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Exit, Voice and Political Change: Evidence from Swedish Mass Migration to the United States

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Abstract

We study the political effects of mass emigration to the United States in the 19th century using data from Sweden. To instrument for total emigration over several decades, we exploit severe local frost shocks that sparked an initial wave of emigration, interacted with within-country travel costs. Our estimates show that emigration substantially increased the local demand for political change, as measured by labor movement membership, strike participation and voting. Emigration also led to de facto political change, increasing welfare expenditures as well as the likelihood of adopting more inclusive political institutions.

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1 Introduction

Institutions are widely regarded as important drivers of long-run development. Yet, less is known about what causes them to change over time. This paper proposes and empirically verifies that large-scale emigration can trigger political change in origin countries. In particular, we study one of the largest migration episodes in human history, the Age of Mass Migration, to estimate the long-run effects of emigration on local political outcomes.

Starting in the mid 19^{th} century, the Age of Mass Migration saw 30 million Europeans leave their home countries for the United States. Through social and family ties, early movers spurred additional emigrants over time, leading to a long-lasting pattern of chain migration (Hatton & Williamson, 1998). What were the political repercussions at the origin of this shock to ordinary citizens' mobility? Consider Figure 1, which plots the relationship between a measure of labor's bargaining strength – the share of workers in 2000 who were unionized – against the size of the US emigrant stock in 1910. Across 29 OECD countries, the figure displays a positive relationship between modern unionization and historical migration.[1] Countries with large US populations, such as Italy, Germany, Ireland, and Sweden, have considerably higher unionization rates than low-emigration countries such as Spain, France, and Poland. Moreover, the Age of Mass Migration also coincided with a notable surge in democracy, with many European states adopting democratic institutions and expanding suffrage (Moses, 2011). These correlations suggest that the United States policy of open borders during the 19^{th} century may have considerably influenced political development in the Old World. This paper is devoted to understanding if such a relationship may be causal.

We focus our attention on Sweden, which had one of the highest exit rates in the period. A quarter of its population, or about 1.3 million citizens, emigrated in the course of sixty years, mainly to the United States.[2] Swedish economic and political elites were highly concerned about the newfound mobility of ordinary citizens. As a result, proposals to restrict emigration were continually made, but were never put in place. Instead, the Age of Mass Migration coincided with a period of political development in Sweden. The dominant force in Swedish 20^{th} century politics, the Social Democratic Party, as well as the powerful labor union movement, were founded during the period and became key actors in reforming Swedish policy and political institutions.

It is unclear how emigration related to this development, however. Theoretically, the

[1] In Appendix Section A.6, we show that this correlation is robust to controlling for a set of covariates, including GDP and schooling length. The correlation is also robust to replacing emigration to the US with emigration to all destinations for countries where such data are available.

[2] The net annual migration rate 1870–1910 was about -4.2 per 1000 inhabitants. By comparison, the average rate in the Old World was about -3.08, with Ireland, Italy and Norway displaying rates of -11.24, -9.25 and -5.25, respectively (Taylor & Williamson, 1997).

effect of emigration on an autocratic origin country is ambiguous. Hirschman (1970) hypothesized that if political dissidents choose to exit the country rather than to push for reforms, the result may be a lower level of voice for political development. On the other hand, other plausible mechanisms could yield the opposite effect. For example, Hovde (1934) argues that the Age of Mass Migration put labor in a stronger bargaining position by improving workers' outside options and making emigration a credible threat. As early as the 18th century, the French economist and statesman Anne-Robert-Jacques Turgot argued that "the asylum which [the American people] opens to the oppressed [...] will oblige the European governments to be just and enlightened" (quoted in Moses, 2011).[3] Observing the wave of European democratization after the mass migration era, Hirschman (1978) later also argued that exit may be a complement to the expression of voice, rather than a substitute.

We deploy a wide range of data sources spanning the mass migration period to study the long-term political effects of emigration across Swedish municipalities. Our main outcome is membership in the local labor movement. Consisting of labor unions and the Social Democratic Party, the labor movement arose during the mass migration period and was the strongest political opposition group at the time.[4] In the second part of our analysis, we estimate the effect of emigration on local welfare policy and choice of political institutions, in order to investigate if emigration had effects on local government actions.

To establish causality, we exploit the fact that Sweden's mass emigration was sparked by a series of severe agricultural shocks in the 1860s, which were caused by unusually cold temperatures (Sundbärg, 1913; Barton, 1994; Beijbom, 1995). Using daily temperature data from this period, we measure the incidence of growing-season frost shocks 1864–1867, just prior to the onset of early mass migration. We then construct an instrument which only captures variation in emigration push factors: the interaction between frost shocks 1864–1867 and the proximity to one of the two major emigration ports.[5] Using only the interaction term as our instrument allows us to control for both proximity to port and frost shocks themselves, which avoids confounding direct effects of severe economic shocks on political outcomes.[6] Importantly, we show that Swedish emigration was highly path dependent,

[3]On a related note, refering to the black out-migration from the US south, Myrdal (1944) pointed out that it would be "one of the surest ways" of pushing the white elites to give more consideration to the remaining southern blacks. Analyzing the relation between black mobility and education spending in the US South, Margo (1991) concludes that the threat of exit placed limits on local government discrimination.

[4]One of its main objectives was universal suffrage, alongside more directly labor-related issues, and it hence serves as a broader indicator of local demand for political change.

[5]See e.g. Sjaastad (1962), Quigley (1972) and Morten & Oliveira (2014) regarding the importance of distance and other travel costs for migration decisions.

[6]For example, it is possible that municipalities which were more affected by frost shocks in this period developed more extensive social insurance systems as a result. However, even if such effects are persistent, they will be taken into account by controlling for the direct effect of frost shocks.

and that the instrument thus strongly predicts cross-sectional variation in total emigration across the 50-year sample period.[7] The instrument passes several exogeneity tests, including balance of pre-determined covariates and placebo treatments using shocks in other periods. An alternative instrument using shocks occurring in the *non-growing* seasons 1864–1867 has no effect on emigration or second-stage outcomes.[8]

Our results show that municipalities that experienced more emigration during the Age of Mass Migration exhibit significantly stronger demand for political change. Membership in the local labor movement is significantly higher starting in 1900, and so is participation in a major general strike in 1909. Furthermore, we find an increased voter turnout in national elections 1911 to 1921, as well as higher vote shares for left-wing parties in those same elections.[9] Rather than inhibiting the use of voice, higher emigration appears to have brought about more political organization and left-wing preferences among ordinary citizens, indicating an improved bargaining position vis-à-vis local elites. We also find that the stronger left-wing preferences persist in present day elections, over a century after the start of Swedish mass migration.[10]

Emigration also affected local policy and political institutions. Reflecting the preferences of the labor movement, local politics became more redistributive and inclusive. Welfare expenditures per capita were significantly higher in municipalities with more emigration, both before and after the introduction of democracy in 1919.[11] Since local political power was biased in favor of wealthier citizens prior to 1919, the results are consistent with the hypothesis that concessions were made by elites in favor of citizens, although we cannot rule out that other mechanisms play a role.

At the time, local governments were organized either as direct or representative democracies. Recent evidence has shown that local representative democracies provided higher welfare expenditures, as direct democracies were more easily captured by local elites (Hinnerich & Pettersson-Lidbom, 2014). We find that municipalities with greater emigration more often introduced representative democracy between 1919 and 1938. As such tran-

[7] High degrees of path dependence in migration patterns is a canonical finding in the migration literature and has been found in numerous settings, see e.g. Massey et al. (1993), Hatton & Williamson (2005), McKenzie & Rapoport (2007), Bryan, Chowdhury & Mobarak (2014) and Giulietti, Wahba & Zenou (2014).

[8] The results are also robust to tests that account for possible exclusion restriction violations, including directly assuming some violation of the exclusion restriction (Conley, Hansen & Rossi, 2012).

[9] This is consistent with recent US evidence that unions affect members' political preferences (Kim & Margalit, 2016).

[10] These findings are in line with studies in economics and political science which have found political preferences to be persistent within individuals as well as correlated across generations, see e.g. Alford, Funk & Hibbing (2005), Jennings, Stoker & Bowers (2009) and Madestam & Yanagizawa-Drott (2012).

[11] These results are not explained by a changing population size, since the results also hold in expenditure levels.

sitions were required to last at least five years, and often lasted longer in practice, this finding is in line with the idea that institutional change may serve as a commitment device (Acemoglu & Robinson, 2000, 2006).

Determining the mechanisms behind these findings that span several decades is hard. Nevertheless, we use the data available to us to evaluate the plausibility of several potential explanations, keeping in mind the difficulty of narrowing the field down to a single one. We consider four broad channels.[12] First, easier access to emigration can raise the outside options of those left behind, influencing bargaining between citizens and elites. Second, emigration may elicit local economic responses that in turn cause political change. Third, the selection of migrants may change the composition of people who remain in Sweden. Fourth, emigrants may transmit American attitudes to their countrymen at home.

We argue that better outside options may be a contributing mechanism behind our findings. Historical accounts document that stayers with social networks overseas had lower moving costs and were more likely to emigrate later-on themselves (see e.g. Runblom & Norman, 1976; Beijbom, 1995). Given the greater living standards in the US, outside options were thus better in locations with a stronger history of emigration. We thus find that locations with high early emigration also not only have more emigrants later on, but also lower internal migration. This is consistent with contemporary evidence suggesting that internal migration was often disregarded in municipalities with a strong history of US emigration (see e.g. Nelson, 1909).

Accounts by historians suggest that the emigration option played an important role in empowering labor unions. As union membership was routinely punished by employers, the option to emigrate reduced the downside risk of organizing labor (Rondahl, 1985). At the same time, unions encouraged emigration (Beijbom, 1995) and the improved outside options for citizens may have caused economic and political elites to be more responsive to citizens' demands (Hovde, 1934). In fact, we find suggestive evidence of emigration leading to higher wages, a central outcome of any employee-employer bargaining process.[13]

Turning to economic channels, we find that, besides increasing low-skilled wages, emigration positively affected the share of workers employed in the burgeoning industrial sector. These results are in line with Ljungberg's (1997) thesis that emigration raised wages and therefore incentivized the modernization of the Swedish economy in the late 19^{th} century. Consistent with this, we also find evidence of substitution away from labor and towards cap-

[12] A similar set of mechanisms is delineated in Kapur & McHale (2005).

[13] Outside options play a central role in bargaining theory. Under coercive institutions, Acemoglu & Wolitzky (2011) show that greater outside options for workers improve their equilibrium outcomes. Relatedly, Margo (1991) finds that the mobility of southern blacks in the US pushed politicians to increase the quality of black public schools.

ital in agriculture.[14] The growing industrial sector may hence have played a role in creating the basis for labor organizations to form. However, the shift in employment towards industry cannot by itself explain our results on labor movement membership and strike participation, as these hold even when expressed *per industrial worker* rather than per capita.

We evaluate migrant self-selection in two main ways. First, a bounding exercise shows that the positive and significant effect on the labor movement holds even under the assumption that all emigrants would not have been members. Second, we find small and insignificant effects of emigration on demographic differences in terms of sex ratios, marriage rates, rates of in-migration and voting eligibility. High-emigration municipalities are, however, younger on average. Consequently, while selection may play a role in explaining our results, they are unlikely to explain them entirely.

Lastly, we evaluate the potential transfer of American attitudes to origin areas. While the influence of Scandinavian labor organizers on American unions is well documented (Nordahl, 1994; Bengston & Brook, 1999), little evidence suggests that the Swedish labor movement was influenced by the US. As an indirect test, we study how emigration affected two types of organizations that were strongly influenced by the US – non-state free churches and temperance lodges – finding no positive effects on membership rates.

Our study relates to a nascent empirical literature on the political effects of emigration in origin countries.[15] Kapur (2014) provides a recent survey of the literature. Several papers have studied the effects of migration to more democratic countries, finding a positive effect on democratization (Spilimbergo, 2009; Docquier et al., 2016; Mercier, 2016), political participation (Chauvet & Mercier, 2014), political institutions (Beine & Sekkat, 2013), demand for political and social change (Batista & Vicente, 2011; Tuccio, Wahba & Hamdouch, 2016), voting for an opposition party (Pfutze, 2012; Barsbai et al., 2017), and a negative effect on conflict prevalence (Preotu, 2016).[16] By contrast, Anelli & Peri (2017) find that emigration during the Great Recession hampered political change in Italy. Migrant remittances have been found to affect home country political institutions in both positive and negative ways (Ahmed, 2012, 2013; Escriba-Folch, Meseguer & Wright, 2015; Pfutze, 2014).

Our contribution to this literature is threefold. First, we exploit plausibly exogenous variation to identify the causal effects of emigration on political outcomes. Second, while the existing literature emphasizes the transfer of attitudes from host to origin countries,

[14] In related work, Andersson, Karadja & Prawitz (2017) also finds higher rates of innovation as measured by technological patents.

[15] There is also a theoretical literature linking political and economic repression to migration (Docquier & Rapoport, 2003; Mariani, 2007; Wilson, 2011).

[16] Li, McHale & Zhou (2017) also study the effects of emigration on domestic institutions by human capital level of emigrants.

we find some evidence against this and explore other mechanisms such as improved outside options of connected citizens. Third, we not only show how emigration affects the demand for political change but also track its effects on actual political change in terms of local policies and institutions.

The effect of mass migration on the United States in this period has been extensively studied.[17] Bandiera, Rasul & Viarengo (2013) compute total immigration flows to the US during this period. Abramitzky, Boustan & Eriksson (2012, 2013) and Spitzer & Zimran (2014) study migrant selection, while Abramitzky, Boustan & Eriksson (2014) analyze labor market assimilation. Others study foreign direct investment (Burchardi, Chaney & Hassan, 2016) and different measures of economic development (Nunn, Qian & Sequeira, 2017). We contribute to this literature by focusing on the effect of the Age of Mass Migration on origin countries, where research is more lacking (**?**).

We also relate to the literature on institutions in economic development, and political change in particular.[18] Besley, Persson & Reynal-Querol (2016) study the effect of incumbents' probability of remaining in power on institutional reform. A growing set of papers investigates the effects of trade on institutional change (Acemoglu, Johnson & Robinson, 2005; Puga & Trefler, 2014; Dippel, Greif & Trefler, 2015; Sánchez de la Sierra, 2017). The importance of factor mobility for institutional change has been studied theoretically, though mainly focusing on the mobility of capital rather than labor (Boix, 2003).

The remainder of the paper proceeds as follows. Section 2 provides an overview of Swedish mass emigration and describes the historical evidence regarding its onset in the 1860s. The labor movement and its relationship to emigration are also described. Section 3 describes our data. Section 4 introduces the econometric framework and our identification strategy. Sections 5 to 7 discuss the first-stage relationship as well as the effects of emigration. Section 8 discusses underlying mechanisms. Section 9 performs robustness checks and placebo tests. Finally, Section 10 discusses our results and concludes the paper.

2 Background

2.1 Swedish mass emigration to the United States

Starting in 1850, the Age of Mass Migration saw 30 million Europeans settle in the United States. Under its policy of free immigration, individuals from across the world were allowed permanent residency in the United States. Sweden was one of the biggest sending countries

[17] See **?** for an overview.

[18] There is a large literature investigating transitions into and from democracy at the national level. See Persson & Tabellini (2009) and studies cited therein.

in per capita terms, along with Ireland, Italy and Norway (Taylor & Williamson, 1997). A total of 1.3 million Swedes emigrated from 1860 to 1920, corresponding to one quarter of the average population over the period.

Swedish emigration took off abruptly at the end of the 1860s. In the peak year of 1869 alone, nearly 1 percent of the population emigrated and in the years between 1867 and 1879, 200,000 Swedes left their home country. We refer to the sharp increase in emigration in 1867–1879 as the *first wave of mass emigration*.[19] The spike of the first wave is evident in Figure 2, which displays per capita emigration rates over the period. The causes and the timing of the Swedish mass emigration episode have been widely discussed by historians. Central to the existing accounts is the series of bad harvests in the 1860s, caused by unusually poor weather conditions, which led to widespread poverty and served as a catalyst for emigration on a large scale (see e.g. Sundbärg, 1913; Barton, 1994; Beijbom, 1995).[20] In particular, cold weather led to a high incidence of frost as nighttime temperatures fell below zero degrees Celsius, even during the regular growing season. The spring of 1867 saw the most extreme weather, in some cases lasting well into the summer months.[21]

The famine years were particularly harshly felt because agriculture was the main source of food and income for most citizens: in 1865, 83 percent of the population lived in rural areas and only 11 percent of the labor force worked in manufacturing (Edvinsson, 2005). Cities and towns were indirectly affected, however, as the supply of food and the demand for goods and services dropped (Beijbom, 1995).[22] Figure 3 displays detrended Swedish real GDP per capita 1850–1900, which has a visible trough in the late 1860s.[23]

Later emigration waves occurred during the 1880s and at the turn of the century, as seen in Figure 2. This pattern was common throughout Europe and has been linked to inversely developing business cycles across the Atlantic during this period (Hatton, 1995). For Sweden, differences in growth rates between the United States and Sweden have been

[19]Earlier emigration was uncommon – in 1865 the Swedish American population was estimated at 25,000 (Barton, 1994). Poor communications may have held back potential emigrants, as crossing the Atlantic was expensive and time-consuming. Sailing was the predominant means of transport and traveling from Sweden to North America took up to two months.

[20]Sweden's case is similar to that of Ireland, whose first emigration wave was caused by a famine (Hatton & Williamson, 1993).

[21]The month of May 1867 is the coldest known May in Swedish history and the meteorological summer (five days in a row with temperatures above 10 C) started only in mid-June in many parts of Sweden (SMHI, 2013). In Finland, the temperatures observed during the spring of 1867 have a 1 in 500 probability of occurring (Jantunen & Ruosteenoja, 2000).

[22]In our data set, 28.3 percent of the emigrants 1867–1920 are from urban areas.

[23]Several factors are likely to have interacted with the poor harvests in sparking the first wave of mass emigration to the United States. The introduction of steamship technology led to a shift away from sailships in the late 1860s and the cost of migration fell considerably. The US Homestead Act of 1862, which offered free land to immigrants, together with the end of the US Civil War in 1865 are also considered to have contributed to the large number of emigrants observed (Barton, 1994).

shown to predict aggregate emigration flows between 1870 and 1910 (Bohlin & Eurenius, 2010). Social networks were also crucial drivers of emigration in the later waves. First-hand accounts of Swedes in the US reveal that many would not have emigrated, were it not for having family members overseas (Sundbärg, 1913). Having emigrants in one's network lowered the uncertainty and cost associated with traveling to the United States and finding an occupation once there (Runblom & Norman, 1976). Postal communication was well-developed and emigrants frequently sent home pre-paid tickets for family members to join them in America.[24] Pre-paid tickets accounted for up to half of all travelers.[25]

In terms of migrant characteristics, migration was a fairly general phenomenon and reflected the population as a whole (Runblom & Norman, 1976). Combining migration and census data 1880–1910, we can compare aggregate distributions of age, gender and occupation. In terms of gender and occupation, emigrants are roughly similar to the population, although the female share is slightly lower among emigrants, with about 45 percent of migrants being women. As in the population, most migrants were either service workers or workers within the agricultural or industrial sector. Migrants were younger as compared to the population, with the bulk of emigrants being between 18 and 30 years old.

The mass emigration of Swedes did not go unnoticed among the elites. Policies to reduce emigration were proposed throughout the period, and applied a mix of carrot and stick strategies: proposals to restrict emigration were common, as were calls for improving living standards so as to induce citizens to stay. In 1869, at the height of the first emigration wave, several motions were raised in parliament by MPs from high-emigration counties. Even at this very early stage, the awareness of and the concern about emigration was high (Kälvemark, 1972). The central government later surveyed governors about their counties' experiences with emigration. A majority of governors then agreed that emigration was a net bad for the country (Kälvemark, 1972). When asked for policy proposals to reduce emigration, governors suggested measures to both make emigration more difficult and to improve the conditions in Sweden, for example by facilitating the procurement of small land plots by landless farmers.[26] However, emigration remained unrestricted throughout the mass migration period.

[24]Data from Denmark, which had a much smaller number of emigrants than Sweden, have shown that up to 1.8 million letters were sent yearly to Denmark from the US (Beijbom, 1995).

[25]Studies of the archives of the Larsson Brothers emigration agency in Gothenburg have shown that around half of their clients traveled using pre-paid tickets (Runblom & Norman, 1976). Beijbom (1995) also reports that half of the Swedish emigrants traveled on pre-paid tickets at the beginning of the 1880s, and around 40 percent by the end of that decade. Pre-paid tickets also accounted for 40 percent of the Norwegian travelers (Hvidt, 1975).

[26]The survey was carried out in 1882. Governors also identify family ties to emigrants as a chief determinant of emigration.

The return of high emigration rates in Sweden in the early 20th century brought the strongest political reactions yet. Landowners and agrarian interest groups worried about labor scarcity and identified emigration as the main culprit.[27] Others were concerned about the emigration of young men who would otherwise perform military service, and worried about a deterioration in the national defense (Kälvemark, 1972). These concerns did eventually lead to the appointment of a large public commission, assigned the task of finding measures to end the mass emigration. When its 21 volume report was published in 1913, it recommended political reforms to improve the conditions of ordinary citizens to induce them to stay, rather than suggesting emigration restrictions (Sundbärg, 1913). The large-scale emigration of Swedes ended in the 1920s, likely due to a combination of US immigration quotas and the Great Depression.

2.2 The labor movement and emigration

The Social Democratic Party was a dominant actor in Swedish politics during the 20th century and long garnered a near majority of votes in national elections. Founded in 1889, it entered government for the first time in 1917 and remained in government for most of the 20th century. The Social Democrats were closely linked to the Swedish Trade Union Confederation (LO), founded in 1898 as a central organization for the many smaller unions that existed at the time (Westerståhl, 1945). Until then, the Social Democratic Party had in fact worked as the official central organization. Both organizations championed the right to organize the 8 hour workday and universal suffrage (Lundkvist, 1977).[28]

The labor movement was regularly in conflict with employers and was known to use emigration as a tool to further its interests. In Stockholm, labor unions held English courses and helped colleagues emigrate. The Social Democrats' main newspaper updated readers about prospects in the US labor market (Tedebrand, 1983). After the general strike in 1909, which was considered to be a defeat for the labor movement, a socialist newspaper called upon workers to emigrate (Beijbom, 1995). Many emigrated labor activists continued their work overseas, founding labor organizations in the United States (Nordahl, 1994; Bengston

[27]Noting that landowners were less likely to emigrate, the state was encouraged to sell smaller plots of land and provide a transfer to enable poor farmers to acquire land. The plot size was a key parameter, however, as transfers were not intended to allow farmers to become self-sufficient but to remain attached to major landowners' farms. In a parliamentary debate in 1904, the Minister of Agriculture openly discussed the central point of contention: should the subsidy be so large that it allowed a farmer to be self-sufficient or should it be smaller, so that "owners would invariably need to seek employment with others in order to earn a living" (Kälvemark, 1972).

[28]The 8 hour workday and universal suffrage were adopted in 1919 by a Liberal-Social Democratic coalition government. In 1938, LO become a key player in the Swedish Labor Market Model, representing employees in collective bargaining over wages and benefits without intervention of the national government.

& Brook, 1999).

Emigration may have been useful to encourage membership in the labor movement because of the high risks involved in labor activism. Workers could be fired, evicted and blacklisted for being union members. Until 1885, an anti-loitering law made striking illegal and punishable by forced labor (Westerståhl, 1945).

A case study of the town of Ljusne elucidates the conflicted interactions between labor, elites and emigration. In 1906, more than a hundred workers emigrated from Ljusne, following a clash between the local Social Democratic club and the main employer, who owned all buildings in town and disallowed political and union organizing among workers. After the Social Democrats sent an incendiary telegram to the Swedish King, leading figures were fired while others were intimidated via the local police to stop their activities or be evicted. Rather than complying, many opted to emigrate. The option of emigrating was facilitated by the town's history of US migration – it had experienced a large participation in the emigration waves of the 1860s and 1880s. The news of Ljusne's "mass emigration" became widely spread in national media at the time and severely hurt the reputation of the owner and first chamber parliamentarian Count Walther von Hallwyl. When the plant shut down in 1907, the company announced that it would be paying pensions to older workers in gratitude for their service (Rondahl, 1985).

3 Data

Emigration Data We compile local emigration histories using two distinct, individual level data sets encompassing the universe of registered emigrants during the Age of Mass Migration. The final data set contains 1.1 million emigrants from 1867 to 1920. To our knowledge, this is the first study to make use of any of these two data sources for disaggregated statistical analysis. They are described in detail below.

The State Church in Sweden was historically tasked with tracking demographic statistics in their parishes. Births, deaths, marriages as well as migration information were recorded year by year at the individual level and stored in parish records. These were later incorporated by the central statistical agency. We obtain emigration data from these parish records that were digitized by family researchers and through various municipal and county efforts.[29] Individual migrants are matched to an origin municipality and year using information on the date of exit and home parish available in the data set.

The second source of individual level emigration data is from archived passenger lists kept by shipping companies. Starting in 1869, at the peak of the first emigration wave, ships with

[29]The data are obtained from The Swedish Migration Center in Karlstad, Sweden.

foreign destinations were required by law to compile lists of all their passengers (Clemensson, 1996). The lists were controlled for authenticity by the police who checked off travelers as they boarded their ships. The passenger manifests were later stored in various city archives and were digitized by the Gothenburg Provincial Archives.[30] The same matching procedure as the parish level data is used to match emigrants to origin municipalities. However, as passengers report their "home town" rather than exact parish or municipality of origin, the resulting match rate is lower compared to the parish data set.

Since the two data sets are independently collected and record emigrants at different points in time, it is possible to ascertain their accuracy by cross-checking the two sources. Appendix Section A.1 shows that there is a high degree of within-year correlation between the data sources. This indicates a high reliability of the emigration numbers. It also indicates that there is no important lag between leaving the home parish and boarding a ship to the United States.[31]

In the remainder of the paper, we use a single emigration variable defined as the maximum of either the church book or passenger list data each year. The primary concern is in undercounting emigrants. Undocumented emigration may be lacking from parish data, while the passenger list data are imperfectly matched to parishes. As a result, using the maximum value each year yields our best estimate of emigration.[32]

Election and Labor Movement Data Municipal level voting data for all national elections between 1911 and 1921 are taken from Berglund (1988).[33] The data set includes the number of eligible voters and votes cast as well as the distribution of votes across political parties.[34] Precinct-level data from municipal and national elections 1998 to 2014 are taken from the Swedish Election Authority and are geographically matched to 1865 municipality borders.

Local organization membership 1881-1945 comes from the Social Movement Archive.[35]

[30]The data set is obtained from Göteborgsemigranten (2006).

[31]This is consistent with earlier studies (Runblom & Norman, 1976).

