DISCRIMINATION, MIGRATION, AND ECONOMIC OUTCOMES: EVIDENCE FROM WORLD WAR I

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Abstract—This paper examines the individual and aggregate costs of ethnic discrimination. Studying Germans in the United States during World War I, an event that abruptly downgraded their previously high social standing, we show that anti-German sentiment was strongly associated with counties' casualties in the war, leading to subsequent outmigration of Germans. Such relocation to evade discrimination was costly for German workers. However, counties with larger outflows of Germans, who tended to be well-trained manufacturing workers, incurred economic costs too, including a drop in average annual manufacturing wages of 0.6% to 2.2%. This effect lasted at least until 1930.

I. Introduction

SINCE Becker's (1957) seminal book on the economics of discrimination, a substantial literature has studied the effects of discrimination on individuals of the affected group.[1] While the effects at the individual level are better understood, a less explored question is whether discrimination against a certain group also generates costs for the communities in which this discrimination occurs. Such costs can arise theoretically in labor markets with frictions that are amplified by discrimination (Lang et al., 2005), or in practice via reduced innovation (Cook, 2014) and deadweight losses paid by workers to avoid workplace interactions with the discriminated group (Heedegaard & Tyran, 2018).[2] A major difficulty in studying this question is to differentiate between taste-based and statistical discrimination (Phelps, 1972), and to find plausibly exogenous variation in discriminatory behavior.

To this end, a recent literature starting with Moser (2012) has focused on Germans in the United States during World War I. Germans used to be the largest, most economically successful and socially accepted immigrant group (Higham, 1998). The war temporarily but substantially turned this previous acceptance into stark discrimination. Prior work on this unexpected shift in taste-based discrimination has mainly focused on the Germans themselves and their assimilation efforts in particular (e.g., Moser, 2012; Fouka, 2019, 2020). In this paper, we exploit this sudden shift in attitudes to causally estimate the costs to both Germans and the communities where anti-German sentiment soared during the war. We show that relocation, as opposed to assimilation, was a frequent but individually costly reaction of Germans to high levels of discrimination. We also provide evidence that the communities that saw increased levels of discrimination paid a price as well. Germans tended to be well-trained manufacturing workers before the war.[3] With these specialized workers leaving to evade discriminatory pressure, the costs of a few years of intense anti-German sentiment led to a decrease in average manufacturing wages in those counties. The wage decline was most pronounced immediately after the war and could still be measured in 1930 before fading out.

We first document a strong link between local anti-German sentiment and World War I casualties at the county level. We digitized and geo-located information for almost 80,000 soldiers who died in the war. With newspapers reporting the daily casualty lists and highlighting losses in the local communities, casualties increased animosity towards Germans in precisely those places. We formalize this idea in a regression framework by estimating a significant positive correlation between the WWI casualty rate and more noisy measures of anti-German sentiment that we collected from digitized newspapers for the war years. Counties with higher World War I casualty rates had a higher share of newspaper pages calling Germans *enemies* or *huns*,[4] or that reported tarrings and featherings of Germans in 1917–1918.[5]

Using both county-level and linked individual Census data, we then provide evidence that German-born

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[1] This includes discrimination in labor markets (Bertrand et al., 2004; Charles & Guryan, 2008; Heedegaard & Tyran, 2018), education (Card & Krueger, 1992; Lang & Manove, 2011), health care (Alsan & Wanamaker, 2018; Alsan et al., 2019), and others to provide just some examples. For reviews see Lang and Lehmann (2012) and Neumark (2018).

[2] At a national level, other studies have calibrated macroeconomic models to estimate the overall output costs of discrimination. They find that discrimination against women or African Americans reduced output in the long-run (Cavalcanti & Tavares, 2016), for example, via the misallocation of talent (Hsieh et al., 2019).

[3] According to the 1910 Census, only 15.7% of the labor force worked in manufacturing, a sector which accounted for 42% of national output (Kendrick, 1961). 23.6% of male German-born labor force participants worked in manufacturing, and 37.1% of them worked in operatives and craftsmen occupations. This compares to 26.5% of non-Germans in operatives and craftsmen jobs and 15.4% in manufacturing.

[4] The term *huns* was used as ethnically-loaded and derogatory term for Germans (similar to *kraut* during World War II) based on the *Hun speech* by Emperor Wilhelm II on July 27, 1900.

[5] Both violent and nonviolent forms of discrimination against Germans were common during the war years but spiked particularly once the United States officially joined the conflict in April 1917 (Lübke, 1974).

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individuals moved away from counties in the top part of the casualty rate distribution while counties in the bottom part of the distribution saw an increase in their German population share. A contributing factor was salience as the outflow of Germans was strongest in the Midwest, where Germans historically had been the largest immigrant group. The inflow was most pronounced in the South and New England region, but was also visible in other parts of the country. The relationship between war casualties and Germans' migration flows existed from before to after the war, but not in prior decades. Accident and disease deaths abroad, which were less likely to be directly attributed to Germans, had no effect on German outflows. Wartime relocation patterns of other immigrant groups, such as Swedes or Italians, were unaffected by WWI casualties. We are the first to document the internal migration of Germans in response to discrimination as previous work mainly focused on assimilation, or lack thereof, on part of the Germans (e.g., Fouka, 2019, 2020).

