of political economy outcomes. Our theoretical framework, however, highlights the potential importance of economic growth and internal migration in changing the composition of societal coalitions and, in doing so, altering how economic change shapes politics.

In the case we study, workers are perfectly mobile across space; this assumption assures that they have common interests and reactions to increased exposure

to trade from falling transportation costs. We think this assumption is empirically supported in the context of the late 19th-century US economy. Nonetheless, barriers to geographic mobility are undoubtedly important in other settings and may even be important in ours. Barriers to mobility will generate conflict among workers and across regions that may be critical for understanding political responses to economic change. Future research should focus on theoretically and empirically identifying the kinds of barriers that influence politics. Similarly, in our model, actors' policy preferences follow from the gains and losses from trade. The key insight of the model, however, is that geographic mobility conditions how economic change affects politics, which applies just as forcefully in a setting in which migrants bring their political preferences, whatever their origins, with them. Our article suggests that explicitly modeling political economy outcomes in a spatial trade model, which allows adjustment through migration, may provide new theoretical insights on that phenomenon and guide new empirical studies.

ACKNOWLEDGMENTS

We thank Björn Bremmer, Judy Goldstein, Zuhad Hai, Sung Mi Kim, Will Marble, Ron Rogowski, Denis Tchaouchev, Christina Toenshoff, three referees at the *AJPS*, and participants at workshops at Cologne, Princeton, Stanford, and Yale, and the APSA 2022 annual meeting for comments. We are grateful to Rick Hornbeck for sharing data.

ORCID

Kenneth Scheve https://orcid.org/0000-0002-6809-0060
Theo Serlin https://orcid.org/0000-0002-1952-0845

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Scheve, Kenneth, and Theo Serlin. 2025. "Trains, trade, and transformation: A spatial Rogowski theory of America's 19th-century protectionism." *American Journal of Political Science* 69: 915–29. https://doi.org/10.1111/ajps.12870