[32]After 1895, all data are necessarily from passenger lists since church books have not been digitized after that year. Before 1895, the parish data reports strictly more emigrants 55 percent of the time, while the passenger data indicate strictly greater numbers 25 percent of the time. In 23 percent of cases, the data sets are equal.

[33]Provided through the Swedish National Data Service (SND).

[34]The data begin in 1911 as it was the first year when party denominations were formally required of all members of parliament. Before then, the parliament consisted of a mix of partisans and independents and partisanship was not systematically recorded. In the absence of roll-call data from the period, this makes it hard to determine the political identification of MPs before 1911. Roll call data from the Parliament were not recorded until 1927.

[35]The data were collected by historians at Uppsala University (Andrae & Lundqvist, 1998). Provided through the Swedish National Data Service (SND).

The Social Movement Archive lists the number of members by municipality as of December 31 each year, for the following organizations: free churches, temperance lodges, labor unions and the Social Democratic Party. We group labor unions and the Social Democratic Party into one variable that we label *labor movement membership*. These organizations were tightly connected and largely worked towards the same political goals, as described in Section 2, making labor movement membership a summary indicator for citizens' demand for political change.

Participation numbers for the 1909 general strike, divided by union and non-union members, are digitized from the original government report following the strike (Kommerskollegii, 1910).

Weather Data Daily temperature data are obtained from the historical records of the Swedish Meteorological and Hydrological Institute. We complement this with daily data for Norwegian weather stations near the Swedish border, provided by the Norwegian Meteorological Institute. The Swedish data contain temperature readings three times per day: 6 am, 12 pm and 8 pm. In addition, most observations have daily minimum and maximum temperatures. The Norwegian data contain daily average temperatures only. Appendix A.2 describes how daily minimum temperatures are predicted from existing data in cases when the minimum temperature is not available.

In total, the data contain 32 unique temperature stations between 1864 and 1867, with a median distance from municipality centroids to the nearest station of 36 kilometers.[36] The relatively small number of stations could be a problem for our ability to find enough variation in weather conditions to precisely predict emigration. However, temperature is known to be evenly distributed over large areas, especially in the northern hemisphere. Rain is, by comparison, more idiosyncratic (Dell, Jones & Olken, 2014). Climatologists have also established that temperature deviations from long-run means are more similar over large distances as compared to levels (Hansen & Lebedeff, 1987). Intuitively, the reason for this is that even if two neighboring locations have different temperature levels, e.g. due to differences in altitude, they are likely to experience similar deviations from their long-run means within a given window of time due to common weather shocks. As our identification strategy relies on estimating shocks to weather, we are precisely interested in using deviations, allowing us to exploit this feature of the data. Section 4 describes how we define frost shocks in detail.

[36]The mean distance is 39 kilometers.

Additional Data In the final data set, all variables are aggregated to the municipality level using 1865 boundaries. Georeferenced data on administrative borders in 1865 are taken from the National Archives of Sweden. Proximity to an emigration port is defined as minus the log distance to either Gothenburg or Malmö, whichever is closest. The two cities were the main emigration ports during the Age of Mass Migration.[37] Population data for 1865 is taken from (Palm, 2000) and the National Archives of Sweden. Soil suitability data for barley, oats, wheat, livestock and forestry are from the FAO GAEZ database. County-level harvest grades 1860 to 1880 are from Hellstenius (1871) and Statistics Sweden. The data set grades harvests yearly on an ordinal scale from 0 to 9, with higher values indicating larger yields.[38]

Municipal level welfare expenditures and type of political institutions (direct or representative democracy) are taken from Hinnerich & Pettersson-Lidbom (2014). Mortality data for infants, children and mothers, averaged over the 1850–1859 period, are from the The Demographic Data Base, CEDAR, Umeå University. Complete decennial censuses for 1880–1920 were obtained from the National Archives of Sweden and the North Atlantic Population Project. The census gives population-wide data on demographic variables including gender, civil status, family structure, and occupation. Summary statistics are presented in Table 1.

4 Empirical Framework

Our goal is to estimate the effect of emigration over the course of the Age of Mass Migration on long-run political outcomes in origin municipalities. The cross-sectional equation of interest is

$$y_{mct} = \beta Emigration_{mct} + \phi_c + \mathbf{X}'_{mc}\beta_X + \eta_{mct}, \tag{1}$$

where y_{mct} is a political outcome in municipality m, county c and year t, $Emigration_{mct}$ is the log of cumulated emigration from 1867 to year t, ϕ_c is a fixed effect for the 24 counties and $\mathbf{X}_{mc}$ is a vector of municipality characteristics determined before the start of mass emigration. The specification focuses on the stock of emigrants as a determinant of political outcomes, capturing the extent of overseas social networks present in a municipality and, hence, the ease of future migration for current citizens. We estimate (1) by OLS as a baseline, always including the log of population in 1865 in $\mathbf{X}_{mc}$ in order to scale the level of emigrants

[37] All distances are calculated using the great circle haversine formula. The results are robust to excluding lakes and waterways between municipalities and Gothenburg or Malmö. Figure 6 shows that the proximity to Gothenburg and Malmö is well approximated by a straight line for most locations in Sweden.

[38] The harvest grades take into account the overall yield for the crops cultivated in each region.

to the initial municipality size.

For several reasons, long-run emigration histories can be expected to correlate with important characteristics of the origin municipality, either observable or unobservable, that can have a direct impact on the outcomes of interest. A strong concern in estimating (1) by OLS is hence that it may yield biased estimates of the effects of emigration. In particular, the risk of picking up reverse causation is high. Locations with favorable initial institutions may induce more emigration because of better access to information or higher incomes. In contrast, places with more repressive leaders might actively inhibit emigration, thus leading to a positive bias in the OLS estimate of β. In the abstract, the reverse situation is, however, equally likely: fewer people may want to leave locations with good institutions and bad institutions could act as a push factor for emigrating. Without the ability to quantify the relative importance of these effects, OLS estimates yield limited information about the causal effect of emigration on local politics.

To overcome the issues related to omitted variables and to consistently estimate parameters, we propose an identification strategy exploiting only migration-related push factors prior to the first wave of mass emigration: the interaction between growing-season frost shocks 1864–1867 and the proximity from a municipality to the nearest of the two main emigration ports. Due to chain migration, these early push factors should therefore predict cross-sectional variation in total emigration over extended periods of time. The remainder of the section describes how we construct frost shocks and presents the instrumental variables strategy in more detail.

Frost shocks The empirical economics literature often uses rainfall as a source of exogenous variation in income for developing countries, motivated by the idea that rainfall has a direct effect on crop yields. Less attention has been given to the importance of temperature variation. However, low temperatures and frost in particular are closely linked to agricultural outcomes in non-tropical climates (Snyder & Melo-Abreu, 2005). Frost has severe effects on crop growth and the likelihood of plant death. In the United States, more economic losses are caused by freezing of crops than by any other weather hazard (White & Haas, 1975). One night of freezing temperatures can lead to a complete crop loss (Snyder & Melo-Abreu, 2005). As mentioned in Section 2, the poor harvests in Sweden in the 1860s occurred during years with unusually cold temperatures in the growing season. Throughout Sweden, frost was observed as late as in June, in the middle of the growing season for most municipalities in our data. Estimating the incidence of frost is difficult, however, as it does not only require daily data but also estimates of the *minimum* temperature at a daily resolution.

We define monthly frost shocks following the approach of Harari & La Ferrara (2013),

expressing shocks relative to the local long-run weather in that particular month. For each month r, year t and weather station s, we calculate the deviation between the actual and the long-run average number of frost days in that month:

$$deviation(Frost\ Days)_{srt} = Frost\ Days_{srt} - \overline{Frost\ Days}_{sr},$$

where a frost day is a day with a minimum temperature below zero degrees Celsius. A frost shock at the municipality level is then defined as a binary variable:

$$Shock_{msrt} \equiv I[deviation(Frost\ Days)_{srt} > sd(Frost\ Days_{mr})], \tag{2}$$

where $Shock_{msrt}$ is an indicator equal to one if municipality m, whose nearest station is s, experienced a positive frost shock in month r of year t.[39] The municipality's long-term standard deviation of frost days in each month is denoted by $sd(Frost\ Days)_{mr}$.[40] Note that we compute the deviation from the long-term mean at the *weather station* level rather than the municipality level. This exploits the fact that weather variables are more precisely interpolated in deviations from long-term means than in levels, as discussed in Section 3 (Hansen & Lebedeff, 1987). Given that we are exactly interested in anomalous temperature variation, this feature increases the accuracy of our measures. Finally, we sum the number of shocks over the growing season for each municipality over the 1864-1867 period. We only exploit shocks occurring during this four-year period as it was bookended by a particularly high incidence of cold temperatures, with shocks rarely occurring in other years of the decade. A growing season month is defined as a month with a long-term mean temperature above three degrees Celsius, following guidelines of the Swedish Meteorological and Hydrological Institute.

The frequency distribution of frost shocks 1864–1867 is displayed in Figure 5. As evidenced by the figure, this period saw a high incidence of cold temperatures in the growing season, with the median municipality experiencing three frost shocks. Figure 6 displays the spatial distribution of growing season frost shocks 1864–1867, indicating considerable variation in shocks across Sweden.[41]

[39] Municipalities are matched with the nearest weather station available in each month. Enough variation is captured by the nearest station so that using more weather stations (e.g. the second and third nearest ones) does not contribute any additional information. In our data, the adjusted R^2 from regressing monthly frost days at weather station s on frost in the nearest neighboring weather station is slightly lower when we add the frost of the second nearest weather station.

[40] As more weather stations are added over time, calculating the long-term standard deviation at the municipality level will use data from stations that are closer to the municipality. This introduces more precision in estimates compared to using only the stations that were available in the pre-emigration period.

[41] Appendix Figure A.3 displays the underlying monthly variation in municipalities' frost days during 6 growing season months of 1864 and 1867.

Identification strategy In order to consistently estimate the effect of emigration on political outcomes, we instrument for emigration using the number of growing season frost shocks 1864–1867 interacted with the proximity to the nearest emigration port. The first-stage and second-stage equations are

$$Emigration_{mct} = \gamma_{SP}(Shocks \times Port)_{mc} + \gamma_S Shocks_{mc} + \gamma_P Port_{mc} + \theta_c + \mathbf{X}'_{mc}\gamma_X + v_{mct} \tag{3}$$

$$y_{mct} = \beta \widehat{Emigration}_{mct} + \beta_S Shocks_{mc} + \beta_P Port_{mc} + \phi_c + \mathbf{X}'_{mc}\beta_X + \varepsilon_{mct}, \tag{4}$$

where $Shocks_{mc}$ is the number of frost shocks 1864–1867 in municipality m of county c, $Port_{mc}$ is the proximity to the nearest emigration port, $(Shocks \times Port)_{mc}$ is the single excluded instrument, and $\widehat{Emigration}_{mct}$ is predicted emigration from the first-stage equation (3).

The intuition behind the identification strategy is twofold. First, the marginal effect of frost shocks on emigration should be larger for municipalities that are close to emigration ports. In other words, when there is an incentive to move (due to frost shocks), we should observe more emigration where the fixed cost of migration is also lower.[42] Second, due to path dependence in migration, the instrument should predict not only first-wave migration, but migration over longer periods of time.[43] The key identifying assumption is that only emigration is affected along this margin. For example, if frost shocks have different economic impacts depending on emigration port proximity, the exclusion restriction assumption may be violated. We discuss threats to identification in more detail below.

An important feature of our identification strategy is that we control for the direct effects of frost shocks and port proximity in (4). This is beneficial because studies that use weather shocks as instruments are typically marred by the problem that weather may simultaneously affect many variables, including citizens' preferences and risk attitudes (Giuliano & Spilimbergo, 2014).[44] In our setting, locations that experience more severe frost shocks may have weaker government finances, worse public health, or other features that can affect our outcomes without going through emigration. Frost shocks themselves are therefore not valid instruments, as the exclusion restriction would likely be violated. Relying on the interaction

[42] Frost shocks and port proximity are hence hypothesized to be complements for emigration. The direction of this relationship is an empirical matter, however, as the two variables could also be substitutes. For identification purposes, what matters is that the relationship fulfills the monotonicity assumption, i.e. that the effect is the same for all observations. Figure 9 displays evidence consistent with this assumption.

[43] Path dependency in migration patterns has been well established in the migration literature (see e.g. Massey et al., 1993; Hatton & Williamson, 2005; Munshi, 2003; McKenzie & Rapoport, 2007; Bryan et al., 2014; Giulietti et al., 2014).

[44] Sarsons (2015) shows that rainfall might have effects on conflict through other channels than agricultural yields, invalidating its use as an instrument for income.

term as an instrument avoids this issue.[45]

Proximity to emigration port is defined as minus the log of the shortest distance to either Gothenburg or Malmö, the two main emigration ports.[46] Likely due to economies of scale, the points of exit were very concentrated, and between them the cities handled more than 95 percent of all emigration before 1920. Their importance is confirmed by comparing yearly emigration shares across ports.[47] Figure 4 displays the share of emigrants exiting through four ports over the period 1869 to 1920. Gothenburg was the biggest port by far throughout the period, with 79 percent of all traffic on average and about 82 percent during the first wave of emigration. Malmö was the second largest emigration port with 18 percent of the emigrants on average and 14 percent during the first wave.[48] Stockholm, the capital and Sweden's largest city by far, averaged 2 percent of total emigrants. This low share is likely driven by supply and not by demand factors. While the Stockholm region sent a large number of emigrants, Stockholm was less suited as an emigration port due to its location on the eastern coast of Sweden. Similarly, Norrköping, the third largest city and an important trade port, was minor in terms of emigration.[49] In our data set, 75 percent of the municipalities have Gothenburg as their closest emigration port, while the rest are closer to Malmö.[50] Emigration via Norwegian ports was an option for some northern municipalities, but was rare until the late 19^{th} century. It is hence not of relevance for the period we use to define our instrument.[51]

By including county fixed effects and using proximity in logarithms (rather than levels), the identifying variation does not disproportionately rely on northern counties where the dis-

[45]There may be interactions between frost shocks and other municipal characteristics that also predict emigration and could be candidates for an instrument. However, such interactions are unlikely to cause *only* emigration to change. For example, frost shocks interacted with local GDP may predict emigration but may also be pick up variation in the economic impact of the frost shocks. Such an interaction would not only predict variation in emigration rates and hence violate the exclusion restriction.

[46]All results are robust to specifying proximity in levels rather than logs, see Appendix Table B.8.

[47]Shares are computed using the passenger list data, which includes emigrants' port of exit. Information on port of exit is not available in the church book data set.

[48]The data distinguish between emigrants from Malmö and Copenhagen. Due to their geographical proximity and because most emigrants likely transited via Malmö before being registered in Copenhagen, we count the two exit ports as one unit.

[49]Gothenburg and Malmö were the second and fourth largest cities in 1865, respectively.

[50]The most common travel route was by steamship from Gothenburg to Hull on the east coast of England, then from Liverpool on the west coast to New York City, with a train connection in between (Brattne & Akerman, 1976). In terms of travel time, distance to an emigration port constituted a considerable share of total travel time to the US. Travel by ship from Gothenburg to New York took around 10 days, while it took 14 hours by rail to reach Gothenburg from Stockholm in the late 1860s. This indicates about a 10 percent within-country share of travel time, starting from Stockholm. Many locations did likely have a considerably higher (or lower) within-country share of travel time to the United States, driven by remoteness vis-a-vis emigration ports.

[51]Appendix Section B.2 provides more details and shows that results are robust to including Norwegian ports in our proximity measure.

tance to ports and distance between municipalities is larger. Northern municipalities, while large in terms of surface area, only constitute 202 out of approximately 2400 observations in our data set and do not drive the results below.

Balance test For the identifying assumptions to hold, the instrument should not systematically correlate with variables that are determined before mass emigration. We test this by performing balance tests of the instrument on a number of observable characteristics of municipalities. Table 2 displays the outcome of these tests. The instrument is uncorrelated with all variables but one, log population in 1865. By random chance, we should expect some variable to be correlated with the instrument. Yet, it is reassuring that the correlation predicts that high-emigration municipalities have *lower* baseline population levels, while it is expected that larger municipalities are more politically organized.[52] Nevertheless, the 1865 population is included in all regressions as a control. We include the following additional control variables: log area, latitude, longitude, the share of arable land, an urban indicator, as well as indicators for high soil suitability for the production of barley, oats, wheat, dairy and lumber. We also include the following proximity measures, all in logarithms: to the nearest weather station, to the nearest railway, to Stockholm, to the nearest town and to the nearest of the ten most important trade ports in 1890.[53]

The three mortality variables, as well as population growth 1810–1865, at the bottom of Table 2, are not included as control variables in our regressions due to a lower number of observations. They provide relevant tests of the instrument, however, as they directly relate to municipal policy and wellbeing prior to mass emigration.[54] The instrument is not correlated with population growth before emigration, nor with any measure of mortality, whether it is for infants, children or mothers.

Exclusion restriction Given that the instrument is exogenous with respect to municipal characteristics, the key identifying assumption for causal inference is the exclusion restriction. The interaction between frost shocks and port proximity should only affect outcomes through its effect on emigration, conditional on our set of controls, such that

$$E[\varepsilon_{mct}|Shocks \times Port_{mc}, Shocks_{mc}, Port_{mc}, \phi_c, \mathbf{X}'_{mc}] = 0.$$

A concern for the credibility of this assumption is that frost shocks may cause economic

[52]Indeed, OLS regressions show that the population in 1865 is weakly positively correlated with labor organization rates and welfare spending, while it is unrelated to support for left-wing parties.

[53]As before, we define proximity as minus the log of distance.

[54]Maternal mortality was partially a function of local policies, as midwives were employed by parishes (Pettersson-Lidbom, 2015)

effects of different intensity depending on proximity to emigration ports. Locations near Gothenburg and Malmö may for example have better market access, which could imply a differential sensitivity to frost shocks due to less volatile prices, better insurance opportunities, or a lower reliance on agriculture. If so, the instrument could affect our outcomes through channels related to the intensity of economic shocks rather than through emigration, violating the exclusion restriction.

To account for this source of confounding variation, we therefore include specifications that control for the interaction effect of frost shocks and two direct measures of proximity to economic hubs: a municipality's proximity to the nearest of the 10 largest trade ports as well as to the nearest town. These controls are denoted as $Shocks \times Market\ Access$ in our tables.[55] In Section 9 we also show specifications were market access is measured using smaller subsets of only the larger trade ports and towns, to check if results are robust to different definitions of market access. As a separate test, we also include interactions between frost shocks and pre-emigration measures of agricultural activity. These specifications test for the possibility that local economic structure may co-vary with port proximity and cause different responses to frost shocks. Finally, Section 9 also presents results from testing the robustness of our results to the method of Conley, Hansen & Rossi (2012), which yields unbiased estimates under the assumption of some specified degree of violation of the exclusion restriction.

It is of particular interest that our models control for the independent effects of $Shocks_{mc}$ and $Port_{mc}$. In our baseline model in equation (4), these variables enter linearly. However, both variables may have nonlinear effects that may be related to the error term. We therefore also estimate models that control for more flexible functional forms of these variables.[56]

The late 19^{th} brought several international trade shocks which lead to important changes in for example the dairy and lumber sectors (O'Rourke, 1997). If our instrument is related to the agricultural or broader economic structure of municipalities, there is a risk that such later trade shocks are picked up by it, which would violate the exclusion restriction.[57] However, Table 2 displayed that there is no significant relationship between the instrument and several measures of soil suitability for the goods that were subject to trade shocks. Hence, later changes in trade patterns should not be a concern for our estimates.

[55] We use the term *market access* as a catch-all term for factors that may mediate the economic effect of frost shocks and that correlate with proximity to economic hubs.

[56] In Appendix Table B.9, all results are shown controlling for frost shocks and port proximity using linear and cubic splines as well as 2^{nd}, 3^{rd}, and 4^{th} degree polynomials.

[57] For example, Schultz (1985) finds that the relative price increase of dairy versus grain products increased female labor supply and sparked the Swedish fertility transition.

5 Frost shocks, travel cost and emigration

Frost and agricultural outcomes Before investigating the link between the instrument and emigration, we verify the effect of frost shocks on agriculture using a panel of county-level harvest grades from 1860 to 1880. Column 1 of Appendix Table A.2 shows that frost shocks in the growing season indeed cause worse harvests in the same year. A standard deviation increase in frost shocks causes a 10 percentage point higher probability of crop failure, an increase of about 0.25 standard deviations. The result holds controlling for county and year fixed effects, as well as county-specific linear trends. Column 2 provides evidence that the distinction between growing and non-growing seasons is crucial, as shocks that occur in the non-growing season have a near-zero and insignificant effect on harvests. If emigration was indeed caused by poor agricultural yields, we should expect to find the same pattern when emigration is the dependent variable. Columns 3 and 4 re-estimate the specifications in the first two columns using the full scale of harvest grades, with the results displaying the same pattern.

First stage We start by establishing the presence of path dependence in Swedsih emigration. Figure 7 evaluates this pattern graphically. Panel A plots the spatial distribution of emigration rates during the first wave of emigration 1867–1879, while Panel B displays emigration in the whole 1867–1920 period. Comparing the raw data between the two maps reveals a substantial correlation in the propensity to emigrate over time. This is consistent with the fact that up to 50 percent of the emigrants travelled on pre-paid tickets sent by network members in the US (Runblom & Norman, 1976; Beijbom, 1995). Figure 8 also displays the relationship between early and later emigration in a scatter plot, which displays a strong positive correlation.[58]

With this in mind, Table 3 estimates how emigration over the full sample period is related to growing season frost shocks 1864–1867, proximity to the nearest emigration port and our instrument: the interaction between the two. Consistent with the notion that individuals take the internal migration costs into account in their decision to emigrate (see e.g. Sjaastad, 1962), the results in Column 1 indicate that over the 1867–1920 period, individuals in municipalities that are closer to a port emigrate more in response to an additional frost shock.[59] In terms of magnitude, the estimates show that a one standard deviation increase in our instrument increases emigration by 14 percent.[60] This result is robust to the inclusion

[58]The next subsection also tests for path dependency causally.

[59]Relatedly, Morten & Oliveira (2014) find that individuals with a shorter road distance to the new city of Brasilia were more likely to migrate and take advantage of the comparatively high wages offered there.

[60]Similarly, given one frost shock, a standard deviation increase in port proximity increases emigration by 6.3 percent.

of pre-emigration control variables in Column 2.

We next consider a potential threat to the exclusion restriction. If frost shocks have a different economic impact depending on port proximity (which can proxy for local market access and economic characteristics), our instrument may capture differences in the economic impact of the shocks. For example, municipalities that are closer to Gothenburg or Malmö may have less weather-dependent economies if they have better access to insurance or rely less on agriculture. If so, the instrument would not only predict emigration, but also capture the intensity of economic effects caused by the frost. This could have direct effects on our outcomes of interest, leading to a violation of the exclusion restriction. To control for this possibility, Column 3 controls for the interaction between frost shocks and our two measures of market access: the proximity to the nearest town and the proximity to the nearest major trade port. The coefficient on the instrument is not sensitive to this adjustment. The interaction terms themselves are also not significantly different from zero. Frost shocks therefore only affect emigration when interacted with travel costs, indicating that the instrument only captures migration-related push factors at the onset of mass emigration.[61]

To provide support for the claim that frost shocks affect emigration through their impact on the agricultural sector, Column 4 additionally includes non-growing season frost shocks and their interaction with port proximity.[62] The coefficient of the interaction term is substantially smaller and statistically indistinguishable from zero, thus mirroring the null effect found for agricultural outcomes. A formal test also rejects the null hypothesis that our instrument and its non-growing season variant have the same coefficient. Growing season shocks therefore identify economically meaningful events and not spurious correlations with underlying variables at the municipality, such as general climatic conditions or fixed effects related to port proximity.

Figure 9 displays the first-stage relationship non-parametrically. In Panel A, residuals of log emigration 1867–1920 and the instrument are plotted after controlling for the full set of covariates. Municipalities are collected in 50 groups of equal size, with dots representing the mean value in each group. The figure shows that across the whole range of the instrument,

[61] Appendix Table A.3 presents additional estimates using the panel variation in emigration and frost shocks and controlling for municipality and year fixed effects. It shows that yearly frost shocks interacted with port proximity predict yearly emigration flows, but only during the first wave of mass emigration. From 1880 to 1920, neither frost shocks nor the interaction with port proximity matter. The importance of both frost shocks and port proximity hence diminishes over time; in line with the finding in Thomas (1941) that later harvest shocks did not cause additional emigration. Both variables that compose our instrument can thus be thought of as only capturing variation that was relevant during the first wave of mass emigration. In Section 9, we perform placebo tests using the interaction between the port proximity and frost shocks occurring during all four-year periods other than 1864-1867.

[62] Non-growing season frost shocks over the period are defined analogously to growing season frost shocks.

observations are clustered near the regression line.[63] The even distribution of group means indicates that there is compliance with the instrument at all values and that the log-linear specification with emigration in logs is an appropriate model. In Panel B, we display the effect of the placebo instrument on migration using the specification in Column 4 of Table 3. As expected, the figure shows that emigration has no apparent relationship with the placebo instrument, whether linear or non-linear.

Early migration and future mobility Having established the importance of the initial frost shocks for emigration over the whole mass migration period, we next estimate the elasticity of later emigration with respect to first-wave emigration. Panel A of Table 4 estimates the effect of the instrument on first-wave emigration, 1867–1879. The results in Columns 1 to 3 indicate the same pattern as that found in Table 3: locations that experienced frost shocks closer to a port had more emigration. In Panel B of Table 4, we use the relationship in Panel A as the first stage for estimating the causal effect of early emigration on later waves. The coefficients in Columns 1 to 3 show that there is a strong pattern of path dependency, with an intertemporal elasticity of emigration near unity. Thus, these results confirm the canonical finding in the migration literature of strong path dependence in migration patterns referred to earlier.[64] Interestingly, the IV coefficients are greater in magnitude than their OLS counterparts.[65] This may be due to measurement error in emigration levels, since unregistered emigration was more common before 1884, when a new law made it harder to emigrate without proper documentation. The larger coefficients may also reflect the estimation of a different parameter between OLS and IV, if the instrument causes different types of individuals to emigrate.[66]

6 Emigration and citizens' demand for political change

This section estimates the effect of emigration on citizens' demand for political change across Swedish municipalities. The main variable of interest is membership in the labor movement, given that unions and the Social Democratic Party were the strongest proponents of political

[63]The slope of the regression line corresponds to the estimate in Column 3 of Table 3.

[64]The F-statistic is low as compared to Table 3 because of the shorter time span over which emigration is counted over. As municipalities' cumulative emigration diverges over time, the instrument yields estimates with higher precision. All main IV regressions are estimated using outcomes from 1890 or later, when the F-statistic is above the levels conventionally recommended to avoid weak instrument problems.