The short-run costs to Germans who moved due to the casualty shock were substantial. Linked Census data from the 1910 and 1920 full count Censuses for almost 300,000 German-born men show that movers were willing to relocate by 457 miles (735 km) on average to leave counties with higher levels of discrimination.[6] In 1920, they were more likely to have left the Midwest region as well as their previous manufacturing occupations in favor of jobs in the agricultural sector. The occupational change toward agriculture occurred because the German-born movers mostly went to rural areas with less manufacturing activity. Living in a more rural setting was a way to reduce the contact with American workers, employers, and customers, and thus the sting of discrimination. We find that German movers resisted naturalization at higher rates despite being more likely to Americanize their surnames. This suggests a complementarity between relocation and assimilation.

At the aggregate level, counties that experienced anti-German sentiment-induced outflows of German workers paid a price as well. Using county-level Census data from 1900 to 1940 in event study type regressions, we estimate that counties that experienced an average outflow of Germans between 1910 and 1920 saw a reduction in their mean annual manufacturing earnings of between 0.6% to 2.2%.[7] The results are robust to the inclusion of prewar county characteristics such as population size, the German population share in 1910, the share of manufacturing employment, the male-to-female ratio, and the urbanization rate. These counties also experienced a drop in manufacturing employment and productivity, which were mediating factors through which German outflows affected manufacturing wages.

To test whether this effect is causal, we employ an instrumental variables strategy and instrument the outflow of Germans from 1910 to 1920 with an indicator for the top quintile of the World War I casualty rate. We rule out a direct labor market effect of war casualties, which would be a violation of the exclusion restriction, by estimating the regressions not only with prewar county characteristics but also with time-varying controls for total population and male population size.[8] This blocks the direct labor market effects that these casualties might have had through their impact on labor supply.[9] The results confirm the baseline estimates. The negative wage effect was strongest in 1920 and then slowly faded out until wages returned to their prewar level in 1940. The costs of a few years of intense anti-German sentiment were therefore reflected in a reduction in average wages that lasted for more than a decade.

Lastly, we mirror the previous linked Census data exercise by examining the effect of German outflows on American-born workers who remained in counties with higher exits of Germans between 1910 and 1920. We find that such outflows were associated with a drop in Americans' occupational income scores and their probability of being employed in craftsmen jobs as opposed to low-skilled laborer positions. Unlike the county-level regressions, which are based on the manufacturing sector only, the linked individual data results provide evidence that the negative effect from losing skilled German workers spilled over to other sectors and thus was not just confined to manufacturing alone.

This paper is the first to quantify the direct effects of the war on the relocation decisions of Germans in the United States, as well as on the economic outcomes of the local communities where anti-German discrimination occurred.[10] Previous work has used this sudden but temporary taste-based discrimination shock to study assimilation (Fouka, 2019, 2020) or employment outcomes (Moser, 2012), innovation and patenting (Moser & Voena, 2012; Baten et al., 2017), and spending on urban schools (Schmick & Shertzer, 2020). We add to this literature by documenting a strong association of anti-German sentiment with World War I casualties at the county level. Using this measure, we provide evidence that Germans' decision to migrate to avoid discrimination substantially affected not only those who moved but also the Americans who were working in the manufacturing

[6] This is approximately the straight line distance from Pittsburgh in Pennsylvania, to Boston, Massachusetts (480 mi); or from Milwaukee in Wisconsin, to Nashville, Tennessee (479 mi). The finding is robust different record linking methods (Abramitzky et al., 2014, 2021).

[7] We test for the effect on counties that received Germans and find a positive effect. This suggests that German workers possessed transferable industry-specific human capital. Our results indicate that the loss of this human capital was associated with a drop in manufacturing productivity in sending counties.

[8] We rule out selection into higher casualty rates based on wealth, skill, racial and ethnic composition, as well as spatial autocorrelation. The average number of casualties was 34 soldiers in the top quintile and thus was not sufficiently high to disturb the labor market itself. Casualties increased discriminatory pressure via newspaper reporting and hence drove the disproportional outflow of Germans from these counties.

[9] It should be noted that the 110,000 fallen soldiers made up only a small part of the overall population of 100 million in 1910. In fact, our results hold with and without such time-varying population controls.

[10] Joe Price, Kerwin Charles, Tanner Eastmond, and Daniel Rees are currently working on a similar project that studies the discrimination against Germans and their long-run outcomes in terms of migration and intergenerational mobility.

sector in counties that saw higher levels of discriminatory pressure. Our setting provides a rare opportunity in which the costs of discrimination can be studied for both the affected group as well as for the sending communities using a natural experiment.