[65]This is similar to estimates in McKenzie & Rapoport (2007).

[66]For example, liquidity constrained individuals should be more likely to emigrate as a response to the reduced migration cost of having a relative already in the US. If our instrument causes a higher fraction of poor people to emigrate than would otherwise have been the case, the incidence of chain migration could also be higher.

change during our period of study and were directly involved in conflicts with economic and political elites at both local and national levels.

Labor movement membership The Social Democratic Party was founded in 1889. Modern labor unions had become more widespread in the preceding decade, ultimately leading to the formation of the Swedish Confederation of Trade Unions in 1898. In Figure 10, we trace out the impact of emigration on municipal labor movement membership rates starting in this period and ranging until 1920. The figure displays IV coefficients from separate regressions in five-year intervals 1890–1920, including the full set of controls, with bars representing 95 percent confidence intervals. In the earliest years of the labor movement, 1890 to 1895, the IV estimates are insignificant and close to zero, albeit with a positive sign. Starting in 1900, however, emigration has a clear positive and statistically significant effect on labor organization rates.[67] The effect sizes show an increasing trend, which mirrors the general positive trend in membership rates in the period. Interestingly, the effect grows over time even as emigration rates dropped during World War I. This may reflect the possibility that, once established, unions could more easily attract members and became less reliant on the emigration threat.

To get an aggregate picture of the relationship, Table 5 reports OLS and IV regression results using the average labor movement membership rate between 1900 and 1920 as the dependent variable. In the two specifications in Columns 4 and 5, the estimated IV coefficients are strongly significant and stable at approximately 0.021, including when we control for pre-determined municipal characteristics. Column 6 includes the two market access interactions, using proximity to the nearest trade port and town to control for potential violations of the exclusion restriction. The point estimate becomes slightly larger with these controls and remains significant at the 1 percent level. This indicates that the instrument is not correlated with the economic impact of frost shocks in a meaningful way. Moreover, it indicates that the market access effect leads to, if anything, a downward bias on our estimates.[68]

The point estimates are large. The preferred estimate in Column 6 suggests that a municipality which doubles its emigration over a 30-year period increases the local labor movement membership by 2.3 percentage points. The effect size corresponds to moving a municipality from the mean to the 90^{th} percentile of the distribution of membership rates. The IV coefficients are also just more than twice as large as the corresponding OLS estimates.

[67]The fact that we first detect significant effects starting in 1900 is likely due to Sweden's comparably late industrialization, which meant that the labor movement started comparably late as well. In 1890, there were 2,308 labor movement members in Sweden, while there were 75,724 in 1900.

[68]Section 9 performs several robustness tests to support the validity of the exclusion restriction. We vary the towns and trade ports that are used to create the market access variables, use pre-emigration agricultural variables as a separate test, and perform sensitivity analysis using the method of Conley et al. (2012).

The difference implies a downward bias in OLS and that, if anything, OLS estimates provide a lower bound on the effect of emigration on labor movement size. A possible reason for this is that emigration was more common in regions that were also less likely to develop labor organizations, perhaps where landlords and employers were particularly powerful. This would be consistent with bad institutions acting as a push factor for emigrants. Measurement error in emigration may, in addition, be contributing to the difference in estimates.

Reduced-form estimates are displayed in Table 6. As expected, the instrument has a positive and statistically significant effect the labor movement. Both market access interactions have negative estimates, and only one is statistically significant (at the 10 percent level). As in Table 3, a formal test rejects the null hypothesis that the instrument and market access interactions have equal coefficients. Additionally, non-growing season frost shocks interacted with port proximity do not have a significant effect on the labor movement, and we can formally reject that the coefficient is equal to that of the instrument.

Together, these results provide evidence of a strong positive effect of emigration on membership in the Swedish labor movement. Thus, they contrast with the hypothesis that vocal political dissidents would emigrate and decrease the level of activism in origin communities. Instead, emigration increased the pool of activists over time.

To verify the robustness of our results, we also graphically display nonparametric estimates of the first stage and reduced-form relationships. Figure 11 plots the instrument against emigration 1867-1900 (the first stage) and labor movement membership 1900-1920 (the reduced form). All variables are residualized using the full set of covariates. We see that both outcomes are positively correlated with the instrument across the entire range of its values. Taken together, these results imply a positive relationship between emigration and labor movement membership, summarizing the main result of this section.

We next study the effect of emigration on a direct, costly action directed towards employers. In response to a downturn in the business cycle in 1909, the Swedish Employers Association sought to lower workers' wages. Anticipating opposition by labor organizations, it enacted a lockout of thousands of workers in order to force acceptance from the unions. The Swedish Confederation of Trade Unions instead responded by calling a general strike, affecting 300,000 laborers who halted work for three months. Using data on strike participation by municipality, we estimate the effect of emigration on the mobilization of workers in Table 7.[69] If our estimated effect on labor movement size indeed captures a greater ability to organize and mobilize citizens, we should expect high-emigration municipalities to display

[69]The number of emigrants is always summed from 1867 until the year that the outcome is measured. In the Appendix Table B.15, we also show results where emigration is counted between 1867 and 1900 for all outcomes.

a greater participation in the strike.[70] This is confirmed by the result in Column 1, which shows a positive and significant effect. Membership in the labor movement was not only ceremonial then, but also resulted in an effective collective action. A ten percent increase in emigration implies a 0.32 percentage points higher strike participation.

Separating strikers by union membership, we can define the share of *unionized* strikers as a more direct indicator for the extent to which the labor movement was the mechanism behind strike participation. This variable is constructed to equal zero for locations with no strikers, while it takes on negative values where non-unionized strikers were more common and positive values where union members constituted a larger fraction of the strikers. As a result, a statistically significant estimate indicates that emigration causes more strike participation, while the sign of the coefficient shows which group that was most common. Column 2 of Table 7 indicates that emigration indeed causes a greater share of union members among strikers. Approximately 9 percent of the municipalities that participated in the strike had more non-unionized than unionized strikers. Since the so-called "striking weapon" was the most common tool available for political and economic protests (Westerståhl, 1945), this finding suggests that emigration developed a stronger bargaining position of citizens, through its effect on the labor movement.[71]

Electoral effects The Social Democratic Party had strong ties with labor unions, and the central Confederation of Trade Unions in particular, each side making up one leg of the Swedish labor movement. The greater local membership of labor unions made them interesting for the Social Democrats, who saw a way of expanding the local penetration of socialist ideas. Unions indeed participated in election campaigns for the Social Democrats and a large fraction of voters for the left are thought to have come from labor union members (Westerståhl, 1945). Having established that emigration increased labor organization and striking, we therefore proceed to test if the relationship also extends to electoral mobilization. For this purpose, we look at turnout rates and support for left-wing parties in national elections between 1911 and 1921. This period ranges from the first election with mandatory party affiliations to the first election with universal suffrage.[72]

[70] Although the willingness to participate in strikes could be independent of union membership, or even negatively related, it is well established that the Swedish labor unions were deeply involved in the 1909 strike. In general, similarly to their German counterparts, Swedish labor unions used strikes as their principal tool for protests (see e.g. Westerståhl, 1945).

[71] While the 1909 general strike was not considered a victory for the labor movement, strikes often resulted in favorable outcomes for workers. Summary evidence on 748 strikes 1863-1902 found that strikes resulted in concessions to workers' demands in 47 percent of the cases, while 32 percent of the cases ended in a compromise and only 20 percent sided with the employers (Kommerskollegii Arbetsstatistik E:1, 1909).

[72] In addition, data on municipal elections would have been informative, because the weighted voting scheme present in local elections until 1919 would have given an indication of how elites' preferences were

Figure 12 displays the IV coefficients of emigration on the vote share of the Social Democrats and Socialists across these elections. Emigration led to significantly greater support for left-wing parties. The effect is strongest in the earliest elections, possibly indicating catch up among low-emigration municipalities over time as suffrage was gradually expanded. Aggregating the two left-wing parties, Table 7 reports regression results for the effect of emigration on the average vote share of the Social Democratic and Socialist parties between 1911 and 1921. The IV estimate in Column 3 indicates that an increase in emigration by 10 percent increased the vote share of the left by 1.2 percentage points.

Until 1921, voting eligibility was reserved for men who had payed their taxes, who were not in poverty care or bankruptcy and who had performed their military service. These restrictions disenfranchised one fifth of otherwise voting eligible men (Grenholm et al., 1985). Nevertheless, even during a time when only relatively well-off men could vote, there is a shift in party preferences toward left-wing parties.[73]

Finally, Column 4 of Table 7 displays regression results for the effect of emigration on average voter turnout during the period. We find positive effects on turnout, with an estimate indicating that a 10 percent increase in emigration increases the voter turnout by approximately 0.8 percentage points, from an average of 60 percent during the period. This result suggests a complementary role of labor organization and voting, in line with the goal of the Social Democratic Party of using local organizations to mobilize citizens for larger, national-wide political change.[74]

Persistence of electoral effects Political preferences have been found to exhibit path-dependence within individuals after being shaped by pivotal events (Kaplan & Mukand, 2014; Madestam & Yanagizawa-Drott, 2012) and to be correlated between parents and children (Alford et al., 2005; Jennings et al., 2009). Moreover, institutions may have long-lasting effects on individual beliefs and values (Nunn & Wantchekon, 2011). Using data on both national and municipal elections from the five most recent election rounds, 1998 to 2014, we estimate the persistence of emigration on left-wing voting. Columns 6 and 7 of Table 7 display IV estimates using emigration from 1867 until 1945, after which emigration was uncommon. Strikingly, the results show that the emigration sparked by in the 1860s have

affected by emigration. It would also have been directly relevant for municipal policy. Unfortunately, such data are unavailable to us.

[73]It is difficult to distinguish how much of this change is due to an increased popularity among working-class voters and how much is due to elites shifting their voting towards parties that would be more popular among average citizens.

[74]It is relevant to note that the results on left-wing vote shares take into account the changes in voter turnout due to emigration, as the vote share is computed using the total number of votes as the denominator. The increase in the vote share of left-wing parties is therefore not simply explained by an increased mobilization of poor voters, but is due to differential voting behavior among voters.

significant effects on voting up to the five latest Swedish elections. The results are stronger in municipal elections than at the national level, possibly due to issues at the national level having a stronger sway over voters as compared to tradition. The estimate in Column 7 of 0.074 is a bit over half as large as the corresponding estimate for the 1911–1921 elections. The mean vote share of the left is also higher in the later period, i.e. 38 percent rather than 24 percent.

7 Emigration and local government policy making

The results in the previous sections show that emigration increased the political organization and mobilization of citizens during the Age of Mass Migration. This section tests if these changes were also reflected in local government policy making, by looking at welfare expenditures and local political institutions.

Welfare expenditures We use welfare expenditures as a measure of redistributive actions taken by local governments.[75] The choice of expenditures can also be seen as an equilibrium outcome of bargaining between elites, who hold political power, and citizens. We study per capita expenditures on welfare in 1918, one year before democratization, and in 1919, immediately afterwards. In 1918, municipal voting was restricted by wealth, income and property ownership. Votes were also weighted by a factor of up to 40 in favor of richer voters (Nilsson, 1964).[76] As a result, formal authority over spending levels was heavily biased in favor of economic elites in 1918. Changes in policy at this time are thus reflective of their choices rather than those of common citizens. This can be quantified by comparing average welfare spending before and after democracy: in 1918 it was 2.42 SEK per capita while it rose by 13 percent to 2.74 SEK in 1919 as ordinary citizens could vote.[77] Nevertheless, it is possible that citizens could wield some influence on the welfare spending decisions of elites before democracy.

Table 8 displays our results. Column 1 shows that emigration leads to a significantly higher per capita expenditure in 1918, one year before democracy was introduced.[78] As

[75]Municipalities had the power to tax their residents and set their own tax rate. Taxation was progressive, as only the relatively rich payed taxes. On average, these taxes averaged more than 90 percent of municipal income in 1910. Welfare spending constituted about 20 percent of municipal budgets and included support for unemployed, disabled, elderly and widows.

[76]In 1905, 1 percent of the rural population held as many votes as the remaining 99 percent (Nilsson, 1964). The cap on votes was 1000 at that time, however, rather than 40.

[77]Expenditure data are deflated by CPI.

[78]Appendix Table C.5 displays full regression tables. The IV estimate is stable when excluding baseline and market access controls.

documented in Column 2, the effects on welfare spending remain in 1919, as voting rights were extended on an equal basis.[79] The estimate is somewhat larger than in 1918 and indicates that a doubling of emigration leads to approximately 1.1 SEK higher expenditures per capita in 1919, an increase of 40 percent over the mean. Overall, both before and after citizens had the formal power of affecting welfare policy in municipalities, emigration thus led to higher levels of redistribution. We discuss a potential interpretation of this result in Section 8.

Political institutions Starting in 1919, rural local governments could adopt two different institutions for decision making, direct or representative democracy. Earlier, all municipalities had been direct democracies. In direct democratic municipalities, public town meetings would be held at least three times a year to decide on economic matters. Deliberations were open, as well as many votes. By contrast, in municipalities of the representative type, eligible citizens voted for their party of choice in closed elections. Starting in 1919, there was an assignment rule dictating that municipalities with more than 1500 inhabitants adopt the representative form of government, whereas those below the threshold were free to choose between the two. In practice, however, only a small fraction of municipalities chose the representative form voluntarily. Hinnerich & Pettersson-Lidbom (2014) study the effects of these institutions in detail. They find that direct democracies implement substantially lower levels of welfare spending per capita, potentially due to direct democracies being more easily captured by elites. This is partly seen by the low attendance rate at town meetings, 12 percent, whereas the voter turnout in national elections was routinely above 50 percent. The choice of institution was then to a large extent a choice about its inclusiveness, the relative power of elites and the amount of redistribution. This may, in turn, explain the low rate of voluntary transitions from direct democracy, which was the default, to representative democracy.

We use data on the local form of democracy to test for the effect of emigration on institutional change. This is done by coding a dummy variable taking the value of 1 if the municipality was a representative democracy by 1919 or 1938, and had a population of 1500 or less in the preceding year. The last condition is included to take into account only voluntary transitions from direct to representative government. We take this measure to be an indicator of the inclusiveness of local political institutions. In addition, we include indicators for a municipality having ever crossed the population threshold in the preceding years.

[79] Since we find that emigration slightly affect the average age downwards over time, it is unlikely that the increase in welfare expenditures is driven by an increase in the elderly population.

Columns 3 and 4 of Table 8 show that high emigration municipalities were indeed more likely to adopt the more inclusive form of democracy in their local governments. The effects are statistically significant in 1919, the first year of the new assignment rule, with the coefficient implying a 4.7 percentage point increase in the likelihood of a representative democracy from a doubling of emigration. Column 4 shows that in 1938, when a larger share of municipalities had transitioned voluntarily, the effect is larger.

How should we interpret the effects on local political institutions? An important institutional feature was that municipalities that switched to representative democracy were required to keep that institution for at least five years. Reversions back to direct democracy were rare, however. An interesting question for interpreting these results is to what extent these institutional changes represent elites' concessions to citizens, versus citizens' own enforcement of their preferences. While we only observe transitions between political regimes after the introduction of one man, one vote, it is not necessarily the case that ordinary citizens held complete *de facto* political power in rural municipalities. Some elites were able to maintain important positions of power even after 1919. Moreover, electoral competition was generally limited, with 30 percent of the elections only having one party in 1919 (see Hinnerich & Pettersson-Lidbom, 2014, and references therein). While the preferences of citizens should more directly affect outcomes after the introduction of local democracy in 1919, our results may therefore still reflect the outcome of bargaining between elites and citizens. This may especially be the case as the default institution was direct democracy, which had been restricted to wealthy citizens for decades. Observing that emigration leads to the adoption of persistently more inclusive institutions may reflect a strategy of elites to commit to more pro-citizen policies by reforming the basic rules of the game, as suggested by Acemoglu & Robinson (2000, 2006).

8 Mechanisms

To study the potential mechanisms behind these results, we explore four broad channels through which emigration may affect home country institutions.[80] First, easier access to emigration can raise the outside options of those who stay behind, influencing bargaining between citizens and elites. Second, emigration may elicit local economic responses that in turn cause political change. Third, the selection of migrants may change the composition of people who remain in Sweden. Fourth, emigrants may transmit American attitudes to their countrymen at home.

While we cannot narrow the field down to one explanation to the exclusion of all others, we

[80] A similar set of mechanisms is delineated in Kapur & McHale (2005).

find evidence consistent with the notion that increased outside options played an important role by strengthening prospective migrants' bargaining power vis-à-vis elites. However, this does not rule out that additional mechanisms contribute to explain our results.

Outside options As living standards were higher in the US as compared to Sweden, the option of migrating constituted an attractive possibility for many. It may have enabled workers to take higher risks, such as joining labor unions. Similar to other countries, labor organizing had long been legally restricted in Sweden, and employers could routinely fire, evict and blacklist workers who were found out to be union members (Westerståhl, 1945). Given the risks involved in union membership, the Ljusne case, described in more detail in Section 2, illustrates the use of emigration among labor activists, and indicates that the outside option of emigration could serve as an insurance mechanism used to circumvent repression by employers. Thus, emigration may have encouraged activism among citizens who would otherwise not have dared to object to employers' demands. This view is also consistent with the claim of Hovde (1934) that the threat of emigration placed unions in a much stronger bargaining position, from which it became easier to build up their organizations.

We provide three pieces of evidence that together suggest that outside options are in fact higher in places with high past emigration. First, the pattern of strong and long-lasting chain migration, as evidenced in Table 4, is prima facie evidence of this. Well beyond the famine years, emigration rates did not converge but instead diverged as connected areas sent additional emigrants. By revealed preference, the continued emigration indicates that the outside option was higher than remaining in Sweden.

However, the observed chain migration could for example also be due to a desire to reunite with family. To identify the role of economic opportunities in raising outside options, we use panel variation and study changes in the value of the emigration option over time. It is well established that aggregate emigration in this period is correlated with the relative prosperity of the United States compared to Sweden (Bohlin & Eurenius, 2010). We should therefore expect the value of the outside option created by migrant networks to fluctuate in accordance with these macro-level incentives for emigration. Correspondingly, Table 9 shows that yearly emigration rates 1880–1920 match this cyclical pattern. Locations with more migrant networks, as predicted by our instrument, are more likely to emigrate during years when the US-Sweden GDP difference is larger.[81] Hence, the emigration option was specifically exercised when its value was high, indicating that material returns were important determinants of chain migration. This is consistent with contemporary evidence that living

[81]The regression controls for municipality and year fixed effects. As documented, the result is also robust to including linear trends by region as well as linear trends in baseline characteristics of municipalities.

standards were a primary concern for prospective emigrants (Sundbärg, 1913)

Lastly, we study the response of high-emigration areas to the rise of a new outside option: migrating within Sweden. Internal migration became widespread as Sweden industrialized in the late 19^{th} century, which brought an increase in higher wage work opportunities (Jörberg, 1972). Using the 1890 census, we define internal out-migration for municipality m as the number of individuals that were born in m but live in any other municipality. Urbanization is defined analogously as out-migration to urban municipalities.[82] Columns 1 and 2 of Table 10 show that locations with more emigrants were less likely to send migrants within Sweden. Even as workers all across Sweden migrated to other parts of the country to take advantage of the higher wages in the industrial sector, this option was apparently not attractive for those who could easily emigrate instead.

Contemporary accounts also lend support to the hypothesis that the outside option of emigration was of substantial value, eclipsing the choice of migrating internally. For example, Rondahl (1985) documents that emigration was a preoccupation among young residents of Ljusne. One labor organizer who had been fired for his activism remarked that "oddly enough, there is only two places in the world for us, Ljusne or America", giving a particularly stark indication that internal migration was not considered an alternative. About Öland, which also had a strong emigration history, Nelson (1909) writes that prospective migrants showed little interest in other parts of Sweden. As family and friends promised good fortunes overseas, they almost considered America to be "the only labor market".

To explore the possibility that outside options also led to a greater bargaining strength of workers, we turn to study how emigration affected wages, as this is a first-order outcome of any employee-employer bargaining process.[83] For this purpose, we employ yearly data on low-skilled agricultural wages at the county level from Jörberg (1972). This is the only available disaggregated wage series for the period before World War I. It covers wages on agricultural day-workers, who were essentially low skilled and landless. Scattered across Sweden, these types of workers made up about half of the agricultural working class (Jungenfelt, 1959) and their employment terms resembled those of industrial and construction workers (Enflo, Lundh & Prado, 2014). The wage series represents both urban and rural areas, and to reflect the level of low skilled wages more in general (Ljungberg, 1997). Table 11 documents the relationship between total emigration 1867–1900 and long-run wage growth in 23 counties. Long-difference regression results in Columns 1, 2, 5 and 6 indicate that counties experiencing more emigration also saw considerably higher wage growth between 1860

[82]Swedish industry is well known to have been located in both urban and rural areas, and hence both measures of internal migration are relevant (Thomas, 1941).

[83]Wages may also rise due to a shortage of labor following emigration. We discuss labor scarcity in the next section.

and 1910. The same relationship is found when aggregating the instrument to the county level and estimating reduced-form impacts. This positive relationship is consistent with the findings of economic historians that the Swedish emigration increased wages (O'Rourke & Williamson, 1995; Ljungberg, 1997). Interestingly, this finding also has similarities with that of Habakkuk (1962). He argued that the possibility of migrating to the western frontier led to an increase in the wages of US workers on the east coast, since agricultural land was cheap in the west and returns were high. Our results suggest that the westward migration of Swedes had a similar effect on wages in Sweden.

In addition to increasing the bargaining strength vis-à-vis employers, improved outside options may have bolstered the labor movement by increasing the returns to organizing, as political elites became more responsive to the demands of citizens. Section 2.1 described how economic and political elites demanded new policies to respond to the perceived threat that emigration posed to economic and political interests. In addition to the emigration threat, the labor movement brought with it a greater strike threat. In particular, as emigration rates dropped during World War I, the political effects of emigration may have been primarily driven by the presence of a strong local labor movement. The responsiveness of elites was displayed locally, with several municipalities recruiting labor movement representatives to the local administration (Östberg, 1995), while left-wing candidates were sometimes included on larger parties' voting lists by parties seeking to increase their representativeness (Lundkvist, 1977).

Local economic responses In the following section we consider if mass emigration affected local economic conditions, and to what extent such effects are likely to explain the upswing in the labor movement. Population declines can have important effects both on labor relations and wages. For example, Neo-Malthusian theories such as Habakkuk (1958) and Le Roy Ladurie (1977) argue that labor coercion declined in 16^{th} century Western Europe due to reduced population and raised per capita income after the Black Death. Our data, however, indicate that lasting shifts to labor supply did not play an important role in our setting. As shown in Column 3 of Table 10, the population as measured in the 1890 census was not significantly lower due to emigration.[84] This perhaps surprising result is potentially explained by two factors. First, as shown above, emigration lowers the rate of internal migration (Columns 1 and 2). Second, emigration creates a fertility response, given by an increase in the number of young children per woman (Column 5).[85] Together these

[84]OLS estimates, presented in Appendix Table C.12 indicate a positive correlation.

[85]The fact that fertility adapts quickly is in line with recent evidence from Sweden showing that a reduction in infant mortality in the early 19th century caused population levels to remain stable rather than increase, because of a rapid decrease in fertility (Ager, Worm Hansen & Sandholt Jensen, 2017).

factors explain a substantial part of population response. For the average municipality, our reduced form estimates indicate that a standard deviation increase in the instrument increases the population by 0.8 inhabitants for every emigrant, with internal migration being the most important factor. To further test the robustness of the effect on total population, we control for population growth between 1810 and 1865, before the emigration episode began. The coefficient remains insignificant with this additional control, as seen in Appendix Table B.16. Moreover, the balance test in Table 2 shows that the instrument is not correlated with pre-emigration population growth. Even though there were no population impacts in the longer term, it is however possible that short-term effects on labor scarcity may have had longer term consequences.

The increase in low-skilled wages that we find above may be related to broader economic changes. For example, Habakkuk (1962) and Allen (2009) argue that labor costs are fundamental in inducing technological change and industrialization. High wages also play a role in the big push literature (Murphy, Shleifer & Vishny, 1989; Magruder, 2013). In fact, in a companion paper, we find that the number of innovations, as measured by technological patents, increased in high emigration municipalities (Andersson, Karadja & Prawitz, 2017). And Ljungberg (1997) argues that high wages, induced by emigration, produced incentives for a structural change towards the industrial sector. While we found little support for an overall presence of labor scarcity, we indeed find that high emigration municipalities underwent faster structural change as compared to their low emigration counterparts. Table 12 displays this finding.[86] Using census data from 1910, we find that high emigration municipalities had fewer farm workers and more industrial workers (Columns 2 and 3). In addition, we find that such municipalities have a greater presence of corporations, as measured using data on the universe of Swedish corporations 1900–1920 (Column 4). Finally, we find evidence of substitution from labor to capital in agriculture, as witnessed by increased adoption of draft horses, which was a labor-saving technology (Column 1).[87] Together with a decreased agricultural workforce, this is indicative of higher capital/labor ratios in agriculture. Rising outside options are consistent with these findings, as they allow workers to bargain more effectively for higher wages, especially when they are organized in unions.

As the labor unions that we observe in our data were almost exclusively organized in non-agricultural sectors, the shift towards industrial employment that we observe could potentially explain the rise in labor movement membership in a mechanical way. To test for this possibility, we use employment data from the 1910 census and rerun regressions for the

[86] Appendix Tables C.19–C.24 document that this relationship is present also in the OLS estimations.

[87] The new labor-saving threshing machines used draft horses, in contrast to the older labor-intensive equipment which instead predominantly used oxes as draft animals (Sjöström, 1922; Morell, 2001).

effect of emigration on the labor movement and strike participation expressed *per industrial worker* rather than per capita. This specification will net out any changes in the sectoral composition of employment.[88] Columns 5 and 6 of Table 12 show the results of this test. Both variables are positive and significant, indicating that the main conclusions are robust to this variation. Hence, holding the number of industrial workers constant, labor organization in 1910 as well as strike participation in 1909 were still more intense in high-emigration areas.[89]

Remittances sent home by emigrants may also increase resources per capita. Unfortunately, the lack of disaggregated data precludes an empirical analysis of the extent of monetary remittances sent back to Sweden. As a share of GDP, aggregate remittances to Sweden were, however, smaller than for Ireland and were "almost insignificant" in comparison to Italy (Babcock, 1914). As a different comparison, remittances to Sweden were below levels sent to low-income countries today, since they amounted to below 1 percent of GDP while they are above 4 percent of GDP for current LDCs. Moreover, it is not known how much of the money sent as remittances was used by stayers to buy tickets and emigrate themselves.

Selection into migration Selection effects are a first-order concern when studying migration. If those who choose to emigrate are different from those who stay behind, migration may change the composition of the origin community population over time. This could itself have direct, mechanical effects on our outcomes of interest. Since selection does not imply any changes in individual behavior, it is important to assess its importance. Whereas Table 12 already showed that labor movement membership was not driven by agriculture-skewed emigration, we here consider several additional selection channels.

Research on Norwegian migrants during the Age of Mass Migration has found that migrant self-selection in terms of earnings potential was negative from urban areas, but ambiguous from rural areas (Abramitzky, Boustan & Eriksson, 2012). To the extent that Swedish and Norwegian migration had similar types of selection, this should not substantially affect our results, given that most of the variation used in this study comes from rural areas. This is verified by re-estimating our models on labor movement participation using the rural sample alone. Appendix Table B.1 shows that our findings on labor movement membership,

[88] Even though we cannot rule out that there is a non-linear relationship between industrial workers and the share of them who are unionized, the correlation suggests that the relationship is in fact linear as evidenced in Appendix Figure A.7.

[89] Even though the instrument affects the agricultural sector more strongly, the majority of citizens worked within agriculture prior to the first wave of mass emigration. Due to the high level of mobility across sectors in local labor markets (Heckscher, 1941), the later growth of the industrial sector was likely to draw upon local agricultural workers. The instrument therefore increases migrant networks in more sectors than agriculture.

striking and voting are robust to the exclusion of urban areas.[90] All point estimates remain significant and roughly similar, with two of them being higher and two being lower than the main estimates.

Data on the share of eligible voters allow us to test for a certain type of selection effect, which could explain our results in a more direct way. For example, McKenzie & Rapoport (2010) show that stronger migrant networks may lead to negative selection of migrants. Given that voting eligibility was based on economic status and gender, it can serve as an indicator of changes to the composition of the population that has direct bearing on electoral outcomes. However, Column 5 of Table 7 indicates that emigration had no significant effect on the share of eligible voters. The sign of the estimated changes goes from positive when excluding controls, to negative when they are included. As a result, the effects on voting patterns do not appear to be explained by this form of selection.

Selection may also be active along other dimensions than income or voting eligibility. Using 1890 census data, Table 10 shows tests for a range of demographic differences across high and low emigration municipalities. Column 4 shows that there is no difference in the number of people born in a different municipality, indicating that welfare migration and selective in-migration of more leftist individuals should not explain our results. Moreover, we find no effect on the prevalence of unmarried adults nor on the ratio of women to men. As these estimates are small compared to their mean, low power should not be the reason for failing to reject the null hypothesis. In addition, Column 8 shows that emigration leads to a lower average age. Potentially, this effect is driven by increased fertility, but the effect is, however, fairly small and only significant at the 90 percent confidence interval.[91]

Finally, we consider the possibility that emigrants were ideologically selected. If more right-leaning individuals chose to emigrate, for example because of the pull factors of more freedom or because of more risk-taking or entrepreneurial preferences, the pool of voters would mechanically change in favor of the left. Similarly, emigrants may have been those that were less inclined to join labor unions.[92] To deal with this concern, we perform a simple bounding exercise. We count the total number of emigrants since 1867, and consider different scenarios for the fraction of them that would not have been labor movement members or left-wing voters. Appendix Table B.2 displays the sensitivity of our estimates concerning the labor movement and the vote share of the left when assuming that 75 or 100 percent of the

[90] Note that regressions on welfare expenditures and representative democracy are already restricted to the rural sample.

[91] Appendix Table C.18 shows the effect of emigration on age at the mean as well as the 25^{th}, 50^{th} and 75^{th} percentiles.

[92] Historical evidence of Swedish emigrants contributing to US labor unions speaks against this possibility to some extent (Nordahl, 1994; Bengston & Brook, 1999).

emigrants would have been against them if they had stayed in Sweden.[93] As expected, the point estimates become smaller as we assume a more skewed ideological selection, reducing the baseline result by about half in the case of the vote share of the left. Nevertheless, the results remain statistically significant. This indicates that such selection cannot explain the entire effect of emigration on left-wing voting.

Overall, these results are consistent with the view represented in Runblom & Norman (1976) that the mass migration became "general and popular", and hence, that individuals who chose to emigrate to the US were not substantially different from the general population, apart from being younger. However, other forms of selection that we cannot measure may yet have been important.[94]

Exposure to American attitudes Existing studies linking migration and political outcomes have emphasized the potential of host country attitudes being transmitted to origin countries, thereby affecting the political outcomes. This raises the question of whether American attitudes could have inspired the Swedish labor movement, whether it be via return migration or information transmission through networks. A priori, there is little evidence of the Swedish labor movement being influenced by the US, however, while the effect of Scandinavian labor organizers on American unions is well documented (Nordahl, 1994; Bengston & Brook, 1999). We nevertheless provide an indirect test of the possibility of US influence by estimating the impact of emigration on two other voluntary associations that we observe in the data: non-state free churches and temperance lodges. Both types of organizations had strong influences in the United States. Methodists were common among the free churches and the temperance movement largely consisted of Swedish chapters of an American organization, the International Order of Good Templars (IOGT). Together with the labor movement, these organizations constituted the three "popular movements" of the era, marked by rapidly growing membership numbers and by the use of democratic processes in an era when Sweden was yet undemocratic.[95]

Table 13 displays our results for per capita membership in both types of organizations. Similar to the specification for the labor movement, we consider the average membership between 1900 and 1920. If there were transmission of information or attitudes to Swedes through their overseas networks, one would expect to see an increased participation in these

[93]For the labor movement, we only consider the latter case, since counting 25 percent of the emigrants as members would inflate the membership rates.

[94]For example, Jaeger et al. (2010) document that migrants are more willing to take risks than non-migrants.

[95]Switching to a new chuch is arguably more costly than joining a labor movement, possibly making the comparison less favorable. However, the temperance movement was by contrast the largest of the popular movements and was socially accepted. All three popular

types of organizations. The IV results in Table 13 show no significant positive effects, however. Both membership in free churches and temperance lodges display negative and insignificant coefficient estimates. These results do not rule out that the labor movement was in some way influenced by the United States, but they nevertheless suggest that general cultural transmission through migrants was not a major factor.

Finally, if emigration areas have more networks in other parts of Sweden that have more experience with the labor movement, internal political remittances could also be a potential mechanism. Given that the labor movement had a substantially larger presence especially in urban areas, the fact our positive estimated impact on labor movement membership goes along with less urbanization – as shown in Column 2 of Table 10 – is an indication that internal political remittances are not likely to play a role in explaining this result.

9 Placebo and robustness tests

The available time-series data suggest a natural placebo test for our identification assumption. We only rely on frost shocks occurring in the 1864–1867 period, which draws support from historians who have found that later harvest outcomes did not cause further emigration (Thomas, 1941). We therefore treat frost shocks during all other four-year periods from 1859 to 1900 as placebos and examine the effect of these placebo shocks interacted with port proximity on all our outcomes, including emigration.[96]

As the variation in frost shocks is random, placebo estimates are expected to be distributed around zero. We should therefore expect coefficients associated with the treatment period to be in the extremes of the distribution. To make frost shocks comparable across periods with very few or very many shocks, and avoid the influence of outliers, they are categorized in quintiles of the shock distribution over the period. Appendix Figure B.1 displays probability density functions of all placebo point estimates. Black bars represent the reduced-form effect associated with the treatment period (1864–1867), while white bars represent placebo periods. As expected, placebo estimates are scattered across the range of values while the treatment coefficients are consistently at the ends of the distribution for all outcomes. This indicates that there are no systematic effects at the municipality that consistently give rise to similar effects, but that the shocks occurring in our treatment period were indeed exogenous and unique.

In Table 3, we found that constructing the instrument using *non-growing season* frost shocks could not predict emigration. This was the expected result, given that frost shocks have no effect on agricultural outcomes outside of the growing season. Appendix Table B.3

[96]Shocks 1864–1869 are excluded to avoid the treatment period.

further shows that such shocks do not have any reduced form effects on our outcomes either. The estimates in all columns are insignificant and close to zero. Hence, the main results that we find do not appear to be driven by unobserved fixed characteristics of municipalities. In particular, they are not driven by general differences in local climate.

Our identification strategy relies on the exclusion restriction assumption that the instrument has no effect on our outcomes through any variable other than emigration. In particular, it assumes that frost shocks do not have different impacts depending on the proximity to emigration ports. This assumption is supported by the finding that including market access measures interacted with frost shocks has minor effects on our main outcomes as shown in Appendix Table B.11. While the interaction of shocks with town proximity are insignificant, the interaction with trade port proximity is significantly negative for 3 out of 8 outcomes, including labor organization. This suggests that locations that are more connected, in terms of being closer to trade ports, are less affected by frost shocks. The fact that the market access effect is negative indicates that, to the extent that our instrument picks up such variation, the exclusion restriction would be violated in a way that would bias our estimates towards zero. This is also supported by the tendency of our IV estimates to become slightly larger when we control for the market access interactions.

We also test the robustness of these results to selecting a subset of only the larger trade ports and towns to create our measures of market access. To the extent that the larger economic hubs provide a better measure of market access, this may be a stricter test of our identifying assumptions. Appendix Table B.13 displays the effect of controlling for frost shocks interacted with the 5 largest trade ports and the 10 largest towns, respectively.[97] Reassuringly, the results are very robust to these modifications, indicating that the exclusion restriction assumption is unlikely to be violated due to frost shocks having heterogeneous impacts by port proximity. Formal tests for the null hypothesis that the coefficient estimates for the instrument is equal to that of the market access interaction terms are uniformly rejected. Furthermore, Appendix Table B.14 replaces the market access measures with pre-emigration measures of economic development: land value and agricultural yield in 1810. Interacting these variables with frost shocks 1864–1867 provides a different way of controlling for the potentially heterogeneous effects of frost shocks by emigration port proximity. Again, our results are robust to this variation.

While the above results indicate no clear violations of the exclusion restriction, we can examine the sensitivity of our results to directly imposing such violations using the method of Conley, Hansen & Rossi (2012).[98] Following common practice, we calculate what is

[97] Appendix Table B.12 displays the reduced form counterpart of the same test.

[98] The method assumes that the instrument has an independent direct effect in the second stage, with a

the largest exclusion restriction violation that can be assumed and still yield a significant positive effect on the labor organization rate 1900-1920. We find that the effect of emigration remains significant at the 95 percent level when at most 52 percent of the reduced-form effect of the instrument on labor organization can be attributed to a direct effect of the instrument itself.[99] The sensitivity analysis indicates that our results are robust even under substantial violations of the exclusion restriction assumption.[100]

Different cutoffs for defining frost shocks are examined in Appendix Table B.4. Panel A displays the reduced-form estimates of our main outcome variables using shocks defined at the baseline of 1 standard deviation, while Panels B and C display estimates from letting shocks count at a 0.75 or 1.25 threshold. In Panel D, we define growing season using months with a mean temperature of above 5 degrees Celsius, as this is the upper bound for counting a month as being in the growing season following the recommendations of the Swedish Meteorological and Hydrological Institute. The baseline case uses 3 degrees. The signs, magnitudes and statistical significance of these results are similar to the main results.

We next evaluate the robustness of our analysis to large (absolute) values of our key variables. In particular, we want to control for the possibility of certain locations that are very distant from ports driving our results. For this purpose, we censor variables at the 5^{th} and 95^{th} percentiles, assigning observations outside of that interval the variable value at the nearest bound. This compresses the range of values that variables take on and reduces the potential for a small number of observations with extreme values to affect estimates. We also display the results after further tightening the variable distributions, by censoring at the 10^{th} and 90^{th} percentiles. Panels A and B of Appendix Table B.5 do this for two variables: growing-season frost shocks 1864–1867 and proximity to the nearest emigration port. The resulting variables are then used to redefine the instrument, i.e. the interaction between shocks and port proximity. All results are robust to this change. Panels C and D then extend this procedure to *all* non-binary variables that are included in our models. Our results are robust to this modification as well. In addition, Appendix Table B.6 documents that our main results are robust to dropping all municipalities above the 90th percentile of

coefficient $\xi \neq 0$, thus violating the usual exclusion restriction assumption that $\xi = 0$. The chosen value of ξ indicates the extent of violation of the exclusion restriction. When ξ is known, the coefficient of interest, β, is identified. Repeating the procedure for a range of plausible values for ξ yields a a confidence interval for the true value of β.

[99] Our cutoff is increased to 75 percent of the instrument's reduced-form effect if we instead test a summary index consisting of the average Z-score of all our outcome variables.

[100] In general, the literature typically reports cutoffs at about 30-50 percent of the instrument's reduced-form effect as suggestive of a robust causal inference (see e.g. Ding et al., 2009; Tajima, 2013; Croke et al., 2016). Satyanath, Voigtländer & Voth (2017) use a 90 percent confidence level, and report robustness up to a 67 percent cutoff. At this confidence level, the corresponding cutoffs in our setting are 60 and 78 percent, respectively.

distance to emigration ports. Thus, distant northern municipalities have a limited influence on our results.

To test for the robustness of the statistical inference, Appendix Table B.7 provides estimates of the reduced-form regressions using three different types of standard errors. In Panel A, we cluster standard errors at the county level rather than at the weather station, as political organization and policy may be more correlated within counties, which are established political boundaries. Panels B and C instead estimate spatial-correlation robust standard errors which allow linearly declining correlations across municipalities of up to 100 or 200 kilometers, using the method of Conley (1999). This method has the advantage of not relying on a fixed number of clusters and allows residuals to be correlated within a given radius of each unit of observation. Panel D generates standard errors using the wild cluster-t bootstrap method, which may improve tests when there are few clusters (Cameron et al., 2008). The estimates in Panels A to D display the same pattern as our main regressions, with few changes to significance levels. The estimates on transitioning to representative democracy lose precision with the wild cluster-t bootstrap method but are nevertheless robust to both levels of spatial dependence using Conley-type standard errors.

The linear relationship apparent in the non-parametric estimations in 9 and 11 suggest that a linear specification of the instrument is a good approximation. Nevertheless, Appendix Table B.8 documents that our results are robust to specifying the frost shocks in logs instead of levels and port proximity in levels instead of logs. We also verify the robustness of our results to using logs of our main outcome variables, rather than per capita values. Appendix Table B.10 displays our results for labor organizations and welfare spending.[101]

In Appendix Table B.15, we fix two periods, either 1867-1879 (only the first wave) or 1867-1900 (when our first main outcome variable begins). Estimates are stable across specifications. However, estimates in panel A using on first-wage emigration have weaker F-statistics and less precisely estimated second-stage coefficients. This is due to the fact that emigration patterns become stronger over time as chain migration continues, increasing the strength of our instrument.

Appendix displays full IV regression output for all main outcome variables, including OLS, reduced-form, first stage and second stage results. It also reports the placebo first-stage using non-growing seasons shocks with and without controls.

[101]To avoid putting high weight on near-zero values on welfare spending, we use the transformation $log(spending + 100)$, where 100 SEK is less than the first percentile value of the distribution. Without this transformation, the results are weaker, with p-values of 0.124 and 0.014 in 1918 and 1919, respectively.

10 Conclusion

During the Age of Mass Migration, 30 million Europeans left their home countries for the United States. Among them were more than one million Swedish citizens, making Sweden one of the major origin countries in per capita terms. This paper uses detailed Swedish data from the period 1860–1920 to shed some light on the question of whether large-scale emigration can lead to political development in undemocratic origin countries. Our results indicate that it may indeed be the case. Using an instrument based on travel costs and the severe agricultural shocks that sparked the initial wave of migration to the United States, we predict total emigration flows over 50 years. We show that emigration caused significantly higher rates of labor organization, strike participation, voter turnout and left-wing voting in the long run. The findings are consistent with the hypothesis that the improved outside options generated by migrant networks bolstered potential labor activists, who faced repression from local elites for organizing. Since the labor movement had strong ties to the political left, our findings on turnout and political party preferences are likely driven by that mechanism.

Emigration also led to formal political change. Welfare expenditures per capita rose in high emigration municipalities, as did the likelihood of adopting more inclusive institutions by transitioning from direct to representative democracy. These results are consistent with the mechanism proposed by Acemoglu & Robinson (2000, 2006), in which elites implement institutional change in order to commit to better outcomes for citizens.

Overall, the Age of Mass Migration improved connected citizens' outside options and brought positive effects on support for redistribution and actual redistribution during a time when Sweden was still undemocratic. Migration arguably played a role in the country's transition to a full democracy in the early 20th century.

How externally valid are the results presented in this study? For example, do our findings generalize to other countries that had high emigration rates during the Age of Mass Migration? Figure 1, discussed in the introduction, documents that there is a positive correlation between historical emigration from 29 OECD countries and contemporary trade union density. While this relationship is robust to the inclusion of various control variables, it would be premature to draw any causal conclusions. Extrapolating from our main setting to a cross-country analysis with a small number of observations would certainly be very speculative. Nevertheless, the robust correlation raises the possibility that the free immigration policy maintained by the United States in the 19th century and until World War I may have had significant unintended consequences for political development in the rest of the world.

Another question is if our findings have any bearing on current emigration waves and record global refugee stocks. The mechanism that we propose, that improved outside options

may encourage risky activism, is general and potentially applies to many other settings, including contemporary ones. However, the question of how responsive political elites will be to such activism is less straightforward. Agricultural and early industrial economies, such as Sweden in our period of study, are heavily reliant on labor for production. This may explain the urgent political response of Swedish elites as emigration took on greater proportions. In modern autocracies, where leaders often rely on natural resource rents, the economic incentive for elites to respond to popular movements may be lower. Nevertheless, to the extent that activists are able to reach a significant mass, institutional change may occur as economies experience critical junctures, consistent with Acemoglu & Robinson (2006).

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11 Tables

Table 1 Summary statistics

	. Mean	SD	P10	P50	P90
Frost shocks 1864–1867	4.577	2.765	2.000	3.000	9.000
Proximity to emigration port	-5.025	0.989	-6.085	-5.135	-3.739
Emigration 1867–1920	5.392	1.272	3.664	5.485	6.924
Emigration 1867–1879	3.591	1.483	1.609	3.714	5.394
Emigration 1880–1920	5.173	1.260	3.526	5.247	6.683
Labor organization 1900–1920	0.012	0.039	0.000	0.001	0.031
Strike participants 1909	0.011	0.041	0.000	0.000	0.027
Left vote share 1911–1921	0.247	0.188	0.030	0.210	0.519
Turnout 1911–1921	0.603	0.099	0.476	0.606	0.725
Welfare exp. per capita 1918	2.414	2.116	0.841	2.064	4.183
Welfare exp. per capita 1919	2.756	1.941	0.972	2.384	4.794
Direct democracy 1919	0.633	0.482	0.000	1.000	1.000
Population 1865	7.079	0.782	6.094	7.047	8.078
Urban	0.048	0.214	0.000	0.000	0.000
Area	8.634	1.264	7.209	8.483	10.147
Arable land share	0.702	0.220	0.500	0.667	1.000
Proximity to trade port	-4.382	0.926	-5.294	-4.516	-3.209
Proximity to town	-2.772	1.215	-3.833	-2.917	-1.911
Proximity to Stockholm	-5.534	0.725	-6.193	-5.746	-4.452
Proximity to railway	-3.151	1.429	-4.907	-3.263	-1.317
Proximity to station	-3.482	0.681	-4.174	-3.594	-2.620
Latitude	58.337	2.023	55.881	58.171	60.418
Longitude	14.824	2.064	12.594	14.217	17.859
Barley	0.239	0.426	0.000	0.000	1.000
Oat	0.136	0.343	0.000	0.000	1.000
Wheat	0.177	0.382	0.000	0.000	1.000
Livestock	0.224	0.417	0.000	0.000	1.000
Forest	0.180	0.384	0.000	0.000	1.000

Notes: Emigration, population, area and proximity variables are in logs. Proximity is defined as minus the log of distance.

Table 2
Balance tests

Dependent variable:	(1)	(2)
Population 1865	-0.0476**	(0.0175)
Urban	-0.0038	(0.0024)
Area	-0.0124	(0.0261)
Arable land share	0.0031	(0.0046)
Proximity to trade port	0.0122	(0.0209)
Proximity to town	-0.0416	(0.0268)
Proximity to Stockholm	0.0205	(0.0244)
Proximity to railway	0.0164	(0.0396)
Proximity to station	0.0023	(0.0211)
Latitude	-0.0267	(0.0227)
Longitude	-0.0183	(0.0204)
Barley	0.0081	(0.0088)
Oat	-0.0022	(0.0058)
Wheat	0.0038	(0.0033)
Livestock	0.0061	(0.0094)
Forest	-0.0121	(0.0080)
Infant Mortality	-1.3808	(1.0198)
Child Mortality	-0.7629	(1.0723)
Maternal Mortality	-0.0810	(0.5028)
Population growth 1810–1865	-0.0061	(0.0065)

Notes: OLS regressions. Each row represents a separate regression of the dependent variable on growing season frost shocks 1864–1867, proximity to the nearest emigration port, and their interaction, which is our instrument. Column 1 displays the coefficient related to the instrument, while Column 2 displays standard errors. Proximity variables are defined as minus the log of the distance. Population 1865 and area variables are in logs. All regressions include county fixed effects. The number of observations is 2358, except for the final four variables, which have 1784, 1778, 1268 and 2308 observations, respectively. Standard errors clustered at the weather station level in parentheses. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 3
FIRST STAGE: FROST SHOCKS AND EMIGRATION 1867-1920

Dependent variable:	Emigration 1867–1920			
	(1)	(2)	(3)	(4)
Shocks × Proximity to port	0.0635***	0.0623***	0.0632***	0.0621***
	(0.0157)	(0.0134)	(0.0135)	(0.0147)
Shocks	0.0036	0.0119*	0.0095	0.0073
	(0.0061)	(0.0063)	(0.0085)	(0.0107)
Shocks × Proximity to trade port			-0.0127	-0.0098
			(0.0209)	(0.0200)
Shocks × Proximity to town			0.0019	0.0022
			(0.0045)	(0.0044)
Shocks NGS × Proximity to port				-0.0004
				(0.0162)
Shocks NGS				0.0079
				(0.0130)
County fixed effects	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes
Observations	2359	2359	2359	2359
Mean dep. var.	5.39	5.39	5.39	5.39

Notes: OLS regressions. This table displays the effect on log emigration 1867–1920 of frost shocks 1864–1867 interacted with proximity to the nearest emigration port. Proximity is defined as minus the log of distance. *Shocks NGS* indicate frost shocks occurring in the non-growing season. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 4
INTERTEMPORAL ELASTICITY OF EMIGRATION

A. Dependent variable:	Emigration 1867–1879				
	(1) OLS	(2) OLS	(3) OLS		
Shocks × Proximity to port	0.0665*	0.0608**	0.0620**		
	(0.0342)	(0.0297)	(0.0301)		
Shocks	0.0362**	0.0488***	0.0465**		
	(0.0143)	(0.0141)	(0.0190)		
Mean dep. var.	3.59	3.59	3.59		
B. Dependent variable:	Emigration 1880–1920				
	(1) IV	(2) IV	(3) IV	(4) OLS	(5) OLS
Emigration 1867–1879	0.9582**	1.0272**	1.0126**	0.3911***	0.3820***
	(0.3873)	(0.4217)	(0.4172)	(0.0217)	(0.0223)
County fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes
Shocks × Market Access	No	No	Yes	No	No
Observations	2359	2359	2359	2359	2359
Mean dep. var.	5.17	5.17	5.17	5.17	5.17
F-statistic	3.79	4.20	4.23		

Notes: OLS and IV regressions. Panel A displays the effects of frost shocks, proximity to the nearest emigration port and their interaction on log emigration 1867–1879. Proximity is defined as minus the log of distance. Panel B displays the relationship between early and late emigration. The excluded instrument in Columns 1 to 3 of Panel B is the number of frost shocks interacted with the proximity to the nearest emigration port. Controls for main effects of shocks and proximity to emigration port are included. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 5
THE EFFECT OF EMIGRATION ON LABOR ORGANIZATION

Dependent variable:	Labor organization 1900–1920					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1900	0.0096***	0.0090***	0.0090***	0.0213***	0.0212***	0.0231***
	(0.0020)	(0.0020)	(0.0020)	(0.0075)	(0.0072)	(0.0068)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2358	2358	2358	2358	2358	2358
Mean dep. var.	0.01	0.01	0.01	0.01	0.01	0.01
F-statistic				13.11	17.30	17.19

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1900 on the average labor organization rate 1900–1920. The excluded instrument is the interaction between the number of growing season frost shocks 1864–1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864–1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 6
REDUCED-FORM EFFECT ON LABOR ORGANIZATION

Dependent variable:	Labor organization 1900–1920			
	(1)	(2)	(3)	(4)
Shocks × Proximity to port	0.0014***	0.0014***	0.0015***	0.0017***
	(0.0004)	(0.0004)	(0.0003)	(0.0004)
Shocks	0.0001	-0.0001	-0.0003	-0.0001
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Shocks × Proximity to trade port			-0.0009*	-0.0012*
			(0.0005)	(0.0006)
Shocks × Proximity to town			-0.0003	-0.0004
			(0.0003)	(0.0003)
Shocks NGS × Proximity to port				-0.0003
				(0.0004)
Shocks NGS				-0.0009**
				(0.0004)
County fixed effects	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes
Observations	2358	2358	2358	2358
Mean dep. var.	0.01	0.01	0.01	0.01

Notes: OLS regressions. This table displays the effect of frost shocks 1864–1867 interacted with proximity to the nearest emigration port on the average labor organization rate 1900–1920. Proximity is defined as minus the log of distance. *Shocks NGS* indicate frost shocks occurring in the non-growing season. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 7
MOBILIZATION OF WORKERS AND ELECTORAL OUTCOMES

Dependent variable:	General strike 1909		Electoral outcomes 1911–1921			Left-wing share 1998–2014	
	Strikers per capita	Share unionized strikers	Left-wing vote share	Turnout	Eligible voters	Municipal elections	National elections
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Emigration 1867–	0.0319**	0.0440**	0.1204**	0.0805**	-0.0962	0.0818**	0.0744**
	(0.0127)	(0.0176)	(0.0494)	(0.0342)	(0.0804)	(0.0368)	(0.0336)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2358	2359	2359	2359	2358	2358	2354
Mean dep. var.	0.01	0.04	0.25	0.60	0.31	0.36	0.38
F-statistic	19.88	19.84	20.95	20.95	20.96	24.94	25.02

Notes: IV regressions. The excluded instrument is the interaction between the number of growing season frost shocks 1864–1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. Column 1 reports the effects of emigration on participation in the 1909 general strike. The dependent variable in Column 2 is the share of strikers who were union members. It is normalized so that zero indicates equal fractions of union and nonunion strikers. Municipalities without any strikes are also assigned value zero. The outcome in Column 3 is the average vote share of the Social Democratic and Socialist parties, while Columns 4 and 5 use voter turnout and the share of eligible voters per capita, respectively. The outcomes in Columns 6 and 7 are the average vote share of the Social Democratic and Socialist parties 1998–2014 in municipal and national elections. All regressions include county fixed effects and control for the log of the population at the baseline. Additional control variables are growing season frost shocks 1864–1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 8
POLICY RESPONSES TO EMIGRATION