The negative impact on the sending communities compares to recent work on forced migration which has mainly focused on state mandated expulsions, one of the most extreme types of discrimination (see e.g., Pascali, 2016; Testa, 2021; Becker et al., 2020). The survey by Becker and Ferrara (2019) highlights that forced migration is well studied with respect to its effects on the migrants and the receiving economies. We provide new evidence for discrimination potentially harming local economies through the channel of outmigration of a relatively skilled group in response to ethnic animus. Even though the discriminatory shock lasted for only a few years, the economic cost of discrimination to those communities lasted for more than a decade.

More broadly, we also contribute to our knowledge of the intangible benefits of certain groups to society that only become tangible once said groups disappear. This includes benefits arising from different factors such as birth place diversity and its positive impact on economic prosperity (Alesina et al., 2016), the returns from specific skills within a group that benefit the broader society via the provision of innovation (Cook, 2014), education (Akbulut-Yuksel & Yuksel, 2015), or talent (Hsieh et al., 2019). The associated long-run costs of losing those benefits because of the disappearance of such groups can be substantial (see, e.g., Acemoglu et al., 2011; D'Acunto et al., 2019; Lee et al., 2022), and it can alter how those groups are treated subsequently (Feigenbaum et al., 2019). We complement this literature by showing that discrimination against a previously well-integrated group can create significant costs for both the discriminated group and their former host societies even when such discrimination is temporary.

II. Historical Background and Related Literature

Germans were among the largest immigrant groups in the United States until and including the early 20th century.[11] They were also known for their economic success. Higham (1998) cites a survey of businessmen from 1908, who ranked immigrant nationalities by traits. They scored Germans above English immigrants and even attributed them with more positive traits than Americans in some respects. Abramitzky et al. (2014) find that Germans had the lowest earnings penalty relative to Americans than any other immigrant group. Germans were much more similar to Americans in terms of business ownership rates, as well as earnings and education scores, than Swedish and Italian immigrants. We report summary statistics for these groups in table A1 using the 1910 full-count population Census.

[11] In the 1910 Census, the share of German-born and second generation Germans among the total population in the United States was over 10%.

Germans were known for being hardworking and economically successful, but also for tending to their own language and customs (Higham, 1998). Communities with larger German populations even offered bilingual education (Fouka, 2020). Other examples include the gymnastics (*Turnvereine*) and shooting (*Schützenvereine*) societies, German language newspapers, and German churches (Lübke, 1974). German culture left a permanent mark on the landscape of the United States. Historically, Germans settled in the Midwest and many towns had German names such as Berlin, Wisconsin, or Bremen, Indiana. For decades they had managed a balance between their old and new home, which is reflected in the saying: "*Germania my mother, Columbia my bride*" (Lübke, 1974, p. 48).

Attitudes changed drastically with the onset of World War I (1914–1918). Germans and German-Americans experienced animosity from the beginning of the war, which increased when some German churches and societies tried to raise funds for the German war effort or lobbied for the United States to remain neutral (Lübke, 1999). The peak of anti-Germanism was reached after the United States entered the war in 1917. A key channel through which anti-German sentiment was spread were newspapers since the radio did not diffuse until the 1920s. Figure 1 provides examples of anti-German slurs in the news.[12] Figure C1 plots the share of newspaper pages including the words *enemy* or *huns*, the derogatory term for Germans during WWI, among pages mentioning *Germans*. While the share of pages mentioning the word *enemy* rises with the start of the war, the derogatory *huns* term spikes in 1917 when the United States entered the war.

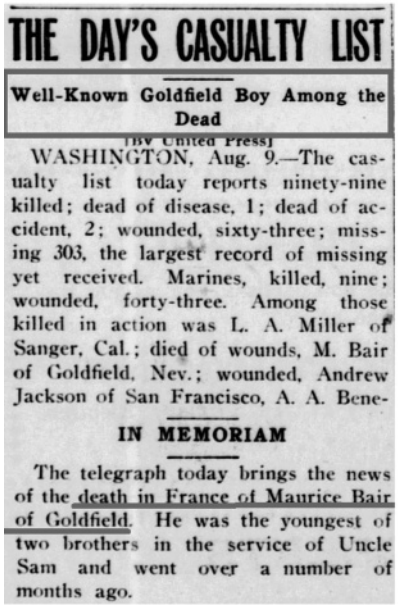
The level and extent of anti-Germanism reached into all parts of life. A large number of schools prohibited the teaching of the German language (Lleras-Muney & Shertzer, 2015).[13] Moser (2012) finds that the share of operas by German composers fell from 43% to less than 7%, the use of Otto or Wilhelm as first names for newborn children declined, and applicants to the NYSE with a German sounding surname were twice as likely to be rejected during the war years. Sauerkraut consumption fell by 75% from 1914 to 1918 and hamburgers were renamed *liberty steaks* (Moser, 2012). Substantial amounts of school resources were reallocated in response to anti-German hysteria (Schmick & Shertzer, 2020). In addition to economic and social discrimination, Germans had to fear physical harm as well. Robert Prager was lynched on April 5, 1918, in Collinsville, Illinois, and beatings or tarring and feathering were other more common forms of assault (Lübke, 1974).

[12] Anti-German posters and prints were other common forms of wartime discrimination, as seen in figure A1.

[13] In areas where language prohibition occurred, Fouka (2020) finds that the children of German immigrants reacted to this effort to force assimilation by volunteering less for military service during World War II, marrying more within their own group, and giving their children typical German names more often.

FIGURE 1.—ANTI-GERMAN SENTIMENT AND WAR CASUALTIES IN NEWSPAPERS

(a) Local Casualty Reports



THE DAY'S CASUALTY LIST

Well-Known Goldfield Boy Among the Dead

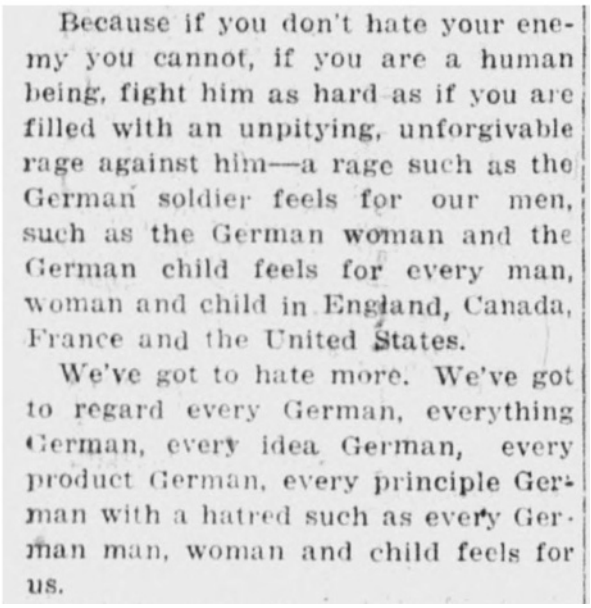
[By United Press]

WASHINGTON, Aug. 9.—The casualty list today reports ninety-nine killed; dead of disease, 1; dead of accident, 2; wounded, sixty-three; missing 303, the largest record of missing yet received. Marines, killed, nine; wounded, forty-three. Among those killed in action was L. A. Miller of Sanger, Cal.; died of wounds, M. Bair of Goldfield, Nev.; wounded, Andrew Jackson of San Francisco, A. A. Bene-

IN MEMORIAM

The telegraph today brings the news of the death in France of Maurice Bair of Goldfield. He was the youngest of two brothers in the service of Uncle Sam and went over a number of months ago.

(b) Anti-German Sentiment



Because if you don't hate your enemy you cannot, if you are a human being, fight him as hard as if you are filled with an unpitying, unforgivable rage against him—a rage such as the German soldier feels for our men, such as the German woman and the German child feels for every man, woman and child in England, Canada, France and the United States.

We've got to hate more. We've got to regard every German, everything German, every idea German, every product German, every principle German with a hatred such as every German man, woman and child feels for us.

Figure a shows an example of publicly communicated anti-German sentiment in the *Albuquerque Morning Journal* in the paper on May 13, 1918. Highlights added by the authors. Panel b displays reporting on the day's casualty list and the highlighting of local war deaths in the *Carson City Daily* paper of August 9, 1918.

German immigrants responded to discrimination by assimilating in various ways. According to Fouka (2019), many Germans anglicized their names and petitioned for naturalization, especially in states with higher incidences of violence against Germans. German parents who had been in the United States longer were more likely to give their children English names.[14] Some Germans sought to demonstrate their loyalty to the United States by volunteering for military service (Mazumder, 2017). Another less well-known response to anti-German attitudes was to move to a more receptive location, which is a focus of our paper. Between 1910 and 1920, Germans migrated to new locations within the United States at a significantly higher rate than any other group. Panel (a) of figure 2 maps the change in the share of German population using county-level Census data.[15] The largest outflows occurred in the Midwest where Germans were a large and salient immigrant group. With the war ending the Age of Mass Migration (Abramitzky et al., 2014), very few Germans left the United States and we present evidence that they tended to relocate to areas with lower anti-German sentiment within the United States.

A major question we address in this paper is the extent to which German migration flows affected economic outcomes not only for the moving Germans, but also for the communities that these Germans left due to the increased discriminatory pressure. In a recent survey, Becker and Ferrara (2019) provide an overview of the few existing examples in which forced migration led to lasting effects on the economies of the sending locations. The expulsion of 3 million Germans from the Czech borderlands after World War II negatively affected economic growth in these areas by eroding property rights and reducing agglomeration economies (Testa, 2021). Pascali (2016) finds that Italian municipalities that expelled their Jewish population during the 15th and 16th centuries have lower incomes and a less developed banking system today. Likewise, Acemoglu et al. (2011) study the long-run effects of the Holocaust and mass murder of Jews during World War II in Russia on economic and political outcomes. They attribute the negative impacts on the permanent change in social structure.