Dependent variable:	Expenditures per capita		Representative democracy	
	1918	1919	1919	1938
	(1)	(2)	(3)	(4)
Emigration 1867–	0.9964***	1.1163***	0.0473**	0.1518**
	(0.3612)	(0.3332)	(0.0221)	(0.0655)
County fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes
Observations	2219	2203	2221	2208
Mean dep. var.	2.41	2.76	0.02	0.13
F-statistic	16.35	15.64	15.62	18.15

Notes: IV regressions. This table displays the effects of emigration on per capita welfare expenditures in 1918 and 1919, as well as on the voluntary adoption of representative democracy by 1919 and by 1938. The excluded instrument is the interaction between the number of growing season frost shocks 1864–1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864–1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. Columns 3–4 include a set of dummy variables taking the value of one if the municipal population was 1500 or higher in 1918 (Column 3), or in each year 1918–1937 (Column 4). The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 9
ELASTICITY OF EMIGRATION WITH RESPECT TO US AND SWEDISH BUSINESS CYCLES

Dependent variable:	Yearly emigration 1880–1920		
	(1)	(2)	(3)
US–SWE GDP × Shocks × Prox. to port	0.2344***	0.1777***	0.1678***
	(0.0539)	(0.0565)	(0.0495)
Municipality FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Regional trends	No	Yes	Yes
Covariate trends	No	No	Yes
Observations	96719	96719	96719

Notes: OLS regressions. This table displays how locations with different level of migrant networks – as proxied by the *Shock* × *Prox. to port* interaction – emigrate as the business cycle in the US improves relative to Sweden. Proximity is defined as minus the log of distance. Yearly emigration is measured as the log of emigrants plus one each year. $US - SWE\ GDP$ is defined as the difference in log real GDP per capita between the US and Sweden, taken from The Maddison Project (2013). The two countries' series are detrended using a linear trend and controls for three lags before differencing. All specifications control for all interaction terms between $US - SWE\ GDP$, *Shock* and *Prox. to port*. *Regional trends* indicates additional controls for linear trends across three major regions of Sweden. *Covariate trends* indicates additional controls for linear trends interacted with the following baseline control variables: log population in 1865, an urban dummy, proximity to the nearest emigration port and latitude. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 10
DEMOGRAPHICS

Dependent variable:	Outmigrants	Urban migrants	Population	Inmigrants	Children/woman	Female ratio	Unmarried ratio	Age
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Emigration 1867–1890	-0.1947***	-0.3480**	0.0611	0.0383	0.0393***	0.0029	-0.0049	-0.7395*
	(0.0616)	(0.1459)	(0.0468)	(0.0498)	(0.0130)	(0.0079)	(0.0080)	(0.4331)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2353	2353	2344	2344	2344	2344	2344	2344
F-statistic	17.56	17.56	18.03	18.03	18.03	18.03	18.03	18.03
Mean dep. var.	6.10	4.82	7.13	6.59	0.50	0.52	0.39	29.74

Notes: IV regressions. This table displays the effects of log emigration 1867–1890 demographic outcomes in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864–1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. *Outmigrants* and *Urban migrants* are the log number of people aged 20 or older that were born in municipality m who live in another (urban) municipality. *Inmigrants* is the log number of people aged 20 or older living in municipality m who were not born there. *Children/woman* is the number of children aged $0-5$ for each women aged $15-50$. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table 11
Long-run growth in wages and emigration

Dependent variable:	Nominal wage growth				Real wage growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Emigration 1867–1910	0.295**	0.479**			0.411*	0.692**		
	(0.136)	(0.202)			(0.223)	(0.302)		
Shocks × Proximity to port			0.191**	0.193**			0.241**	0.249*
			(0.078)	(0.086)			(0.114)	(0.128)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	23	23	23	23	23	23	23	23
Mean dep. var.	2.37	2.37	2.37	2.37	3.20	3.20	3.20	3.20

Notes: OLS regressions. This table displays the county-level relationship between long-run wage growth and emigration. Wage growth is defined as the ratio between wages in 1910 and 1860. Columns 1, 2, 5 and 6 display OLS regressions, while Columns 3, 4, 7 and 8 display reduced-form estimates using our instrument aggregated to the county level. Real wages are constructed using county-level food prices. All regressions include the log of population in 1865. *Controls* include log area, the share of urban municipalities and the arable share of land. Robust standard errors are reported in parentheses. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 12
EMIGRATION AND ECONOMIC OUTCOMES

Dependent variable:	Horses per area	Farm workers	Industrial workers	Any firm	Labor org. per industr. work.	Strikers per industr. work.
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–	0.0315**	-0.2978**	0.4033	0.1627**	0.2440***	0.2911**
	(0.0131)	(0.1275)	(0.3069)	(0.0681)	(0.0696)	(0.1213)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2070	2341	2341	2359	2339	2339
F-statistic	24.37	21.49	21.49	20.56	21.46	21.46
Mean dep. var.	0.06	5.30	4.17	0.21	0.09	0.11

Notes: IV regressions. *Horses per area* is the number of horses per area in 1910. *Farm workers* and *Industrial workers* are measured in logs in 1910. *Any firm* is an indicator variable equal to one if there is a corporation in 1900–1920. *Labor org. per industr. work.* and *Strikers per industr. work.* are the number of labor movement and strike participants per industrial worker in 1910, respectively. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at the baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE 13
EMIGRATION AND MEMBERSHIP IN NON-LABOR ORGANIZATIONS

Dependent variable:	Free church members					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–	0.0063***	0.0054***	0.0054***	-0.0081	-0.0036	-0.0037
	(0.0011)	(0.0012)	(0.0012)	(0.0097)	(0.0090)	(0.0087)
Observations	2358	2358	2358	2358	2358	2358
F-statistic				13.11	17.30	17.19
Mean dep. var.	0.01	0.01	0.01	0.01	0.01	0.01
Dependent variable:	Temperance members					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–	0.0077***	0.0068***	0.0068***	-0.0374**	-0.0274*	-0.0265
	(0.0016)	(0.0015)	(0.0015)	(0.0160)	(0.0162)	(0.0165)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2358	2358	2358	2358	2358	2358
F-statistic				13.11	17.30	17.19
Mean dep. var.	0.04	0.04	0.04	0.04	0.04	0.04

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1900 on average per capita membership in non-labor organizations 1900-1920. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

12 Figures

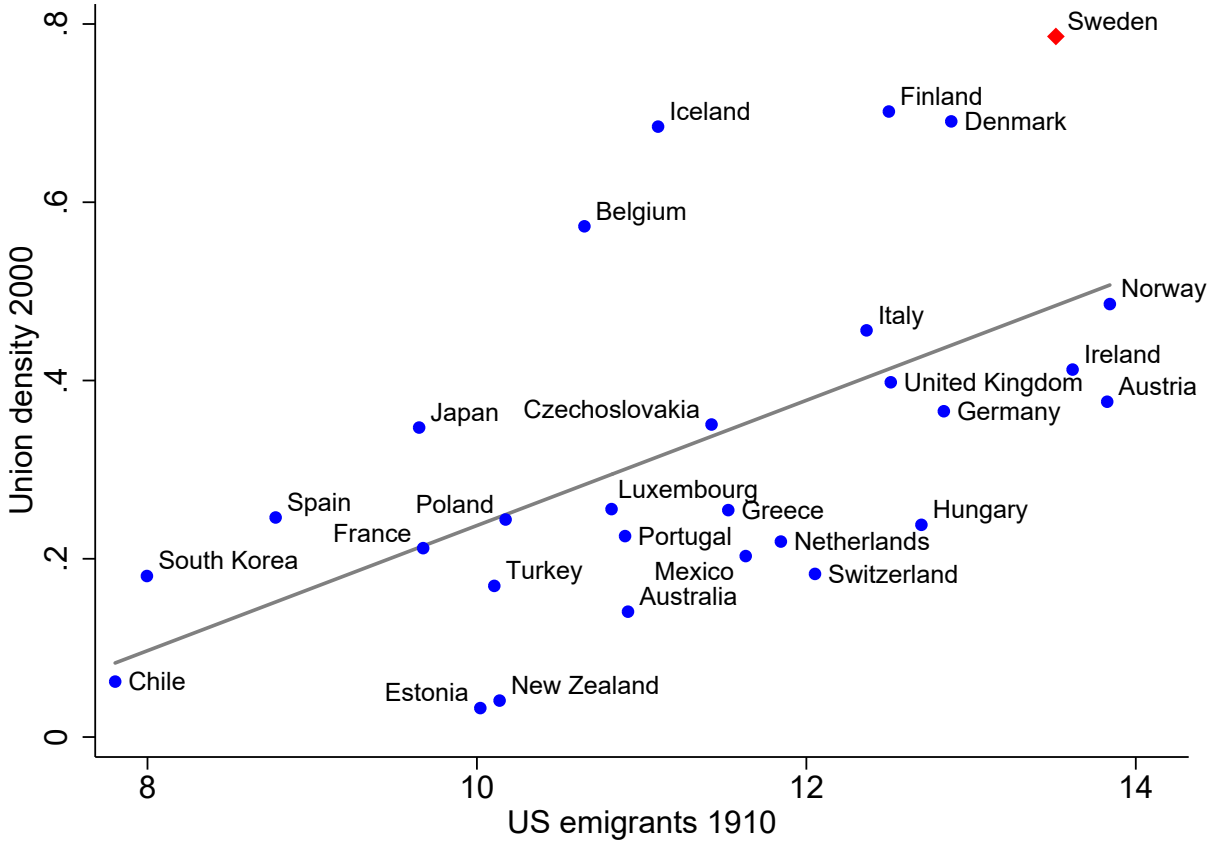


FIGURE 1
EMIGRATION AND TRADE UNION DENSITY ACROSS OECD COUNTRIES

Notes: This figure displays the cross-country relationship between trade union density in the year 2000 and the log number of US emigrants as of 1910. Both variables are the residuals after being regressed on log population 1820. Means of the unadjusted variables have been added for scale. A regression line based on the underlying data is displayed, also controlling for the 1820 population. Trade union density is defined as the share of wage and salary earners that are members of a trade union. Trade union density for Czechoslovakia is defined as the sum of values from the Czech Republic and Slovakia.

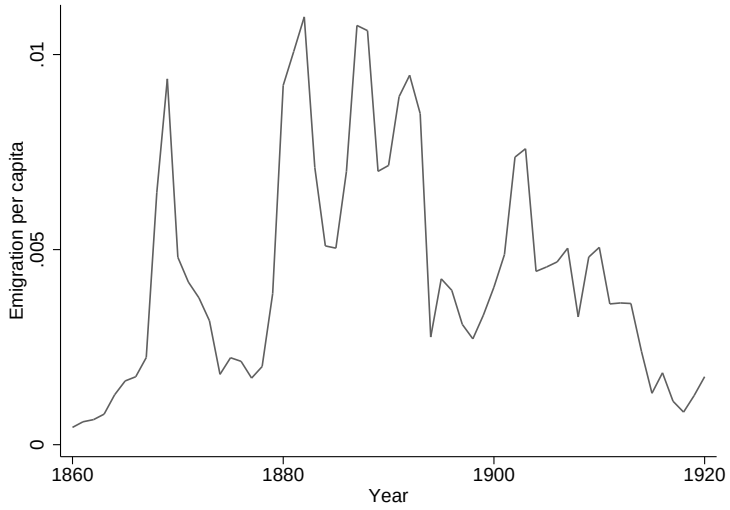


FIGURE 2
EMIGRATION FLOWS 1860–1920

Notes: This figure displays aggregate emigration flows per year between 1860 and 1920. We label emigration during the 1867–1879 period *the first wave of mass emigration*. Later waves, during the 1880s and early 1900s, are also visible. Mass migration from Sweden ended in the 1920s, as the United States enacted immigration quotas.

FIGURE 3
DETRENDED REAL GDP PER CAPITA 1850–1900

Notes: This figure displays the cyclical component of Swedish real GDP per capita (using a Hodrick Prescott-filter with smoothing parameter set to 100). The shaded area highlights the years used when defining our measure of frost shocks, 1864–67. Source: Edvinsson (2013).

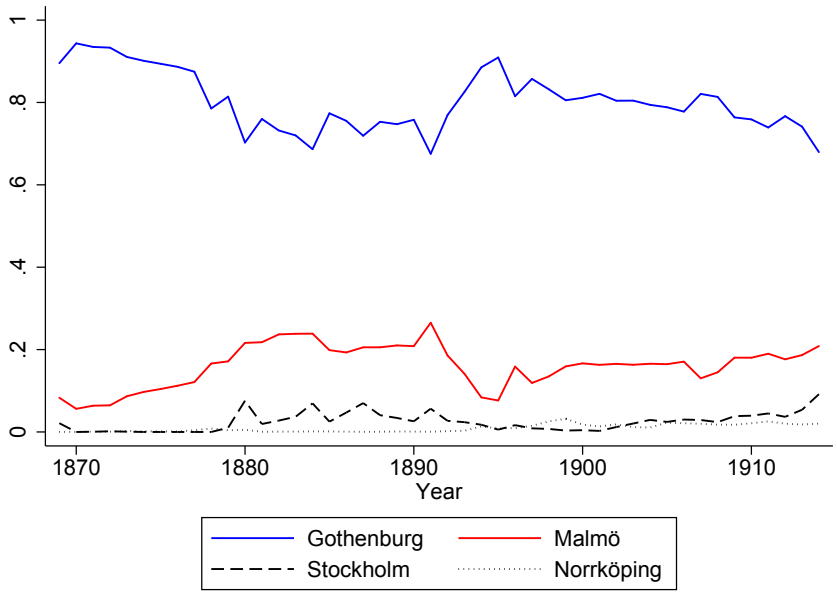
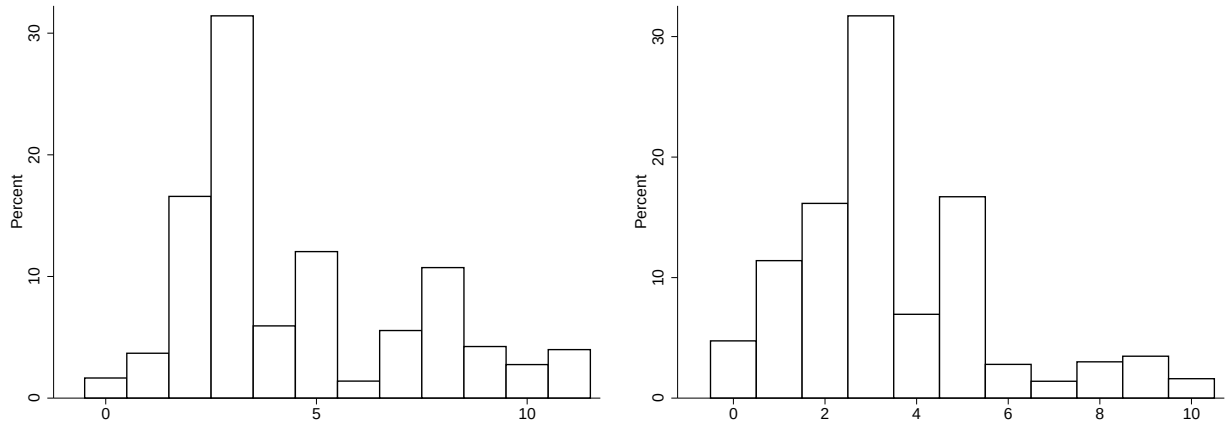


FIGURE 4
MAIN EMIGRATION PORTS 1869–1920: GOTHENBURG AND MALMÖ

Notes: Share of total emigrants per year 1869–1914 by port of emigration. The figure shows that Gothenburg and Malmö were the main emigration ports in the mass migration period. This motivates our use of proximity to these cities to define the instrumental variable. Stockholm and Norrköping, the first and third largest cities at the time, had minor shares of emigration. Source: passenger list data set.



(A) **Growing season** (B) **Non-growing season**

FIGURE 5
FREQUENCY DISTRIBUTION OF FROST SHOCKS 1864–1867

Notes: Distribution of frost shocks during 1864-1867 by growing and non-growing season. Shocks are defined at a monthly resolution. For example, a value of 5 in Panel A indicates that a municipality experienced 5 growing-season months with unusually high frost incidence between 1864 and 1867.

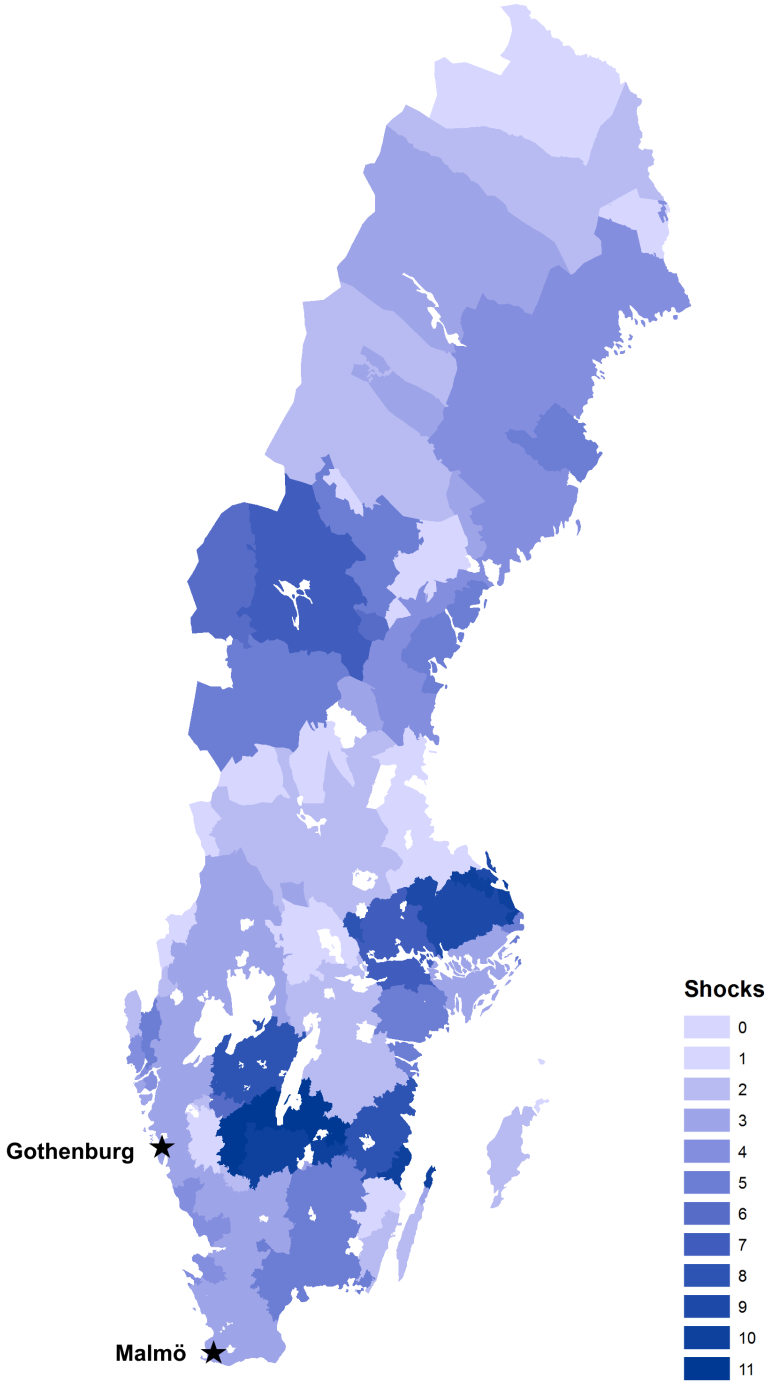
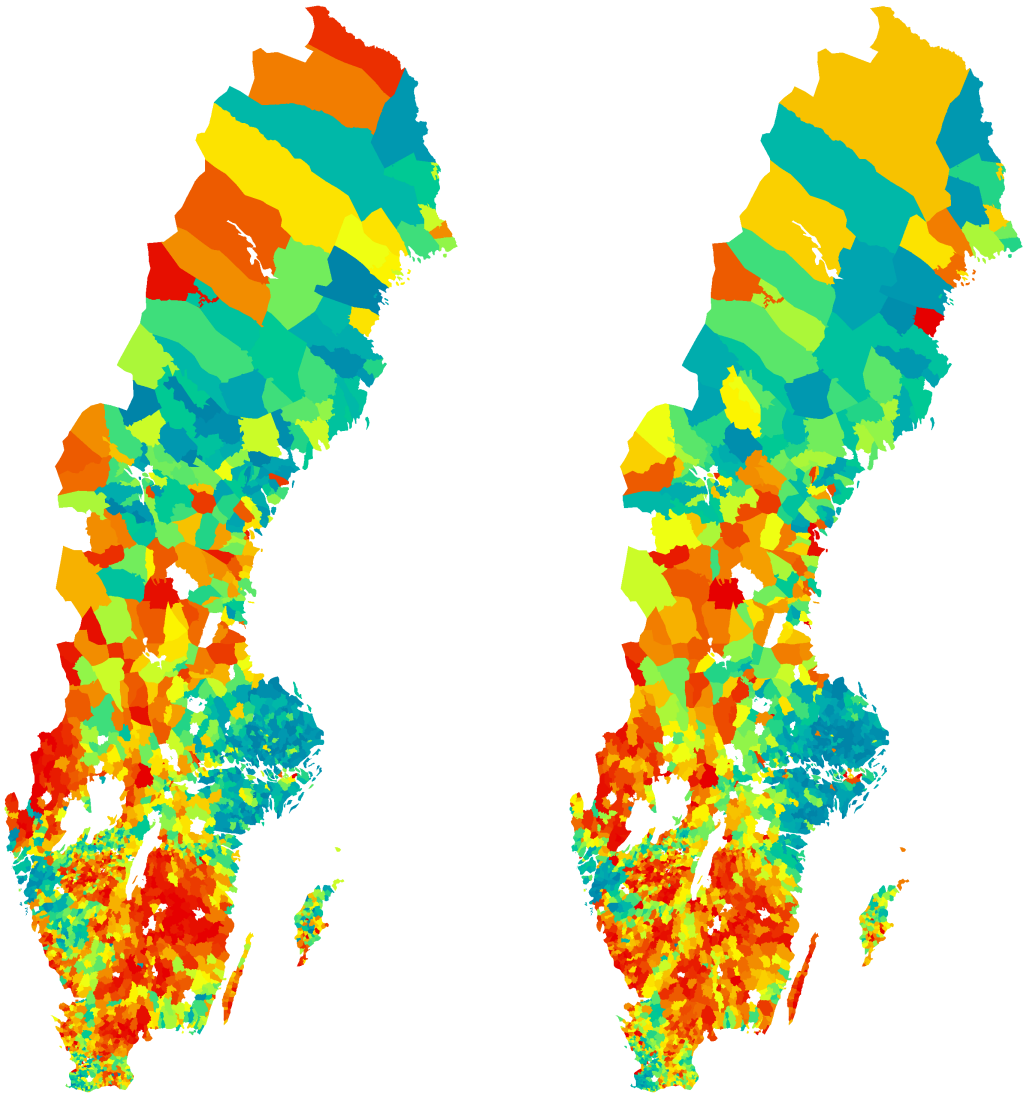


FIGURE 6
SPATIAL DISTRIBUTION OF GROWING-SEASON FROST SHOCKS 1864–1867

Notes: This figure displays the spatial distribution of growing-season frost shocks 1864–1867, used to define the instrumental variable. Darker areas indicate a higher number of shocks. Frost shocks are defined by month, relative to the local long-term mean and standard deviation of frost in that month. Gothenburg and Malmö are the two main emigration ports. In our data, 75 percent of municipalities are closest to Gothenburg, while 25 percent are closer to Malmö. More than 90 percent of municipalities and the population are located in the southern half of the country.



(A) **First wave emigration, 1867–1879** (B) **Total emigration, 1867–1920**

FIGURE 7
SPATIAL DISTRIBUTION OF EMIGRATION

Notes: This figure displays the spatial distribution of emigration during the first wave of emigration (1867–1879) and in total (1867–1920). Each geographical unit represents one municipality. Emigration values are divided by the population in 1865. More red values indicate that a larger fraction of the 1865 population emigrated. Color scales are relative to the distribution in the period in question, hence color comparisons between Panels A and B indicate difference in relative importance across periods.

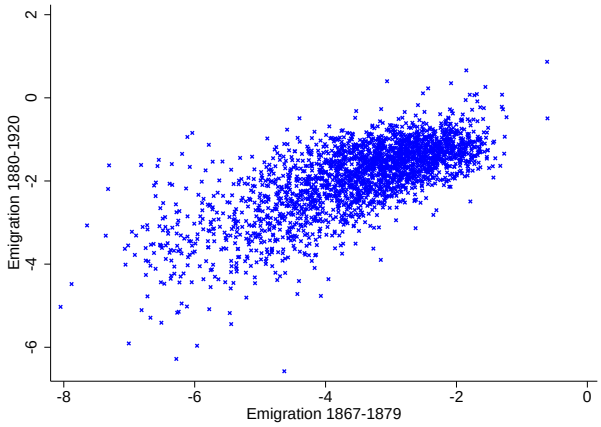
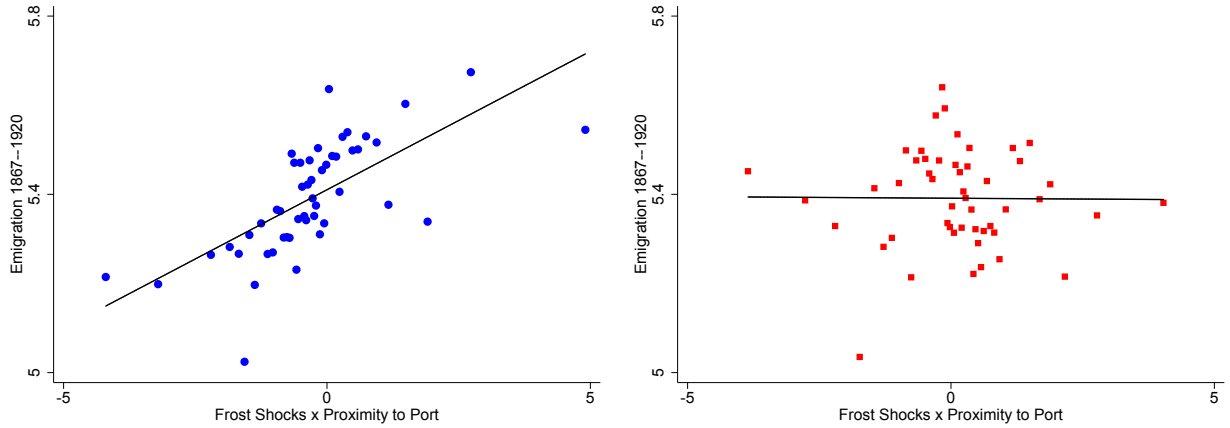


FIGURE 8
CORRELATION BETWEEN EARLY AND LATE EMIGRATION

Notes: This figure displays a scatter plot of total emigration during the first wave of emigration (1867–1879) against later emigration (1880-1920). Each dot represents one municipality. Emigration values are in logarithms and divided by the population in 1865.