A. *Theoretical Considerations*

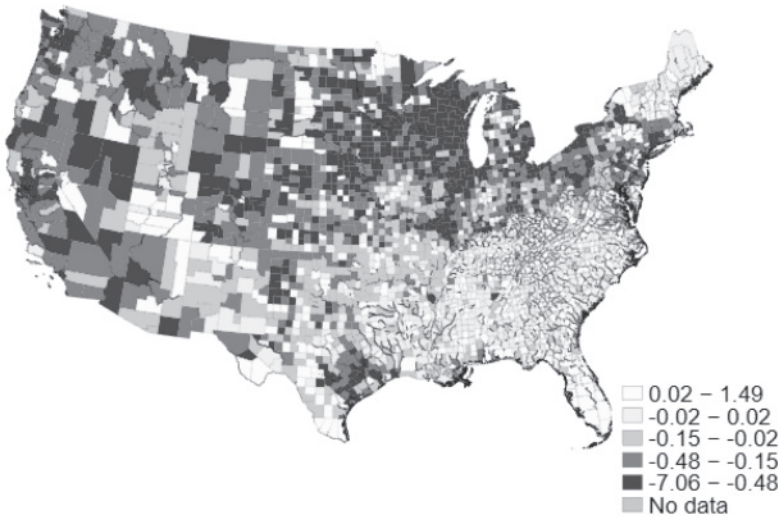
How would an outflow of German workers affect the wages of Americans? Neoclassical labor market theory would suggest that a reduction in labor supply should raise the wages of the remaining workers. However, this assumes that German and American workers are homogenous and substitutable. If they are complements, however, the outflow would lead to a reduction in earnings for the remaining workers as they became less productive. We provide empirical evidence for the ethnic specialization of German workers and their complementarity with Americans. To make this point, it is important to first know what industries employed Germans most frequently. The Committee on Immigration (1911) reported that Germans in the late 19th century were

[14] Biavaschi et al. (2017) provide evidence of positive payoffs for name Americanization by migrants in the early 20th century.

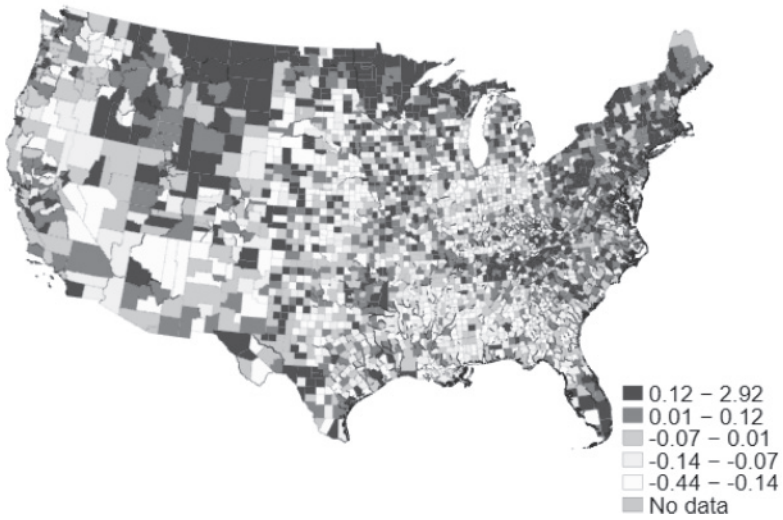
[15] The shares in the map are net of both total population changes from 1910 to 1920 and the prewar share of Germans. Figure A2 does not adjust for the prewar share of Germans in 1910, which does not change these patterns.

FIGURE 2.—SPATIAL DISTRIBUTION OF GERMAN POPULATION FLOWS AND THE WWI CASUALTY RATE

(a) Change % German-born 1910-20



(b) WWI Casualty Rate



Panel a maps the quintiles of the change in the county-level share of the German-born population from 1910 to 1920. Panel b maps the county-level WWI casualty rate which is defined as the total number of WWI deaths over the male population of service eligible age in 1910 times one hundred. Total population changes from 1910 to 1920 as well as the baseline share of German population in 1910 have been controlled out.

"the leading race of old immigration" (Part 23, pp. 17–73) in a variety of industries, including beverages, furniture production, meat packing, clothing, leather work, and wool textiles, and their sons often continued in the same skilled jobs. Figure A3 plots the share of German workers by industry sub-group within the manufacturing sector to confirm these patterns in the data. Figure A4 plots the change in the share of German workers from 1910 to 1920, and in the share of German workers in skilled positions, by manufacturing industry sub-groups. Industries with the highest prewar shares of German workers were also the ones that saw the largest outflows of these workers from before to after the war.

To test this empirically, we offer two exercises. First, when regressing the 1910 log occupational income scores of American workers on the log number of Germans in 1880 by county, skill, and industry group, there is a strong positive correlation between the two, especially in sectors with particularly high concentrations of Germans, such as the beverage industry. The results are reported in table A2. While this is not causal, it still suggests some benefits of being employed in jobs, sectors, and areas that had historically higher employment of German workers. Losing those workers would then depress American's wages if they are complements. Second, we reinforce this point by following

Boustan (2009) and estimate the elasticity of substitution between American and German workers, as well as between American and Italian and Swedish workers, in appendix B.1. Table B1 reports the results from this exercise. We reject perfect substitutability between German and American workers. We also find that Germans were least substitutable for American workers relative to Italians and Swedes. Given these patterns of ethnic specialization in industries that subsequently saw the largest outflow of Germans after the war, as well as the complementarity between German and American labor, we would expect any wage gains from reduced labor supply to be outweighed by the reduction in productivity following the outmigration of German workers.

III. WWI Casualties, Discrimination, and Patterns of German Migration

A. War Casualties and Anti-German Sentiment in the News

To study the causal impact of discrimination on the German migration response and economic outcomes at the local level, we need a measure of the discrimination that German immigrants were exposed to and a driving source of variation in that measure that is arguably exogenous. We propose measures of anti-German sentiment based on text from 3.2 million newspaper pages which we collected from *Chronicling America* and *newspapers.com* for the war years. In particular, we extracted all pages that mentioned Germans in any context and then calculated the share of pages that mentioned Germans as *enemies*, used the derogatory term *huns*, or reported tarring and feathering of Germans. The term *enemies* could merely reflect war reporting. The use of the term *huns* in print, however, suggests that both the newspaper staff and the readers found it acceptable to use a derogatory, anti-German slur in a public manner.

A plausibly exogenous force that influenced local anti-German attitudes during World War I was the extent to which members of the local population became casualties in battles against the German Empire during the War.[16] Newspapers were the primary source of information because radios did not diffuse until the 1920s. They were instrumental in spreading anti-German slurs as well as information on war casualties abroad for which they would highlight fallen soldiers from the local communities. Figure 1 provides an example of such a daily report on casualties abroad that highlights the death of a local soldier in panel a, as well as an example of anti-German slurs in panel b. Notice that these newspaper databases do not contain the universe of all articles. The main determinant of being in the newspaper sample is population size, which we control for in our regressions. We discuss issues of selectivity in appendix C which also provides a more detailed overview of the newspaper data.

We collected information on WWI casualties from Crowder (1920), which includes almost 80,000 of the 110,000 fallen soldiers. While there are around 30,000 missing deaths, we show in appendix B.2 that the missingness is uncorrelated with observable county characteristics as well as with the presence and size of the prewar German population.[17] We validate this by collecting additional casualty data from twelve states that compiled their own casualty records after the war independently of the centrally collected register by Crowder (1920). The casualty data are described in depth in appendix D.

The relationship between anti-German sentiment and WWI casualties can be estimated by the following regression equation,

$$D_c = \alpha_s + \phi \text{WWI Casualty Rate}_c + X_c'\gamma + \nu_c, \quad (1)$$

where D_c is one of three measures of anti-German animus: (i) the percentage of newspaper pages in county c mentioning Germans as *enemies* out of all pages mentioning Germans in any context in 1917 and 1918, that is, the war years with United States involvement, (ii) the percentage mentioning Germans as *huns*, and (iii) the percentage reporting tarring and feathering of Germans. The regression includes state fixed effects α_s and prewar controls X_c that are measured at the county level in 1910, such as the percentage of German-born individuals, population size, male-to-female ratio, the percentage of employment in manufacturing, and percent urban. Also included are the draft rate and the total number of pages published in the different counties. The denominator of the casualty and draft rate is the number of men aged 18 to 45 during the war years based on the 1910 Census. The distributions of the casualty and draft rate are plotted in figure A5. While the distribution of the casualty rate has a long right tail, we provide robustness checks later to show that our results do not depend on functional form assumptions.[18]

The results from this correlation exercise are reported in table 1. A 1 percentage point increase in the WWI casualty rate is associated with a 5.3 percentage points increase in the share of pages mentioning Germans as *enemies*, a 3.4 percentage points increase in the share of pages mentioning them as *huns*, and a 0.2 percentage point increase in reported tarrings and featherings of Germans. Around one-third of counties in our sample had at least one newspaper outlet

[16] Recent work has used war deaths as exogenous shocks in different contexts such as their effect on marriage markets in France after WWI (Abramitzky et al., 2011; Boehnke & Gay, 2020) or on labor market outcomes of Black workers in the United States after WWII (Ferrara, 2022), among others.

[17] Figure B1 reports scatter and binned scatter plots that compare the two casualty data sources, and figure B2 plots the coefficients from regressing the difference between the two sources on prewar county characteristics.

[18] The average casualty rate in the bottom quintile corresponds to six fallen soldiers whereas in the top quintile this is 34 soldiers. For a total duration of 20 months of United States involvement in the war, the average county in the bottom quintile would therefore experience a casualty report involving one of its own soldiers once every three months while in the top quintile such a news report would appear almost twice per month on average, assuming a uniform distribution of casualties over time as an approximation.