(A) **Growing-season shocks** (B) **Non growing-season shocks**

FIGURE 9
FIRST STAGE: RELATION BETWEEN EMIGRATION AND THE INSTRUMENT

Notes: This figure shows the first stage relationship non-parametrically. Panel A plots log total emigration 1867–1920 against the instrument, defined as the interaction between the number of growing-season frost shocks 1864–1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. Panel B instead shows the effect of non growing-season shocks occurring in the same period. Municipalities are sorted into 50 groups of equal size. Dots indicate the mean value in each group. A linear regression line based on the underlying (ungrouped) data is also shown. Included controls are county fixed effects, frost shocks 1864–1867, proximity to the nearest emigration port, nearest trade port, nearest weather station, nearest town and Stockholm, log population in 1865, log area, latitude, longitude, arable land share in 1810 and indicators for urban municipalities and high soil suitability for the production of barley, oats, wheat, dairy and timber. Panel B additionally controls for growing-season frost shocks 1864–1867 and the instrument.

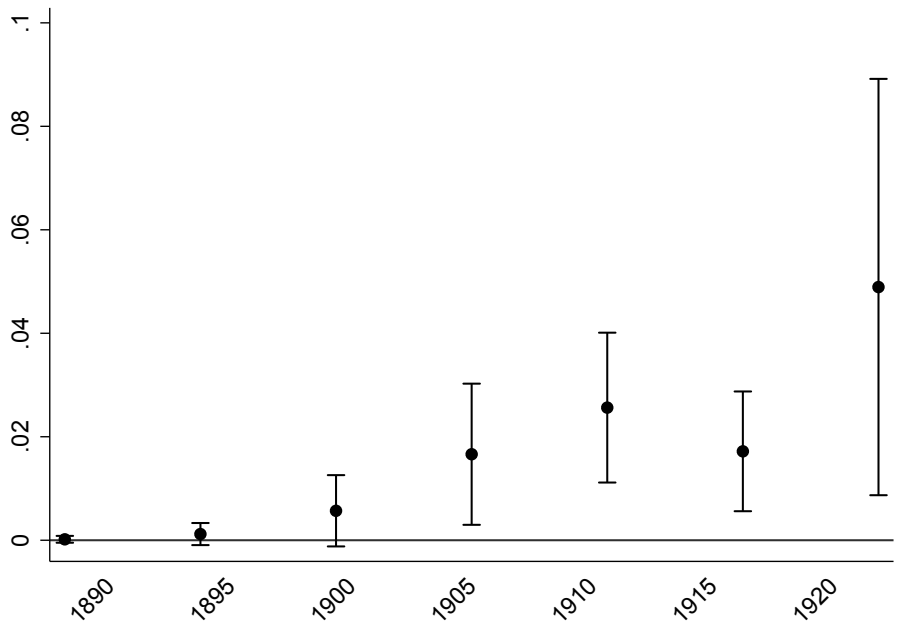


FIGURE 10
EMIGRATION AND LABOR ORGANIZATION RATES 1890–1920

Notes: This figure displays the IV coefficients on the log of total emigration from 1867 to year t on the labor organization rate, defined as the number of members of labor unions and the Social Democratic Party over total population. The excluded instrument is the interaction between the number of growing season frost shocks 1864–1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects, the log of the population at baseline, log area, latitude, longitude, proximity to nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, the number of growing season frost shocks in 1864–1867, the interaction between growing season frost shocks and proximity to the nearest town and trade port, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber.

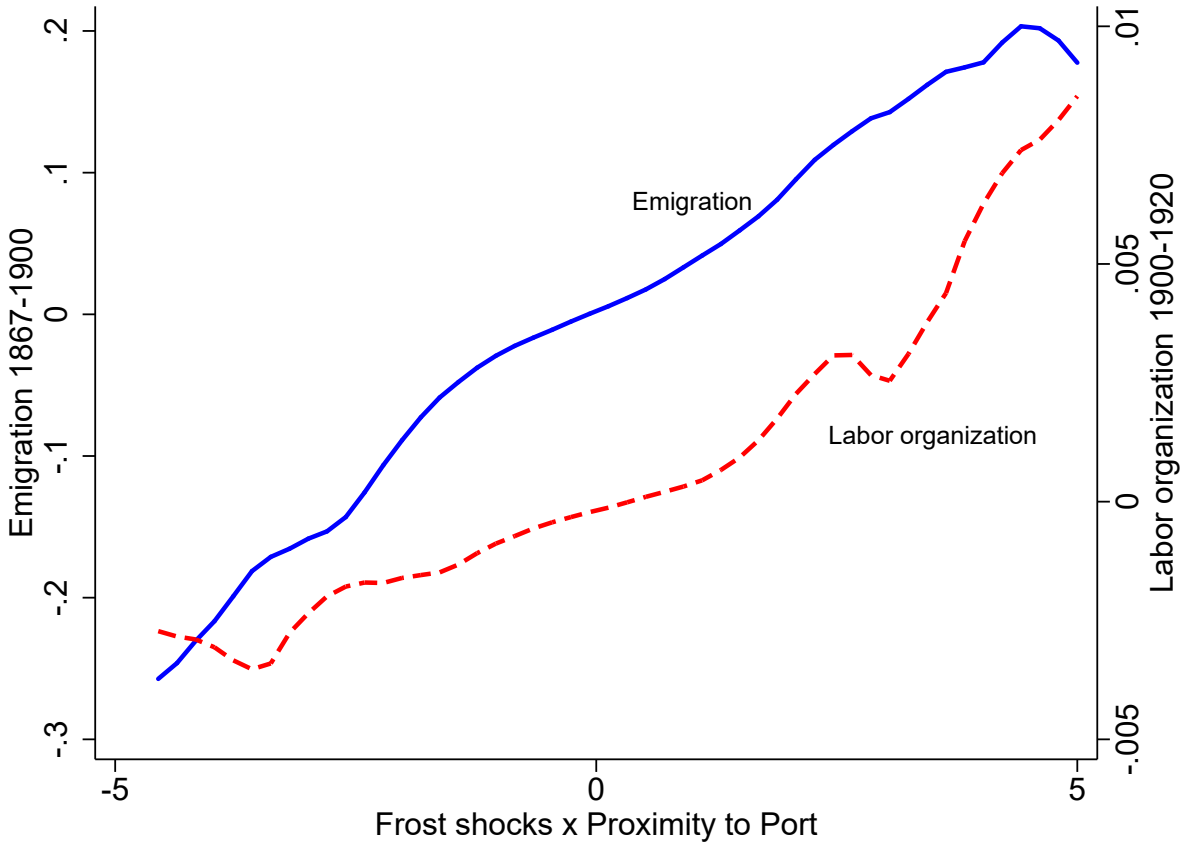


FIGURE 11
NONPARAMETRIC EFFECT OF THE INSTRUMENT ON LABOR ORGANIZATION AND EMIGRATION

Notes: Local mean smooth. Bandwidth: 1. This figure nonparametrically displays the first stage relationship, as well as the reduced-form effect of the instrument on the average labor organization rate 1900–1920. The instrument is the interaction between the number of growing season frost shocks 1864–1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All variables have been residualized using the following covariates: county fixed effects, the log of the population at baseline, log area, latitude, longitude, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, the number of growing season frost shocks in 1864–1867, the interaction between growing season frost shocks and proximity to the nearest town and trade port, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. 16 observations that have IV residual values above 5 have been top coded at 5 to reduce noise.

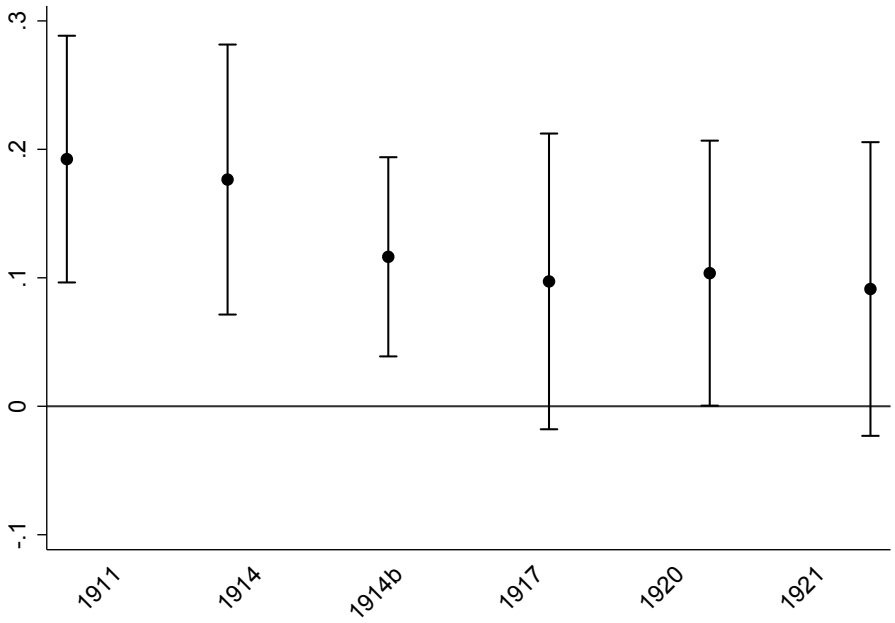


FIGURE 12
EMIGRATION AND LEFT-WING VOTE SHARE IN NATIONAL ELECTIONS 1911-1921

Notes: This figure displays the IV coefficients on the log of total emigration from 1867 to year t on vote shares for the Social Democratic and Socialist parties. The excluded instrument is the interaction between the number of growing season frost shocks 1864–1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects, the log of the population at the baseline, log area, latitude, longitude, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, the number of growing season frost shocks in 1864–1867, the interaction between growing season frost shocks and proximity to the nearest town and trade port, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. Standard errors are clustered at the weather station level. Bars around point estimates represent 95 percent confidence intervals.

Appendix A: Data and supporting evidence

A.1 Correlation between emigration data sets

Appendix Table A.1 quantifies the correlation by regressing the passenger list data on the church book data using the 1869-1895 period when both data sets are available. As in the remainder of the analysis, we aggregate all data to the municipality level using 1865 borders. Using county fixed effects, the estimated relationship is 1.3 church book emigrants for every passenger data emigrant. This reflects the fact that some parishes are not fully matched in the passenger data, leading to an underestimation in the latter. Controlling for municipality fixed effects, however, the point estimate becomes statistically indistinguishable from one. This indicates that for those parishes from the passenger data that we are able to match, the two data sets report the same number of emigrants on average. The R-squared value of 0.84 indicates a high degree of similarity. For comparison, in Columns 3 and 4, we use one-year lagged values of emigration from both data sets to predict parish emigration. Both models return lower and similar point estimates of 0.70 and 0.64. Taken together, these results suggest a high reliability of the emigrant data sets and that there is no important lag between leaving the home parish and boarding a ship to the United States.

Table A.1
Comparison between emigration data sets

	(1) Emigrants	(2) Emigrants	(3) Emigrants	(4) Emigrants
Passenger emigrants	1.2894***	0.9863***		
	(0.0686)	(0.0623)		
Lag parish emigrants			0.7108***	
			(0.0423)	
Lag passenger emi.				0.6566***
				(0.0875)
County FE	Yes	No	No	No
Municipality FE	No	Yes	Yes	Yes
Observations	63693	63693	45634	45053
R-squared	0.66	0.84	0.83	0.74

Notes: OLS regressions. This table displays the relationship between the church book and passenger list data 1869-1895. Lag variables are lagged one year.

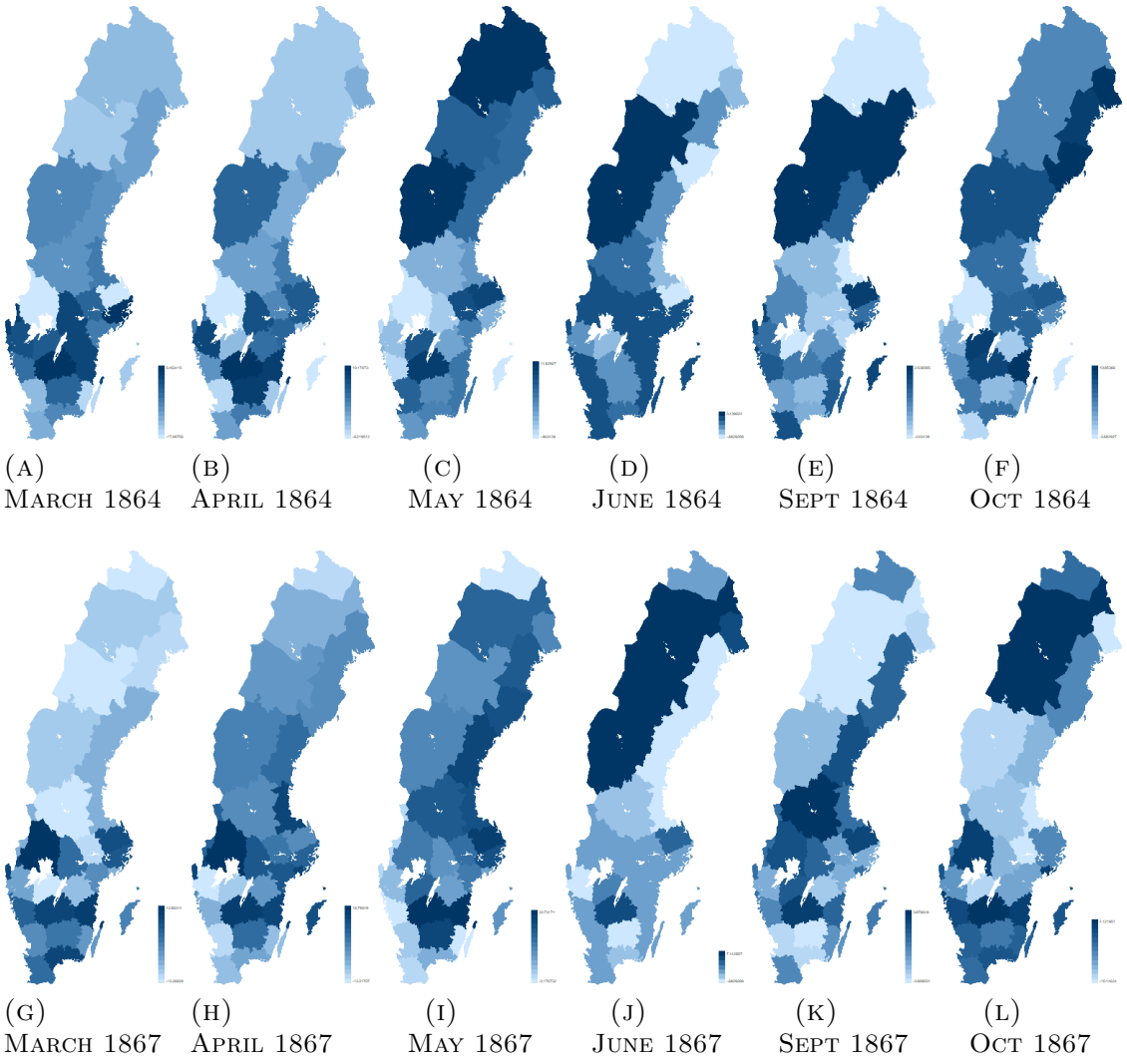
A.2 Estimating minimum daily temperatures

In order to fill in the missing values on minimum temperatures, we use the remaining variables to predict daily minimum temperatures. Observations containing minimum daily temperatures are used to fit a model relating minimum recorded daily temperature to the minimum of temperatures at 6 am, 12 pm and 8 pm, respectively, as follows:

$$min(Temp)_{sdmt} = \alpha_0 + \alpha_m min(Temp^{6am}, Temp^{12pm}, Temp^{8pm})_{sdmt} + \nu_{sdmt},$$

where $min(Temp)_{sdmt}$ is the minimum temperature on day d at station s, month m and year t and $min(Temp^{6am}, Temp^{12pm}, Temp^{8pm})_{sdmt}$ is the minimum of the three daily readings. The coefficients are allowed to vary by month to capture seasonal variation in the relationship. We then use this model to predict daily minimum temperatures for observations with missing values.

A.3 Spatial variation in frost days deviations



(A) March 1864 (B) April 1864 (C) May 1864 (D) June 1864 (E) Sept 1864 (F) Oct 1864

(G) March 1867 (H) April 1867 (I) May 1867 (J) June 1867 (K) Sept 1867 (L) Oct 1867

Figure A.1
Monthly spatial variation in frost days deviations

Notes: This figure displays the spatial variation in the deviation between the actual number of frost days and its long-run mean for each displayed month.

A.4 Frost shocks and agricultural outcomes

TABLE A.2
FROST SHOCKS AND AGRICULTURAL OUTCOMES IN A PANEL 1860–1880

Dependent variable:	Crop failure		Harvest Grade	
	(1)	(2)	(3)	(4)
Frost Shocks	0.104**	0.104**	-0.409***	-0.409***
	(0.038)	(0.040)	(0.136)	(0.135)
Frost Shocks NGS		0.006		-0.036
		(0.022)		(0.117)
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
County linear trend	Yes	Yes	Yes	Yes
Observations	489	489	489	489

Notes: Columns 1-2: OLS regressions. Columns 3-4: Ordered probit regressions. This table displays the effect of frost shocks on county level agricultural outcomes in a panel 1860–1880. The dependent variable in Columns 1 and 2 is a yearly indicator of crop failure, defined as a harvest grade below 3 on a scale from 0 to 9. The dependent variable in Columns 3 and 4 is the full harvest grade index. *Frost Shocks* is the mean number of growing season frost shocks among a county's municipalities. *Frost Shocks NGS* is defined analogously but for the non-growing season. Both variables are normalized by their standard deviations. Regressions are weighted by arable land area. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

A.5 Using panel variation in emigration

TABLE A.3
FROST SHOCKS AND EMIGRATION IN THE PANEL 1867-1920

Dependent variable:	Yearly emigration per capita			
	1867–1879		1880–1920	
	(1)	(2)	(3)	(4)
Shocks × Proximity to port	0.0099**	0.0250***	-0.0001	-0.0040
	(0.0041)	(0.0050)	(0.0038)	(0.0043)
Shocks	0.0637***	0.0591***	0.0037	-0.0082*
	(0.0061)	(0.0066)	(0.0046)	(0.0046)
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Year × Region FE	No	Yes	No	Yes
Observations	30654	30654	73098	73098

Notes: OLS regressions. This table displays the relationship between yearly growing-season frost shocks, proximity to emigration port and their interaction on yearly emigration rates using panel data. Columns 2 and 4 additionally control for yearly fixed effects that vary by the three main regions of Sweden (South, Central, and North). Standard errors clustered at the municipality level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

A.6 Emigration and unions across countries

TABLE A.4
EMIGRATION AND TRADE UNION DENSITY ACROSS OECD COUNTRIES

Dependent variable:	Union density 2000					
	(1)	(2)	(3)	(4)	(5)	(6)
US emigrants 1910	0.0702***	0.0699***				
	(0.0160)	(0.0197)				
All emigrants 1850–1910			0.0590***	0.0668		
			(0.0141)	(0.0651)		
Combination of rows 1 & 2					0.0580***	0.0507***
					(0.0133)	(0.0130)
Controls	No	Yes	No	Yes	No	Yes
Observations	29	27	9	9	29	27
R-squared	0.45	0.54	0.59	0.87	0.43	0.48

Notes: OLS regressions. This table displays the relationship between emigration and trade union density across OECD countries. *US emigrants* 1910 is the number of individuals born in country c that resided in the US in 1910. *Total emigrants* $1850-1910$ is the total number of emigrants to all destinations between 1850 and 1910. *Combination of rows* 1 & 2 fills in missing values present in *Total emigrants* $1850-1910$ with each country's corresponding value of *US emigrants* 1910. All emigration variables are in logs. Control variables are: real GDP per capita in 1960, rural share of the population in 1960, life expectancy at birth in 1960 and length of primary and secondary schooling in 1970. Robust standard errors in parentheses. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

A.7 Relation between industrial employment and labor movement membership

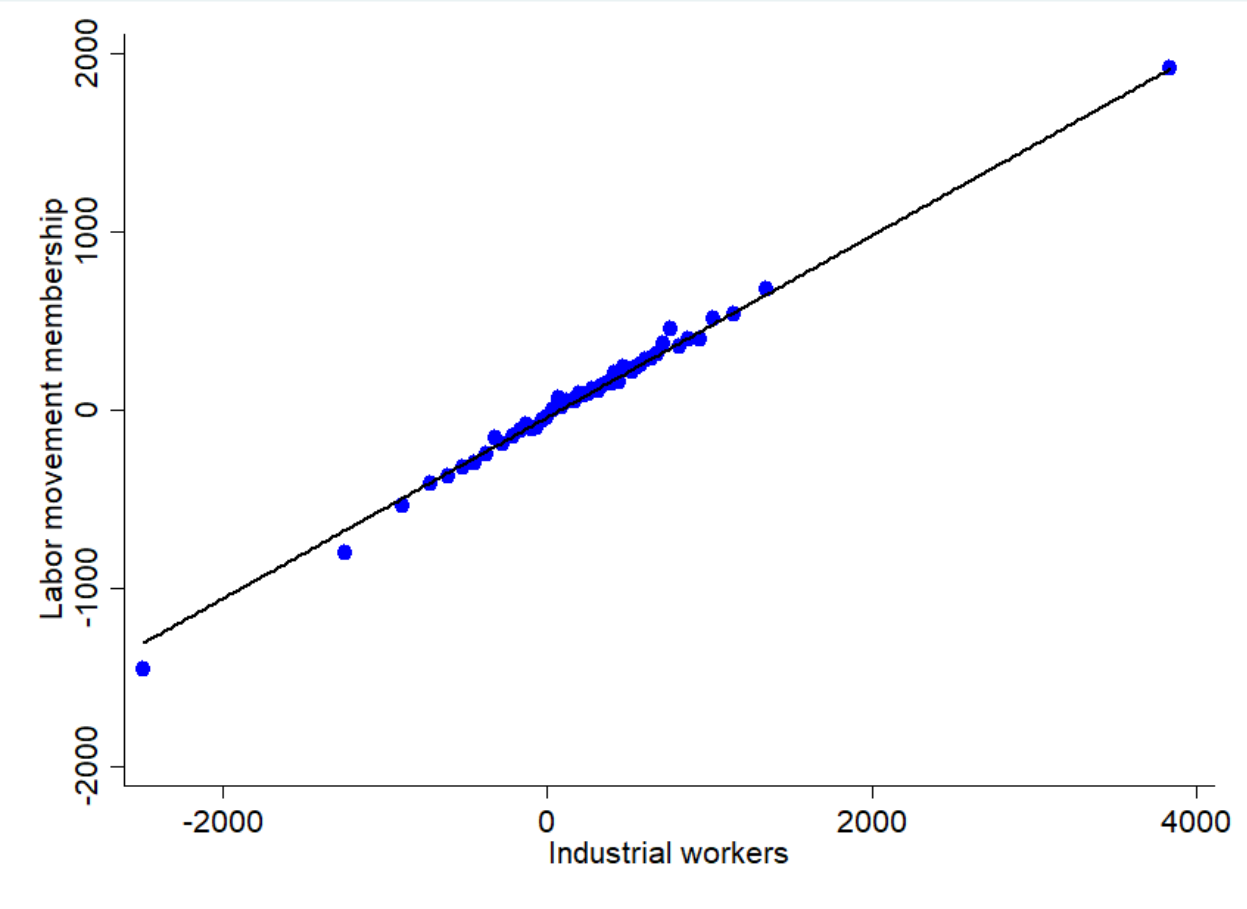
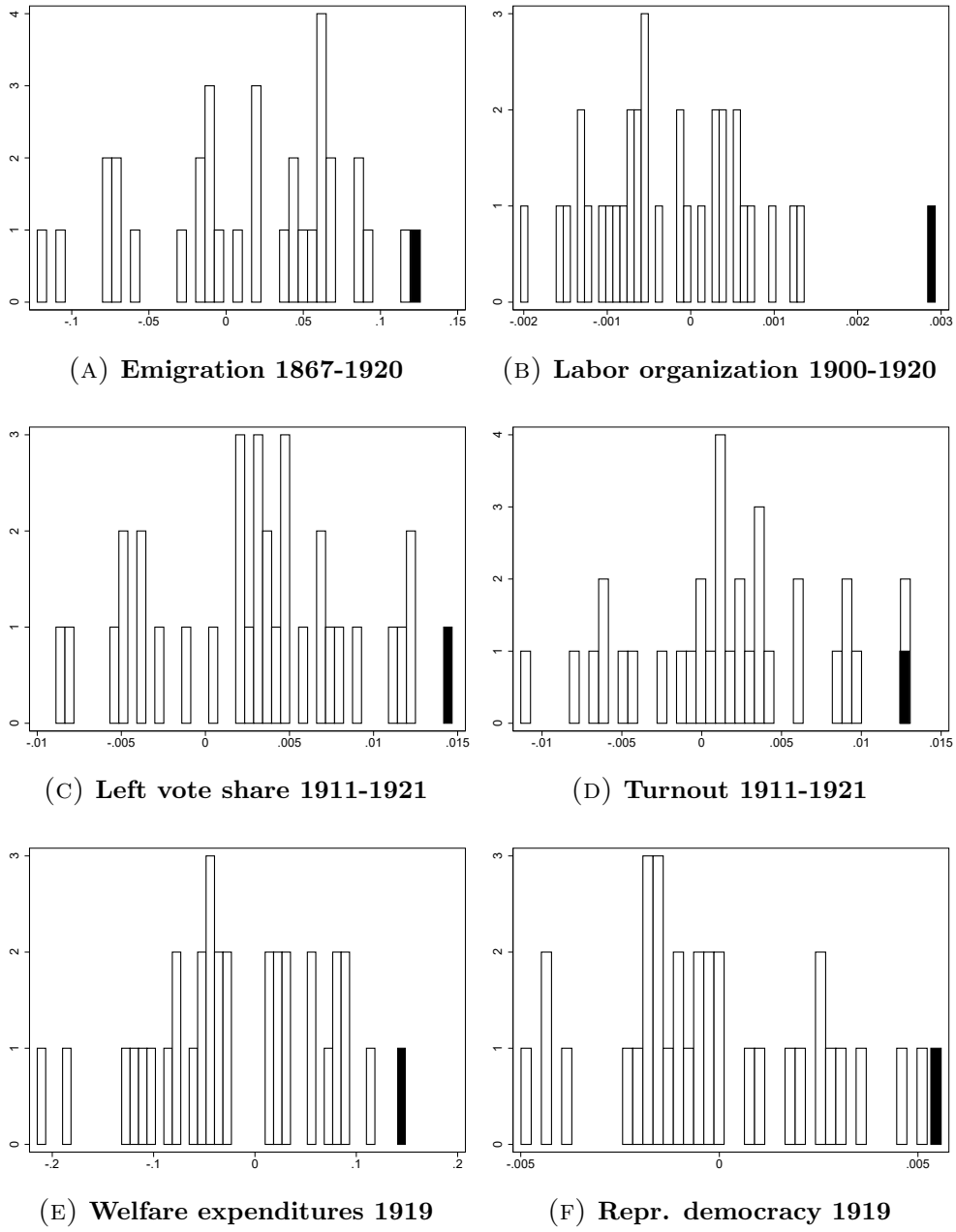


FIGURE A.2
INDUSTRIAL EMPLOYMENT AND LABOR MOVEMENT SIZE

Notes: This figure displays relationship between the number of industrial workers in a municipality and the size of the labor movement. Both variables have been residualized using the standard set of controls and county fixed effects.