TABLE 1.—RELATIONSHIP BETWEEN WWI CASUALTIES AND ANTI-GERMAN SENTIMENT IN NEWSPAPERS

	Counties with newspaper seat			Plus neighboring counties		
	Enemies (1)	Huns (2)	Tar and feather (3)	Enemies (4)	Huns (5)	Tar and feather (6)
WWI casualty rate	0.053*	0.034*	0.002**	0.049*	0.031*	0.002**
	(0.030)	(0.019)	(0.001)	(0.029)	(0.018)	(0.001)
Outcome mean	0.372	0.191	0.003	0.372	0.191	0.003
Observations	769	769	769	1,469	1,469	1,469
Adj. R^2	0.112	0.104	0.086	0.137	0.127	0.111

Cross-sectional county-level regressions of newspaper based anti-German sentiment measures on the WWI casualty rate. Outcomes express the share of pages mentioning Germans as enemy or huns or that report tarring and feathering relative to all pages mentioning Germans in any context during the war years in county *c*. Newspaper outlets are geolocated at the county level. Columns 1–3 report results using only counties that had a newspaper outlet with available newspaper information. Columns 4–6 add neighboring counties to the sample as approximation for the local media market. Controls include the WWI draft rate, prewar measures of population size, share of Germans, male-to-female ratio, share of manufacturing employment, and urbanization rate, as well as state fixed effects. Robust standard errors in parentheses. Significance levels are denoted by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

in *Chronicling America* or *newspapers.com* that recorded at least one published page during 1917 and 1918. At the time, the majority of newspapers circulated locally within the county of their headquarter or in the neighboring counties (Gentzkow et al., 2014). In columns 4 to 6, we assign the outcome values of counties with newspaper outlets to their neighboring counties as proxy for the relevant media market and repeat the regressions from columns 1 to 3, which leaves results unchanged.[19] In a placebo regression in table C1, we use the disease and accident casualty rate, which is less likely to be related to anti-German sentiment as these deaths were unlikely attributed to fighting the Germans.

While newspaper-based information on anti-German sentiment is a more direct measure of potential discrimination, we do not have full newspaper data coverage for all our counties. Given the strong relationship between war casualties and anti-German sentiment in table 1, and the availability of casualty rates for every county, we use the WWI casualty rate as measure for the shift in anti-German sentiment for the remainder of the paper.

B. War Casualties and German Migration Patterns

Data patterns. With anti-German sentiment peaking during 1917/1918, Germans had two options. First, they could attempt to assimilate and demonstrate their loyalty to America as argued by Fouka (2019). The alternative was relocation. The war severely restricted cross-Atlantic migration and also made a return to the German Empire unattractive, therefore migrating Germans were most likely to relocate to other counties in the United States. Panel a of figure 2 maps the change in the German-born population from 1910 to 1920 across U.S. counties. The German share of the population fell the most in the Midwest where Germans had been a large, salient group.

This is also the area where discrimination was most pronounced: "The mid-western state councils, in particular, got a notorious reputation for patriotic vigilantism […]. Most of this coercion was directed at the German-American communities" (Breen, 1984, p. 79). Hegi (2005) describes the case of Fred Tenekheig in Audubon, Iowa, who got dragged across the public square with a rope around his neck by parents of American soldiers. He was then forced to leave the town with his family a few days later. Hegi (2005) also discusses the much lower degree of violence against Germans in Texas.[20] Potential reasons for this are the rural character of the South at the time as well as relatively little exposure to German immigrants in general, making it harder to identify their accents or names.

A striking geographic relationship between WWI casualty rates and changes in the German population share from 1910 to 1920 can be seen in the two maps in figure 2. This relationship is unlikely to have been driven by other county characteristics. To provide evidence for this, we estimate a standard OLS model and a LASSO selection model to determine which observables from the 1910 Census were most likely to have a statistically significant relationships with the casualty rate during World War I.[21] We consider not only the WWI casualty rate as an outcome but also an indicator that equals one for counties in the top quintile of the casualty rate distribution, which is a variable that we pay closer attention to in the following parts of this paper. The OLS regression includes variables for which we had a prior that they might be possible determinants of the WWI casualty rate. This includes demographic variables, characteristics of the manufacturing and agricultural sectors, and geographic variables. The LASSO discards our priors and selects from

[19]The newspaper data are described in detail in appendix C.1. Appendix C.2 provides additional information on the characteristics of newspaper counties in table C2 and figure C2, as well as further robustness checks with respect to circulation, volume, and price of daily newspapers which are reported in table C3.

[20]Figure C3 plots the share of reported tarrings and featherings in newspapers across casualty quintiles in the South and non-South, which shows a substantially lower level in the South except for the top quintile. These are extreme events, hence the magnitudes are small but the figure is informative of trends in overall anti-German violence if other forms of violent acts, such as beatings or assaults, follow the same pattern.