Appendix B: Robustness and placebo tests

B.1 Tables and figures



(A) **Emigration 1867-1920** (B) **Labor organization 1900-1920**

(C) **Left vote share 1911-1921** (D) **Turnout 1911-1921**

(E) **Welfare expenditures 1919** (F) **Repr. democracy 1919**

FIGURE B.1
TREATMENT AND PLACEBO SHOCKS 1859-1900

Notes: Probability density functions of reduced form coefficients from regressing the outcome variables on the interaction between growing season frost shocks and proximity to emigration port during all consecutive four-year periods between 1859 and 1900. Proximity is defined as minus the log of distance. The coefficient associated with the treatment period of 1864–1867 is highlighted in black. Frost shocks are categorized into quintiles of the distribution before interacting with port proximity. All regressions include county fixed effects and control for the log of the population at baseline. All regressions control for growing season frost shocks in the relevant four-year period, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. Regressions also include the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively.

TABLE B.1
EXCLUDING URBAN MUNICIPALITIES

Dependent variable:	Labor org.		Striking		Left vote		Turnout	
	(1) All	(2) Rural	(3) All	(4) Rural	(5) All	(6) Rural	(7) All	(8) Rural
Emigration 1867–	0.0231***	0.0193***	0.0319**	0.0255**	0.1206**	0.1288**	0.0806**	0.0919***
	(0.0068)	(0.0067)	(0.0127)	(0.0104)	(0.0496)	(0.0578)	(0.0343)	(0.0350)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2358	2245	2358	2245	2359	2246	2359	2246
F-statistic	17.19	13.83	19.88	16.00	20.56	16.65	20.56	16.65

Notes: IV regressions. This table displays the effects of log emigration 1867 to year t on four outcome variables, with and without urban municipalities. *Labor org.* denotes the average per capita membership in labor unions and the Social Democratic Party 1900–1920. *Striking* denotes per capita strike participation in the 1909 general strike. *Left Vote* denotes the average vote share of the Social Democratic and Socialist parties in national elections 1911-1921. *Turnout* denotes the average turnout rate in those same election. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. $Shocks \times Market\ Access$ includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.2
BOUNDING IDEOLOGICAL SELECTION OF EMIGRANTS

Dependent variable:	Labor organization 1900-1920		Left-wing vote share 1911–1921		
	Main result	100 percent	Main result	75 percent	100 percent
	(1)	(2)	(3)	(4)	(5)
Emigration 1867–	0.0231***	0.0215***	0.1206**	0.1009***	0.0665*
	(0.0068)	(0.0061)	(0.0496)	(0.0334)	(0.0368)
County fixed effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes
Observations	2358	2358	2359	2359	2359
F-statistic	17.19	17.19	20.56	20.56	20.56

Notes: IV regressions. This table puts lower bounds on the size of our estimated effect of emigration on left-wing party voting, taking into account the possibility of ideological selection of emigrants. The basic assumption is that all emigrants would have been eligible to vote and would have voted in all elections 1911-1921. Columns 2 to 4 then consider 3 different scenarios for how emigrants would have voted if they had stayed. Column 2 assumes that 75 percent of all emigrants would have voted for the non-left. Columns 3 and 4 make this assumption 90 and 100 percent, respectively. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.3
NON-GROWING SEASON SHOCKS AS PLACEBO INSTRUMENT

	Placebo test using non-growing season shocks 1864–1867							
	(1) Emi. 1867–1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
Shocks NGS × Proximity to port	0.0038	0.0002	-0.0003	0.0012	0.0006	0.0525	0.0131	0.0010
	(0.0202)	(0.0005)	(0.0009)	(0.0031)	(0.0022)	(0.0381)	(0.0303)	(0.0016)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221
	(1) Emi. 1867–1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
Shocks × Proximity to trade port	-0.0043	-0.0009	0.0011	-0.0077*	-0.0029	0.0529	-0.0170	-0.0057***
	(0.0236)	(0.0007)	(0.0010)	(0.0041)	(0.0029)	(0.0394)	(0.0308)	(0.0018)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221
	(1) Emi. 1867–1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
Shocks × Proximity to town	0.0028	-0.0004	-0.0004	-0.0001	-0.0008	-0.0215	-0.0089	0.0002
	(0.0043)	(0.0003)	(0.0004)	(0.0006)	(0.0007)	(0.0284)	(0.0188)	(0.0008)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221

Notes: OLS regressions. This table displays the effects of non-growing season frost shocks 1864–1867 interacted with proximity to the nearest emigration port on our outcome variables. Proximity is defined as minus the log of distance. *Emi. 1867-1920* denotes log total emigration 1867–1920 in a municipality. *Labor* denotes average per capita membership in the labor movement 1900–1920. *Strike* denotes per capita participation in the 1909 general strike. *Left* and *Turnout* denote the average vote share of left-wing parties and average turnout in national elections 1911–1921. *Welfare 1918* and *Welf. 1919* denote per capita expenditures on welfare in 1918 and 1919, respectively. *Repr. Dem. 1919* denotes whether a municipality had voluntarily adopted representative rather than direct democracy in 1919. All regressions control for the log of the population at baseline. Additional control variables are non-growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks × Market Access* includes the interaction between frost shocks and proximity to the nearest town and trade port, respectively. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.4
DIFFERENT CUTOFFS FOR FROST SHOCKS

A.	**Shocks defined with 1 standard deviations as threshold**							
	(1) Emi. 1867–1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
Shocks × Proximity to port	0.0632***	0.0015***	0.0020***	0.0076***	0.0051**	0.0630***	0.0674***	0.0029*
	(0.0135)	(0.0003)	(0.0007)	(0.0026)	(0.0021)	(0.0211)	(0.0217)	(0.0015)
B.	**Shocks defined with 0.75 standard deviations as threshold**							
Shocks × Proximity to port	0.0465***	0.0015***	0.0019**	0.0091***	0.0056***	0.0665**	0.0540*	0.0041**
	(0.0130)	(0.0003)	(0.0008)	(0.0023)	(0.0019)	(0.0249)	(0.0277)	(0.0017)
C.	**Shocks defined with 0.125 standard deviations as threshold**							
Shocks × Proximity to port	0.0586***	0.0018***	0.0019***	0.0070**	0.0027	0.0641**	0.0655***	0.0032*
	(0.0113)	(0.0004)	(0.0006)	(0.0029)	(0.0022)	(0.0234)	(0.0229)	(0.0017)
D.	**Growing season cutoff at 5 degrees C instead of 3**							
Shocks × Proximity to port	0.0575***	0.0012***	0.0014**	0.0059**	0.0036	0.0579**	0.0617***	0.0030**
	(0.0134)	(0.0003)	(0.0006)	(0.0028)	(0.0022)	(0.0211)	(0.0207)	(0.0014)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221

Notes: OLS regressions. This table displays the sensitivity of the main results to changing the definition of frost shocks. Panel A displays the baseline reduced-form results. Panels B and C display results from counting frost shocks with a 0.75 or 1.25 deviation cutoff. Panel D maintains the baseline cutoff of 1 standard deviation but counts as growing season months with a long-run mean temperature above 5 degrees Celsius, rather than 3 as in the baseline. *Emi. 1867-1920* denotes log total emigration 1867–1920 in a municipality. *Labor* denotes average per capita membership in the labor movement 1900–1920. *Strike* denotes per capita participation in the 1909 general strike. *Left* and *Turnout* denote average vote share of left-wing parties and average turnout in national elections 1911–1921. *Welfare 1918* and *Welf. 1919* denote per capita expenditures on welfare in 1918 and 1919, respectively. *Repr. Dem. 1919* denotes whether a municipality had voluntarily adopted representative rather than direct democracy in 1919. Proximity is defined as minus the log of distance. All regressions control for the log of the population at baseline. Additional control variables are growing-season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between frost shocks and proximity to the nearest town and trade port, respectively. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.5
SENSITIVITY TO LARGE VALUES: WINSORIZING VARIABLES

A.	**Censor shocks and port proximity at 5^{th} and 95^{th} percentiles**							
	(1) Emi. 1867–1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welfare 1919	(8) Repr. dem. 1919
Shocks × Proximity to Port	0.0670***	0.0015***	0.0021***	0.0063**	0.0067***	0.0557**	0.0646***	0.0030*
	(0.0163)	(0.0003)	(0.0006)	(0.0025)	(0.0022)	(0.0221)	(0.0230)	(0.0015)
B.	**Censor shocks and port proximity at 10^{th} and 90^{th} percentiles**							
Shocks × Proximity to Port	0.0866***	0.0016***	0.0023***	0.0066**	0.0093***	0.0577**	0.0660***	0.0033*
	(0.0204)	(0.0004)	(0.0007)	(0.0027)	(0.0026)	(0.0271)	(0.0235)	(0.0017)
C.	**Censor all variables at 5^{th} and 95^{th} percentiles**							
Shocks × Proximity to Port	0.0578***	0.0011***	0.0018***	0.0078***	0.0057**	0.0678**	0.0749***	0.0035**
	(0.0157)	(0.0003)	(0.0006)	(0.0025)	(0.0021)	(0.0251)	(0.0248)	(0.0016)
D.	**Censor all variables at 10^{th} and 90^{th} percentiles**							
Shocks × Proximity to Port	0.0812***	0.0014***	0.0021***	0.0096***	0.0082***	0.0592**	0.0653***	0.0035*
	(0.0182)	(0.0004)	(0.0007)	(0.0032)	(0.0026)	(0.0229)	(0.0201)	(0.0017)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221

Notes: OLS regressions. This table displays the sensitivity of the main results to large values in the model's variables. It does so by censoring variables at the bottom and top 5^{th} (10^{th}) percentile of the distribution. That is, observations below the 5^{th} percentile of values are assigned the value at the 5^{th} percentile, and so on. The first two panels censor two variables: growing-season frost shocks 1864–1867 and proximity to port, and re-define the instrument using these new variables. The bottom two panels repeat the exercise for *all* non-binary variables that are in the model. *Emi. 1867-1920* denotes log total emigration 1867–1920 in a municipality. *Labor* denotes average per capita membership in the labor movement 1900–1920. *Strike* denotes per capita participation in the 1909 general strike. *Left* and *Turnout* denote average vote share of left-wing parties and average turnout in national elections 1911–1921. *Welfare 1918* and *Welf. 1919* denote per capita expenditures on welfare in 1918 and 1919, respectively. *Repr. Dem. 1919* denotes whether a municipality had voluntarily adopted representative rather than direct democracy in 1919. Proximity is defined as minus the log of distance. All regressions control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks × Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.6
SENSITIVITY TO LARGE VALUES: DROPPING 10 PERCENT OF MUNICIPALITIES FARTHEST FROM EMIGRATION PORTS

	(1) Emi. 1867–1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
Shocks × Proximity to port	0.0565***	0.0013***	0.0019**	0.0062***	0.0049**	0.0617***	0.0640***	0.0028*
	(0.0142)	(0.0003)	(0.0007)	(0.0022)	(0.0021)	(0.0198)	(0.0208)	(0.0016)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2123	2122	2122	2123	2123	1998	1985	2000

Notes: OLS regressions. This table displays the sensitivity of the main results to dropping the 10 percent of municipalities that are farthest from emigration ports. *Emi. 1867-1920* denotes log total emigration 1867–1920 in a municipality. *Labor* denotes average per capita membership in the labor movement 1900–1920. *Strike* denotes per capita participation in the 1909 general strike. *Left* and *Turnout* denote average vote share of left-wing parties and average turnout in national elections 1911–1921. *Welfare 1918* and *Welf. 1919* denote per capita expenditures on welfare in 1918 and 1919, respectively. *Repr. Dem. 1919* denotes whether a municipality had voluntarily adopted representative rather than direct democracy in 1919. Proximity is defined as minus the log of distance. All regressions control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.7
VARYING METHODS FOR ESTIMATING STANDARD ERRORS

A.	**Standard errors clustered at county level**							
	(1) Emi. 1867–1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
Shocks × Proximity to port	0.0632***	0.0015***	0.0020**	0.0076***	0.0051**	0.0630**	0.0674**	0.0029*
	(0.0132)	(0.0004)	(0.0008)	(0.0016)	(0.0018)	(0.0243)	(0.0250)	(0.0016)
B.	**Standard errors robust to spatial correlation up to 100 kilometers**							
Shocks × Proximity to port	0.0632***	0.0015***	0.0020**	0.0076***	0.0051***	0.0630***	0.0674***	0.0029*
	(0.0103)	(0.0003)	(0.0008)	(0.0022)	(0.0017)	(0.0219)	(0.0249)	(0.0017)
C.	**Standard errors robust to spatial correlation up to 200 kilometers**							
Shocks × Proximity to port	0.0632***	0.0015***	0.0020**	0.0076***	0.0051***	0.0630***	0.0674***	0.0029**
	(0.0143)	(0.0003)	(0.0010)	(0.0016)	(0.0013)	(0.0189)	(0.0200)	(0.0014)
D.	**Wild cluster-t bootstrapped errors at weather station level**							
Shocks × Proximity to port	0.0632***	0.0015***	0.0020**	0.0076***	0.0051**	0.0630***	0.0674**	0.0029
	(0.0000)	(0.0000)	(0.0010)	(0.0027)	(0.0023)	(0.0229)	(0.0285)	(0.0019)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221

Notes: OLS regressions. This table displays reduced form estimates of the main effects, including emigration, using different standard errors. Panel A uses cluster-robust standard errors at the county-level (24 clusters). Panel B and C estimate spatial correlation-robust standard errors (Conley, 1999), with spatial dependencies allowed up to 100 and 200 kilometers from the center of a municipality, respectively. Panel D estimates wild cluster-t bootstrapped standard errors (Cameron et al., 2008). *Emi. 1867-1920* denotes log total emigration 1867–1920 in a municipality. *Labor* denotes average per capita membership in the labor movement 1900–1920. *Strike* denotes per capita participation in the 1909 general strike. *Left* and *Turnout* denote average vote share of left-wing parties and average turnout in national elections 1911–1921. *Welfare 1918* and *Welf. 1919* denote per capita expenditures on welfare in 1918 and 1919, respectively. *Repr. Dem. 1919* denotes whether a municipality had voluntarily adopted representative rather than direct democracy in 1919. Proximity is defined as minus the log of distance. All regressions control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks × Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table B.8
Varying functional form of instrument

	Distance in levels instead of logs							
	(1) Emi. 1867–1920	(2) Labor	(3) Strike	(4) Turnout	(5) Left	(6) Welfare 1918	(7) Welfare 1919	(8) Repr. dem. 1919
Shocks × Proximity to Port	0.2706***	0.0069***	0.0093**	0.0147	0.0448***	0.2752**	0.3640***	0.0180**
	(0.0660)	(0.0015)	(0.0035)	(0.0119)	(0.0121)	(0.1046)	(0.1066)	(0.0078)
	Shocks in logs instead of levels							
Shocks × Proximity to port	0.2545***	0.0070***	0.0096**	0.0185*	0.0413***	0.2746***	0.2777**	0.0143**
	(0.0659)	(0.0017)	(0.0036)	(0.0102)	(0.0114)	(0.0924)	(0.1114)	(0.0069)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221

Notes: OLS regressions. This table displays reduced form estimates of the main outcomes, including emigration, using the proximity to the nearest port in levels rather than in logarithms. Proximity is defined as minus distance. The instrument and the *Shock* × *Market Access* variables are redefined using proximity in levels as well. Due to small point estimates, all outcomes have been multiplied by 1000. *Emi. 1867-1920* denotes log total emigration 1867–1920 in a municipality. *Labor* denotes average per capita membership in the labor movement 1900–1920. *Strike* denotes per capita participation in the 1909 general strike. *Left* and *Turnout* denote average vote share of left-wing parties and average turnout in national elections 1911–1921. *Welfare 1918* and *Welf. 1919* denote per capita expenditures on welfare in 1918 and 1919, respectively. *Repr. Dem. 1919* denotes whether a municipality had voluntarily adopted representative rather than direct democracy in 1919. All regressions control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.9
FLEXIBLE CONTROLS FOR MAIN EFFECTS OF SHOCKS AND PORT PROXIMITY

	(1) Emi. 1867-1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
A.	**Baseline reduced form results**							
Shocks × Proximity to port	0.0621***	0.0015***	0.0020**	0.0080***	0.0051**	0.0648***	0.0670***	0.0029*
	(0.0137)	(0.0004)	(0.0007)	(0.0026)	(0.0021)	(0.0227)	(0.0220)	(0.0015)
B.	**2nd degree polynomials in shocks and proxport**							
Shocks × Proximity to port	0.0569***	0.0015***	0.0018***	0.0074***	0.0050**	0.0564***	0.0681***	0.0023
	(0.0156)	(0.0004)	(0.0007)	(0.0026)	(0.0025)	(0.0194)	(0.0218)	(0.0015)
C.	**3rd degree polynomials in shocks and proxport**							
Shocks × Proximity to port	0.0556***	0.0019***	0.0025***	0.0086***	0.0065**	0.0471*	0.0773***	0.0023
	(0.0167)	(0.0004)	(0.0008)	(0.0029)	(0.0024)	(0.0237)	(0.0263)	(0.0018)
D.	**4th degree polynomials in shocks and proxport**							
Shocks × Proximity to port	0.0509***	0.0018***	0.0024***	0.0079***	0.0062**	0.0493**	0.0753***	0.0025
	(0.0166)	(0.0004)	(0.0007)	(0.0025)	(0.0025)	(0.0233)	(0.0268)	(0.0017)
E.	**Linear spline in shocks and port proximity with 4 knots**							
Shocks × Proximity to port	0.0580***	0.0017***	0.0021***	0.0096***	0.0050**	0.0750***	0.0910***	0.0027*
	(0.0132)	(0.0004)	(0.0007)	(0.0024)	(0.0019)	(0.0247)	(0.0260)	(0.0015)
F.	**Cubic spline in shocks and port proximity with 4 knots**							
Shocks × Proximity to port	0.0588***	0.0017***	0.0022***	0.0088***	0.0056**	0.0676***	0.0856***	0.0025*
	(0.0134)	(0.0004)	(0.0007)	(0.0022)	(0.0021)	(0.0221)	(0.0230)	(0.0015)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221

Notes: OLS regressions. This table displays the effect of frost shocks 1864-1867 interacted with proximity to the nearest emigration port on different main outcomes by varying the functional form of controls. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks × Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table B.10
Outcomes in logs instead of per capita

	Outcomes in logs rather than per capita			
	(1) Labor	(2) Strike	(3) Welfare 1918	(4) Welfare 1919
Shocks × Proximity to port	0.0757***	0.1000***	0.0241**	0.0366***
	(0.0256)	(0.0280)	(0.0115)	(0.0112)
County fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes
Observations	2359	2359	2219	2207

Notes: OLS regressions. This table displays reduced form estimates with outcomes defined using logarithms rather than per capita values. Columns 1 and 2 use the $log(x+1)$ transformation, while Columns 3 and 4 use $log(x+100)$ to avoid putting high weight on near-zero outliers. *Labor* denotes log average membership in the labor movement 1900–1920. *Strike* denotes log number of participants in the 1909 general strike. *Welfare 1918* and *Welf. 1919* denote log expenditures on welfare in 1918 and 1919, respectively. All regressions control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. Proximity is defined as minus the log of distance. Due to small point estimates, all outcomes have been multiplied by 1000. $Shocks \times Market\ Access$ includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table B.11
Reduced-form effect on all outcomes

	Emi. 1867-1920	Labor	Strike	Left	Turnout	Welfare 1918	Welf. 1919	Repr. dem. 1919
1) Shocks × Proximity to port	0.0632***	0.0015***	0.0020***	0.0076***	0.0051**	0.0630***	0.0674***	0.0029*
	(0.0135)	(0.0003)	(0.0007)	(0.0026)	(0.0021)	(0.0211)	(0.0217)	(0.0015)
2) Shocks	0.0095	-0.0003	-0.0001	-0.0074***	0.0038***	-0.0548**	-0.0202	-0.0008
	(0.0085)	(0.0003)	(0.0005)	(0.0020)	(0.0013)	(0.0236)	(0.0183)	(0.0011)
3) Shocks × Proximity to trade port	-0.0127	-0.0009*	0.0010	-0.0087**	-0.0034	0.0514	-0.0233	-0.0064***
	(0.0209)	(0.0005)	(0.0011)	(0.0037)	(0.0021)	(0.0437)	(0.0302)	(0.0021)
4) Shocks × Proximity to town	0.0019	-0.0003	-0.0005	0.0001	-0.0007	-0.0348	-0.0142	0.0006
	(0.0045)	(0.0003)	(0.0003)	(0.0008)	(0.0007)	(0.0310)	(0.0167)	(0.0008)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359	2358	2358	2359	2359	2219	2207	2221

Notes: OLS regressions. This table displays the effect of frost shocks 1864-1867 interacted with proximity to the nearest emigration port on different main outcomes. Proximity is defined as minus the log of distance. *Shocks NGS* indicate frost shocks occurring in the non-growing season. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.12
DIFFERENT DEFINITIONS OF MARKET ACCESS

A.	**Changing the set of trade ports considered**							
Dependent variable:	Emigration 1867-1920		Labor org. 1900-1920		Left 1911-1921		Welfare 1918	
Number of ports:	Baseline (10)	5	Baseline (10)	5	Baseline (10)	5	Baseline (10)	5
Shocks × Proximity to port	0.0632***	0.0655***	0.0015***	0.0016***	0.0076***	0.0082***	0.0630***	0.0705***
	(0.0135)	(0.0135)	(0.0003)	(0.0004)	(0.0026)	(0.0028)	(0.0211)	(0.0245)
Shocks × Proximity to trade port	-0.0127	-0.0206	-0.0009*	-0.0011	-0.0087**	-0.0073	0.0514	0.0227
	(0.0209)	(0.0306)	(0.0005)	(0.0008)	(0.0037)	(0.0048)	(0.0437)	(0.0554)
Shocks × Proximity to town	0.0019	0.0021	-0.0003	-0.0004	0.0001	-0.0000	-0.0348	-0.0346
	(0.0045)	(0.0046)	(0.0003)	(0.0003)	(0.0008)	(0.0008)	(0.0310)	(0.0322)
B.	**Changing the set of towns considered**							
Dependent variable:	Emigration 1867-1920		Labor org. 1900-1920		Left 1911-1921		Welfare 1918	
Number of towns:	Baseline (88)	10	Baseline (88)	10	Baseline (88)	10	Baseline (88)	10
Shocks × Proximity to port	0.0632***	0.0655***	0.0015***	0.0015***	0.0076***	0.0081***	0.0630***	0.0497***
	(0.0135)	(0.0134)	(0.0003)	(0.0003)	(0.0026)	(0.0026)	(0.0211)	(0.0167)
Shocks × Proximity to trade port	-0.0127	-0.0139	-0.0009*	-0.0010**	-0.0087**	-0.0083**	0.0514	0.0395
	(0.0209)	(0.0202)	(0.0005)	(0.0005)	(0.0037)	(0.0038)	(0.0437)	(0.0331)
Shocks × Proximity to town	0.0019	0.0110	-0.0003	-0.0001	0.0001	-0.0010	-0.0348	-0.0090
	(0.0045)	(0.0177)	(0.0003)	(0.0004)	(0.0008)	(0.0028)	(0.0310)	(0.0249)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2359.0000	2359.0000	2358.0000	2358.0000	2359.0000	2359.0000	2219.0000	2219.0000

Notes: OLS regressions. This table displays the effect of frost shocks 1864-1867 interacted with proximity to the nearest emigration port on different main outcomes, varying the number of trade ports and towns considered in our market access controls. Proximity is defined as minus the log of distance. *Shocks × Proximity to trade port* and *Shocks × Proximity to town* includes the interaction between growing season frost shocks and proximity to the nearest trade port and town, respectively. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table B.13
Different definitions of market access

A.	**Changing the set of trade ports considered**					
Dependent variable:	Labor org. 1900-1920		Left 1911-1921		Welfare 1918	
Number of ports:	Baseline (10)	5	Baseline (10)	5	Baseline (10)	5
Emigration 1867–	0.0231***	0.0243***	0.1206**	0.1243**	0.9964***	1.0809***
	(0.0068)	(0.0073)	(0.0496)	(0.0524)	(0.3612)	(0.3903)
Shocks × Proximity to trade port	-0.0008	-0.0007	-0.0072	-0.0047	0.0739	0.0549
	(0.0008)	(0.0012)	(0.0053)	(0.0069)	(0.0507)	(0.0633)
Shocks × Proximity to town	-0.0004	-0.0004	-0.0001	-0.0003	-0.0244	-0.0252
	(0.0003)	(0.0003)	(0.0010)	(0.0010)	(0.0264)	(0.0288)
F-statistic	17.19	19.00	20.56	22.13	16.35	18.50
B.	**Changing the set of towns considered**					
Dependent variable:	Labor org. 1900-1920		Left 1911-1921		Welfare 1918	
Number of towns:	Baseline (88)	10	Baseline (88)	10	Baseline (88)	10
Emigration 1867–	0.0231***	0.0222***	0.1206**	0.1227**	0.9964***	0.7772***
	(0.0068)	(0.0059)	(0.0496)	(0.0476)	(0.3612)	(0.2385)
Shocks × Proximity to trade port	-0.0008	-0.0009	-0.0072	-0.0066	0.0739	0.0581*
	(0.0008)	(0.0007)	(0.0053)	(0.0053)	(0.0507)	(0.0336)
Shocks × Proximity to town	-0.0004	-0.0003	-0.0001	-0.0024	-0.0244	-0.0102
	(0.0003)	(0.0004)	(0.0010)	(0.0024)	(0.0264)	(0.0264)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obsevations	2358	2358	2359	2359	2219	2219
F-statistic	17.19	19.77	20.56	22.70	16.35	18.72

Notes: IV regressions. This table displays results for different main outcomes, when varying the number of trade ports and towns considered in our market access controls. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. *Shocks × Proximity to trade port* and *Shocks × Proximity to town* includes the interaction between growing season frost shocks and proximity to the nearest trade port and town, respectively. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table B.14
Agriculture 1810

	(1) Emi. 1867-1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
A.				**Reduced-form**				
Shocks × Proximity to port	0.0583***	0.0015***	0.0021***	0.0071**	0.0051**	0.0682**	0.0658***	0.0028*
	(0.0141)	(0.0004)	(0.0006)	(0.0029)	(0.0023)	(0.0261)	(0.0239)	(0.0016)
Shocks × Yield per capita, 1810	0.0016	-0.0002**	-0.0001	-0.0001	-0.0002	0.0017	0.0007	-0.0005
	(0.0023)	(0.0001)	(0.0001)	(0.0004)	(0.0004)	(0.0040)	(0.0037)	(0.0003)
Shocks × Land value per capita, 1810	0.1424	0.0314	0.0341	-0.1927	-0.0812	0.5448	-1.2892	0.0709
	(0.7411)	(0.0244)	(0.0353)	(0.1325)	(0.0604)	(1.6352)	(1.7969)	(0.0474)
B.				**IV**				
Emigration 1867 -		0.0249***	0.0362***	0.1226**	0.0883**	1.2321**	1.1870**	0.0517*
		(0.0090)	(0.0140)	(0.0613)	(0.0423)	(0.6085)	(0.4995)	(0.0291)
Shocks × Yield per capita, 1810		-0.0002**	-0.0001	-0.0003	-0.0004	0.0003	-0.0007	-0.0005
		(0.0001)	(0.0001)	(0.0006)	(0.0006)	(0.0061)	(0.0059)	(0.0004)
Shocks × Land value per capita, 1810		0.0269	0.0307	-0.2095	-0.0933	0.3450	-1.4894	0.0585
		(0.0258)	(0.0310)	(0.1501)	(0.0859)	(1.8977)	(1.9875)	(0.0518)
County fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		2308	2308	2308	2308	2171	2161	2173
F-statistic		14.06	15.60	16.28	16.28	12.59	13.33	12.76

Notes: OLS and IV regressions. This table displays results for different main outcomes when controlling for the interaction between frost shocks and the yield per capita and the land value per capita (both in 1810), respectively. The excluded instrument in Panel B is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. *Shocks × Proximity to trade port* and *Shocks × Proximity to town* includes the interaction between growing season frost shocks and proximity to the nearest trade port and town, respectively. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE B.15
EMIGRATION UNTIL 1879 OR 1900 ON ALL OUTCOMES

A.	**Emigration until 1879**						
	(1) Labor	(2) Strike	(3) Left	(4) Turnout	(5) Welfare 1918	(6) Welf. 1919	(7) Repr. dem. 1919
Emigration 1867–1879	0.0238**	0.0324	0.1232*	0.0824	1.0230*	1.1438**	0.0475
	(0.0120)	(0.0204)	(0.0747)	(0.0591)	(0.5793)	(0.5657)	(0.0304)
F-statistic	4.27	4.27	4.23	4.23	3.80	3.44	3.79
B.	**Emigration until 1900**						
Emigration 1867–1900	0.0231***	0.0314**	0.1192**	0.0797**	0.9997***	1.0674***	0.0470**
	(0.0068)	(0.0132)	(0.0514)	(0.0368)	(0.3840)	(0.3231)	(0.0223)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2358	2358	2359	2359	2219	2207	2221
F-statistic	17.19	17.19	17.13	17.13	12.70	13.28	12.32

Notes: IV regressions. This table displays the effects of log emigration 1867-1879 (in panel A) or log emigration 1867–1900 (in panel B) on our main outcomes. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. $Shocks \times Market\ Access$ includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table B.16
Population effect controlling for past population growth

A. Dependent variable:	Emigration 1867–1890			Population		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0750***	0.0705***	0.0722***	0.0035	0.0022	0.0028
	(0.0217)	(0.0179)	(0.0179)	(0.0032)	(0.0036)	(0.0033)
B. Dependent variable:	Population					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.0572***	0.0489***	0.0486***	0.0483	0.0326	0.0392
	(0.0134)	(0.0128)	(0.0128)	(0.0442)	(0.0539)	(0.0492)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2295	2295	2295	2295	2295	2295
F-statistic				12.51	15.35	16.56

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on log total population in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline and the percentage population growth 1810-1865. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. $Shocks \times Market\ Access$ includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

B.2 Emigration through Norway

Using data on emigration via Norwegian ports collected by the Norwegian National Archives, we identify 53290 emigrants with a Swedish residence. Under the assumption that all of them are Swedish, the number of Swedish emigrants through Norway make up a small share of the total Swedish emigration. While most Swedish emigration via Norway occurred starting in the early 1900s, we nevertheless investigate the robustness of our results to include proximity to a Norwegian port in constructing our instrument. In particular, we use either Oslo or both Oslo and Trondheim as possible additional emigration ports.

Table B.17
Including Oslo as an emigration port

	(1) Emi. 1867-1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
A.	**Include Oslo as emigration port: Reduced-form**							
Shocks × Proximity to port	0.0682***	0.0017***	0.0021***	0.0082***	0.0056**	0.0693***	0.0682***	0.0029*
	(0.0151)	(0.0004)	(0.0008)	(0.0029)	(0.0022)	(0.0237)	(0.0228)	(0.0015)
B.	**Include Oslo as emigration port: IV**							
Emigration 1867 -		0.0244***	0.0312***	0.1194**	0.0822**	1.0645***	1.0549***	0.0452**
		(0.0076)	(0.0117)	(0.0519)	(0.0331)	(0.3931)	(0.3317)	(0.0224)
County fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shocks×Market Access		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		2357	2357	2358	2358	2218	2206	2220
F-statistic		16.37	18.66	19.22	19.22	16.29	16.79	15.62

Notes: OLS and IV regressions. This table displays results for different main outcomes when including Oslo as an additional emigration port. The excluded instrument in Panel B is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. *Shocks × Proximity to trade port* and *Shocks × Proximity to town* includes the interaction between growing season frost shocks and proximity to the nearest trade port and town, respectively. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table B.18
Including Oslo and Trondheim as an emigration port

	(1) Emi. 1867-1920	(2) Labor	(3) Strike	(4) Left	(5) Turnout	(6) Welfare 1918	(7) Welf. 1919	(8) Repr. dem. 1919
A.	**Reduced-form**							
Shocks × Proximity to port	0.0661***	0.0015***	0.0022***	0.0073**	0.0069***	0.0632**	0.0604***	0.0024
	(0.0148)	(0.0003)	(0.0007)	(0.0030)	(0.0022)	(0.0234)	(0.0218)	(0.0015)
B.	**Include Oslo and Trondheim as emigration port: IV-form**							
Emigration 1867 -		0.0215***	0.0345***	0.0994*	0.1015***	1.0714**	0.9361***	0.0309
		(0.0074)	(0.0124)	(0.0579)	(0.0358)	(0.4868)	(0.3090)	(0.0203)
County fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes
		No	No	No	No	No	No	No
Observations		2358	2358	2359	2359	2219	2207	2221
F-statistic		15.42	17.43	17.94	17.94	13.71	14.45	13.76

Notes: OLS and IV regressions. This table displays results for different main outcomes when including Oslo and Trondheim as additional emigration ports. The excluded instrument in Panel B is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. *Shocks × Proximity to trade port* and *Shocks × Proximity to town* includes the interaction between growing season frost shocks and proximity to the nearest trade port and town, respectively. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Appendix C: Full regression output for additional outcomes

This Appendix section provides full IV tables for outcome variables whose results were compressed in the main paper.

Table C.1
Placebo first stage: Non growing-season shocks and emigration

Dependent variable:	Emigration 1867–1920			
	(1)	(2)	(3)	(4)
Shocks NGS × Proximity to port	0.0080	0.0131	0.0038	-0.0094
	(0.0192)	(0.0172)	(0.0202)	(0.0167)
Shocks NGS	0.0063	0.0206	0.0299*	0.0139
	(0.0153)	(0.0143)	(0.0163)	(0.0134)
Shocks NGS × Proximity to trade port			0.0404*	0.0386*
			(0.0226)	(0.0225)
Shocks NGS × Proximity to town			0.0001	-0.0028
			(0.0055)	(0.0055)
Shocks × Proximity to port				0.0578***
				(0.0153)
Shocks				0.0173
				(0.0105)
Controls	No	Yes	Yes	Yes
Observations	2359	2359	2359	2359

Notes: OLS regressions. This table displays the effect on log emigration 1867–1920 of frost shocks 1864-1867 interacted with proximity to the nearest emigration port. Proximity is defined as minus the log of distance. *Shocks NGS* indicate frost shocks occurring in the non-growing season. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are log area, latitude, longitude, proximity to the nearest town, nearest trade port, nearest weather station and Stockholm, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.2
THE EFFECT OF EMIGRATION ON LABOR ORGANIZATION PER WORKER 1910

A. Dependent variable:	Emigration 1867–1910			Labor org. per worker		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks×Proximity to port	0.064***	0.062***	0.062***	0.012***	0.012***	0.013***
	(0.016)	(0.014)	(0.014)	(0.004)	(0.004)	(0.003)
B. Dependent variable:	Labor org. per industrial worker 1910					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1910	0.079***	0.073***	0.073***	0.199**	0.205**	0.215***
	(0.013)	(0.017)	(0.017)	(0.080)	(0.080)	(0.073)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks×Market Access	No	No	Yes	No	No	Yes
Observations	2298	2298	2298	2298	2298	2298
F-statistic				15.87	19.51	20.73

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867-1908 on the labor organization per worker in 1910, rather than per capita. The denominator is calculated using the 1910 census. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.3
THE EFFECT OF EMIGRATION ON GENERAL STRIKE PARTICIPATION 1909

A. Dependent variable:	Emigration 1867–1908			Strikers 1909		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0638***	0.0621***	0.0630***	0.0019***	0.0021***	0.0020***
	(0.0165)	(0.0140)	(0.0141)	(0.0006)	(0.0006)	(0.0007)
B. Dependent variable:	**Strikers per capita 1909**					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1908	0.0095***	0.0080***	0.0081***	0.0301***	0.0330***	0.0319**
	(0.0024)	(0.0017)	(0.0017)	(0.0110)	(0.0121)	(0.0127)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2358	2358	2358	2358	2358	2358
F-statistic				14.96	19.78	19.88

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867-1908 on the strike participation per capita in the 1909 general strike. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.4
THE EFFECT OF EMIGRATION ON GENERAL STRIKE PARTICIPATION PER WORKER 1909

A. Dependent variable:	Emigration 1867–1908			Strikers per worker		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0638***	0.0621***	0.0630***	0.0130	0.0100	0.0105
	(0.0165)	(0.0140)	(0.0141)	(0.0093)	(0.0099)	(0.0103)
B. Dependent variable:	Strikers per industrial worker1909					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1908	0.1176***	0.0875***	0.0879***	0.2094	0.1693	0.1740
	(0.0344)	(0.0280)	(0.0288)	(0.1613)	(0.1711)	(0.1728)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2339	2339	2339	2339	2339	2339
F-statistic				16.13	19.91	20.66

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867-1908 on the strike participation per industrial worker in the 1909, rather than per capita. The denominator is calculated using the 1910 census. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.5
The Effect of Emigration on Welfare Expenditures 1918

A. Dependent variable:	Emigration 1867–1917			Exp. per capita 1918		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0637***	0.0647***	0.0656***	0.0665**	0.0626***	0.0630***
	(0.0158)	(0.0139)	(0.0138)	(0.0274)	(0.0223)	(0.0211)
B. Dependent variable:	Expenditures per capita 1918					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1917	0.1248	0.2241**	0.2240**	1.0487**	1.0565**	0.9964***
	(0.0969)	(0.0977)	(0.0985)	(0.5034)	(0.4382)	(0.3612)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2219	2219	2219	2219	2219	2219
F-statistic				13.83	15.23	16.35

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867-1917 on the welfare expenditures per capita in 1918. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.6
The Effect of Emigration on Welfare Expenditures 1919

A. Dependent variable:	Emigration 1867–1918			Exp. per capita 1919		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0617***	0.0577***	0.0612***	0.0686**	0.0643***	0.0685***
	(0.0170)	(0.0149)	(0.0155)	(0.0311)	(0.0213)	(0.0211)
B. Dependent variable:	Expenditures per capita 1919					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1918	0.0446	0.1195	0.1195	1.1086**	1.1118***	1.1163***
	(0.1044)	(0.0780)	(0.0781)	(0.5222)	(0.3471)	(0.3332)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2203	2203	2203	2203	2203	2203
F-statistic				13.20	14.98	15.64

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867-1918 on the welfare expenditures per capita in 1919. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.7
The Effect of Emigration on Political Institutions 1919

A. Dependent variable:	Emigration 1867–1918			Repr. democracy 1919		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0617***	0.0577***	0.0612***	0.0019	0.0023	0.0029*
	(0.0170)	(0.0149)	(0.0155)	(0.0016)	(0.0015)	(0.0015)
B. Dependent variable:	Transition to representative democracy by 1919					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1918	0.0066**	0.0098**	0.0099**	0.0301	0.0404*	0.0473**
	(0.0032)	(0.0044)	(0.0043)	(0.0253)	(0.0231)	(0.0221)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2221	2221	2221	2221	2221	2221
F-statistic				13.17	14.91	15.62

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867-1918 on voluntarily transitioning to representative democracy by 1919. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. A dummy for a municipality having more than 1500 inhabitants in 1918 is included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.8
THE EFFECT OF EMIGRATION ON POLITICAL INSTITUTIONS 1938

A. Dependent variable:	Emigration 1867–1918			Repr. democracy 1938		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0598***	0.0570***	0.0604***	0.0066	0.0062	0.0090**
	(0.0176)	(0.0149)	(0.0152)	(0.0046)	(0.0038)	(0.0044)
B. Dependent variable:	Transition to representative democracy by 1938					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1918	0.0145	0.0248**	0.0246**	0.1098	0.1085*	0.1487**
	(0.0106)	(0.0119)	(0.0115)	(0.0752)	(0.0572)	(0.0649)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2208	2208	2208	2208	2208	2208
F-statistic				11.52	14.74	15.82

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867-1918 on voluntarily transitioning to representative democracy by 1938. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.9
The Effect of Emigration on Contemporary Left-wing Voting

Dependent variable:	Left vote share 1998–2014					
	Reduced-form					
	Municipal elections			National elections		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0031	0.0046**	0.0051**	0.0027	0.0041*	0.0047**
	(0.0027)	(0.0021)	(0.0019)	(0.0029)	(0.0021)	(0.0018)
Dependent variable:	Left vote share 1998–2014					
	IV					
	Municipal elections			National elections		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1945	0.0502	0.0756*	0.0818**	0.0426	0.0672*	0.0744**
	(0.0473)	(0.0399)	(0.0368)	(0.0485)	(0.0369)	(0.0336)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2358	2358	2358	2354	2354	2354
F-statistic	18.45	24.00	24.94	18.46	24.03	25.02

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867-1945 on the average vote share of the Social Democratic and Socialist parties 1998-2014. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.10
THE EFFECT OF EMIGRATION ON OUTMIGRATION 1890

A. Dependent variable:	Emigration 1867–1890			Outmigrants		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0768***	0.0747***	0.0760***	-0.0108	-0.0149**	-0.0147**
	(0.0215)	(0.0180)	(0.0180)	(0.0083)	(0.0066)	(0.0060)
B. Dependent variable:	Outmigrants					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	-0.0667***	-0.0465**	-0.0465***	-0.1415	-0.2018***	-0.1947***
	(0.0198)	(0.0172)	(0.0168)	(0.0932)	(0.0676)	(0.0616)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2353	2353	2353	2353	2353	2353
F-statistic				13.00	16.48	17.56

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on log number of inhabitans living outside their birth municipality in 1890. in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.11
THE EFFECT OF EMIGRATION ON URBAN OUTMIGRATION 1890

A. Dependent variable:	Emigration 1867–1890			Urban migrants		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0768***	0.0747***	0.0760***	-0.0279	-0.0294*	-0.0262*
	(0.0215)	(0.0180)	(0.0180)	(0.0245)	(0.0168)	(0.0149)
B. Dependent variable:	**Urban migrants**					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	-0.1506***	-0.1309***	-0.1319***	-0.3655	-0.3976**	-0.3480**
	(0.0445)	(0.0318)	(0.0313)	(0.2925)	(0.1783)	(0.1459)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2353	2353	2353	2353	2353	2353
F-statistic				13.00	16.48	17.56

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on log number of inhabitants living in urban municipalities outside their birth municipality in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.12
The Effect of Emigration on Total Population 1890

A. Dependent variable:	Emigration 1867–1890			Population		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0768***	0.0747***	0.0760***	0.0046	0.0039	0.0045
	(0.0215)	(0.0180)	(0.0180)	(0.0031)	(0.0034)	(0.0031)
B. Dependent variable:	Population					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.0653***	0.0552***	0.0552***	0.0618	0.0539	0.0611
	(0.0147)	(0.0140)	(0.0140)	(0.0424)	(0.0504)	(0.0468)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2344	2344	2344	2344	2344	2344
F-statistic				13.14	17.01	18.03

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on log total population in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.13
THE EFFECT OF EMIGRATION ON INMIGRATION 1890

A. Dependent variable:	Emigration 1867–1890			Inmigrants		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0768***	0.0747***	0.0760***	0.0026	0.0025	0.0028
	(0.0215)	(0.0180)	(0.0180)	(0.0027)	(0.0036)	(0.0035)
B. Dependent variable:	Inmigrants					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.0551***	0.0432***	0.0432***	0.0351	0.0347	0.0383
	(0.0138)	(0.0127)	(0.0127)	(0.0389)	(0.0525)	(0.0498)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2344	2344	2344	2344	2344	2344
F-statistic				13.14	17.01	18.03

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on log number of inhabitants born outside of the municipality in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.14
THE EFFECT OF EMIGRATION ON FERTILITY 1890

A. Dependent variable:	Emigration 1867–1890			Children/woman		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0768***	0.0747***	0.0760***	0.0035**	0.0026**	0.0029***
	(0.0215)	(0.0180)	(0.0180)	(0.0014)	(0.0012)	(0.0009)
B. Dependent variable:	Children/woman					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.0086	0.0097**	0.0097**	0.0473**	0.0366**	0.0393***
	(0.0053)	(0.0044)	(0.0044)	(0.0207)	(0.0148)	(0.0130)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2344	2344	2344	2344	2344	2344
F-statistic				13.14	17.01	18.03

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the number of children aged 0–5 years per woman aged 15–50 years in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks × Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.15
The Effect of Emigration on Share Female Population 1890

A. Dependent variable:	Emigration 1867–1890			Female ratio		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0768***	0.0747***	0.0760***	0.0153	0.0276	0.0214
	(0.0215)	(0.0180)	(0.0180)	(0.0618)	(0.0598)	(0.0577)
B. Dependent variable:	Female ratio					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.2827***	0.1707*	0.1722*	0.2036	0.3848	0.2916
	(0.1013)	(0.0965)	(0.0960)	(0.8219)	(0.8487)	(0.7922)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2344	2344	2344	2344	2344	2344
F-statistic				13.14	17.01	18.03

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the share female population in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks × Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.16
THE EFFECT OF EMIGRATION ON THE SHARE UNMARRIED 1890

A. Dependent variable:	Emigration 1867–1890			Unmarried		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0768***	0.0747***	0.0760***	-0.0006	-0.0004	-0.0004
	(0.0215)	(0.0180)	(0.0180)	(0.0006)	(0.0006)	(0.0006)
B. Dependent variable:	Unmarried					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	-0.0023	-0.0037	-0.0037	-0.0086	-0.0049	-0.0049
	(0.0025)	(0.0022)	(0.0022)	(0.0077)	(0.0084)	(0.0080)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2344	2344	2344	2344	2344	2344
F-statistic				13.14	17.01	18.03

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the share unmarried among the adult population in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.17
THE EFFECT OF EMIGRATION ON AGE 1890

A. Dependent variable:	Emigration 1867–1890			Age		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0768***	0.0747***	0.0760***	-0.0592	-0.0443	-0.0542
	(0.0215)	(0.0180)	(0.0180)	(0.0530)	(0.0427)	(0.0360)
B. Dependent variable:	Age					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	-0.3404***	-0.3661***	-0.3640***	-0.7897	-0.6179	-0.7395*
	(0.1025)	(0.1041)	(0.1060)	(0.5924)	(0.5224)	(0.4331)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2344	2344	2344	2344	2344	2344
F-statistic				13.14	17.01	18.03

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the mean age in 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. $Shocks \times Market\ Access$ includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.18
THE EFFECT OF EMIGRATION ON AGE DISTRIBUTION 1890

1890 Census:	Age	25 percentile	50 perc.	75 perc.
	(1)	(2)	(3)	(4)
Emigration 1867–1890	-0.7395*	-0.7336***	-0.5078	-1.1605
	(0.4331)	(0.2377)	(0.6774)	(0.7485)
County fixed effects	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Shocks × Market Access	Yes	Yes	Yes	Yes
Observations	2344	2344	2344	2344
F-statistic	18.03	18.03	18.03	18.03
Mean dep. var.	29.74	10.90	25.39	46.74

Notes: IV regressions. This table displays the effects of log emigration 1867–1890 on age measured in the decennial census 1890. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality never having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.19
The Effect of Emigration on Horses per Area 1910

A. Dependent variable:	Emigration 1867–1890			Horses per area		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0640***	0.0624***	0.0634***	0.0007	0.0022**	0.0021**
	(0.0163)	(0.0138)	(0.0140)	(0.0013)	(0.0010)	(0.0009)
B. Dependent variable:	Horses per area					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.0075*	0.0047**	0.0047**	0.0101	0.0330**	0.0315**
	(0.0038)	(0.0022)	(0.0023)	(0.0184)	(0.0141)	(0.0131)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2070	2070	2070	2070	2070	2070
F-statistic				18.41	24.06	24.37

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the number of horses per area. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.20
THE EFFECT OF EMIGRATION ON FARM WORKERS 1910

A. Dependent variable:	Emigration 1867–1890			Farm workers		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0640***	0.0624***	0.0634***	-0.0079	-0.0175***	-0.0182***
	(0.0163)	(0.0138)	(0.0140)	(0.0052)	(0.0061)	(0.0063)
B. Dependent variable:	Farm workers					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	-0.0624***	-0.0229	-0.0230	-0.1257	-0.2925**	-0.2978**
	(0.0198)	(0.0184)	(0.0183)	(0.0895)	(0.1277)	(0.1275)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2341	2341	2341	2341	2341	2341
F-statistic				16.82	20.50	21.49

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the log number of farm workers. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.21
The Effect of Emigration on Industrial workers 1910

A. Dependent variable:	Emigration 1867–1890			Industrial workers		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0640***	0.0624***	0.0634***	0.0177	0.0206	0.0246
	(0.0163)	(0.0138)	(0.0140)	(0.0179)	(0.0191)	(0.0166)
B. Dependent variable:	Industrial workers					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.2974***	0.2596***	0.2585***	0.2831	0.3443	0.4033
	(0.0684)	(0.0587)	(0.0583)	(0.3164)	(0.3424)	(0.3069)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2341	2341	2341	2341	2341	2341
F-statistic				16.82	20.50	21.49

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the log number of industrial workers. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

TABLE C.22
THE EFFECT OF EMIGRATION ON FIRMS 1910

A. Dependent variable:	Emigration 1867–1890			Any firm		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0640***	0.0624***	0.0634***	0.0101*	0.0099**	0.0103**
	(0.0163)	(0.0138)	(0.0140)	(0.0050)	(0.0041)	(0.0044)
B. Dependent variable:	Any firm					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.0963***	0.0810***	0.0810***	0.1586*	0.1580**	0.1627**
	(0.0139)	(0.0118)	(0.0119)	(0.0827)	(0.0702)	(0.0681)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2359	2359	2359	2359	2359	2359
F-statistic				15.48	20.33	20.56

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on an indicator variable equal to one if there is a corporation. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.23
The Effect of Emigration on Labor Movement Participation per Industrial Workers 1910

A. Dependent variable:	Emigration 1867–1890			Labor org. per industrial worker		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0640***	0.0624***	0.0634***	0.0139***	0.0134***	0.0149***
	(0.0163)	(0.0138)	(0.0140)	(0.0040)	(0.0037)	(0.0035)
B. Dependent variable:	Labor org. per industrial worker					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.0812***	0.0698***	0.0697***	0.2226***	0.2236***	0.2440***
	(0.0202)	(0.0203)	(0.0201)	(0.0760)	(0.0734)	(0.0696)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2339	2339	2339	2339	2339	2339
F-statistic				16.77	20.48	21.46

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the number of labor movement participants per industrial worker. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.

Table C.24
The Effect of Emigration on Strike Participation per Industrial Workers 1910

A. Dependent variable:	Emigration 1867–1890			Striker per industrial worker		
	First stage			Reduced form		
	(1)	(2)	(3)	(4)	(5)	(6)
Shocks × Proximity to port	0.0640***	0.0624***	0.0634***	0.0175**	0.0174**	0.0178**
	(0.0163)	(0.0138)	(0.0140)	(0.0074)	(0.0072)	(0.0072)
B. Dependent variable:	Strikers per industrial worker					
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Emigration 1867–1890	0.0550**	0.0364	0.0367	0.2803**	0.2921**	0.2911**
	(0.0267)	(0.0245)	(0.0247)	(0.1294)	(0.1270)	(0.1213)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
Shocks × Market Access	No	No	Yes	No	No	Yes
Observations	2339	2339	2339	2339	2339	2339
F-statistic				16.77	20.48	21.46

Notes: OLS and IV regressions. This table displays the effects of log emigration 1867–1890 on the number of strikers per industrial worker. The excluded instrument is the interaction between the number of growing season frost shocks 1864-1867 and proximity to the nearest emigration port. Proximity is defined as minus the log of distance. All regressions include county fixed effects and control for the log of the population at baseline. Dummies for a municipality every having had more than 1500 inhabitants in prior years are included. Additional control variables are growing season frost shocks 1864-1867, proximity to the nearest emigration port, nearest town, nearest trade port, nearest weather station and Stockholm, log area, latitude, longitude, as well as an urban indicator and a set of indicators for high soil quality for the production of barley, oats, wheat, dairy and timber. *Shocks* × *Market Access* includes the interaction between growing season frost shocks and proximity to the nearest town and trade port, respectively. The F-statistic refers to the excluded instrument. Standard errors are clustered at the weather station level. *** - $p < 0.01$, ** - $p < 0.05$, * - $p < 0.1$.