[21]All variables were standardized by population size. The LASSO regression then solves the problem $\arg\min_{\beta} \sum_{i=1}^{N}(y_i - X'\beta)^2 + \lambda \sum_{j=1}^{p} |\beta_j|$ to select the most significant regressors while shrinking unimportant ones towards zero via the regularized penalization term that is added to the standard least squares minimization problem.

all variables in the 1910 Census.[22] The correlates with the strongest relationships are ranked by their respective coefficients' t-statistic from highest to lowest and are visualized in figure A6.

In the OLS results, the only statistically significant coefficients are the share of the illiterate population and farms per capita. The effects are small with a one standard deviation increase in either of the two variables reducing the WWI casualty rate by 0.01 percentage points. We find no significant correlates for the top casualty rate quintile and also the LASSO does not find any statistically significant predictors for the casualty rate or top quintile of the casualty rate. Note that this is mainly a correlational exercise and we do not rely on the LASSO to select the controls for our final model.[23]

Another potential confounding factor could be a spatial correlation between changes in the German-born population share from 1910 to 1920 and the casualty rate. Tests for spatial clustering in table A3 show that spatial autocorrelation disappears once coarse geographic controls, such as state fixed effects, and prewar county controls are included in the estimations.[24] Additionally, results are robust to using Conley (1999) standard errors.

The strong raw negative correlation between the WWI casualty rates and the change in the German-born population share between 1910 and 1920 can also be seen in the binned scatter plot in panel a of figure 3.[25] The figure implies that counties in the bottom of the casualty rate distribution experienced an increase in the share of German-born population whereas those in the top of the distribution saw a decrease. This differential treatment response motivates why we use the quintiles of the casualty rate distribution in the analysis in the next section.

We provide two visual placebo tests. First, there was no negative relationship between the World War I casualty rate and the change in the German population share between 1900 and 1910 as seen in panel b of the same figure. Second, there were numerous Swedish and Italian immigrants in the United States and their home countries did not fight against the United States in World War I. Panels c and d provide evidence that there was no negative relationship between the WWI casualty rate and changes in their population shares across counties between 1910 and 1920. Thus the negative relationship between casualty rates and the German share exists only during the decade of World War I, and this relationship is not present for other immigrant groups whose countries of origin were not fighting against the United States.

Estimation. To formalize the analysis, we combine the casualty rate measure with county-level data from the U.S. decennial Census from 1880 to 1940 and estimate the following regression,[26]

$$\begin{aligned}&\%\ \text{German population}_{ct}\\ &= \sum_{q=1,q\neq 3}^{5} \tau_q \big[Q_q(\text{WWI Casualty rate})_c \\ &\quad \times I(\text{year} = t)_{t,t\neq 1910} \big] + X_{ct}'\gamma + \alpha_c + \lambda_t + \epsilon_{ct}, \qquad (2)\end{aligned}$$

where the outcome is the share of the German-born population in county c in Census year t. To capture the differential treatment response across the casualty rate distribution highlighted in figure 3, we split the casualty rate into quintiles. Let Q_q denote the qth quintile of the World War I casualty rate distribution, where Q_3 serves as omitted comparison group. Each quintile indicator is interacted with time fixed effects leaving out the interaction with the 1910 dummy. If local casualties led to anti-German sentiment, and if Germans sought to evade such animosity, then counties with lower casualty rates should receive Germans and those with more war deaths should lose them, that is, τ_q should be decreasing in q.

We control for time-invariant county characteristics with county fixed effects α_c and aggregate shocks common to all counties are absorbed by time fixed effects λ_t. The vector X_{ct}' includes the World War I draft rate, as well as prewar characteristics such as population size, the share of Germans, male-to-female ratio, share of manufacturing employment, and urbanization rate. All of these are measured in 1910 and are interacted with time fixed effects, hence the t subscript. All unexplained variation remains in the error term ϵ_{ct}. We cluster standard errors at the county level to account for heteroscedasticity and autocorrelation.

Results. The results from estimating equation (2) are reported in figure 4 for the bottom quintile (panel a) and top quintile (panel b) of the casualty rate distribution.[27] Error bars are 95% confidence intervals. The τ_q coefficients for the top-quintile casualty-rate are negative and statistically significant after the war but not prior to the war. Conversely, for counties in the bottom-quintile of the distribution, the share of Germans increased after the war with a significant and positive effect that mirrors the outflow from the top-quintile. This indicates that Germans were primarily relocating within

[22] The 1910 Census has almost 200 variables from which we selected. Figure A6 therefore only plots a subset of the coefficients which are ranked by their t-statistic from highest to lowest.

[23] The LASSO might omit variables that are potentially important but highly correlated with other controls and hence their coefficients would be shrunk to zero. Also, selecting controls based only on correlations with the treatment may lead to biased estimates since it ignores the potential correlations with the outcome (Belloni et al., 2014).

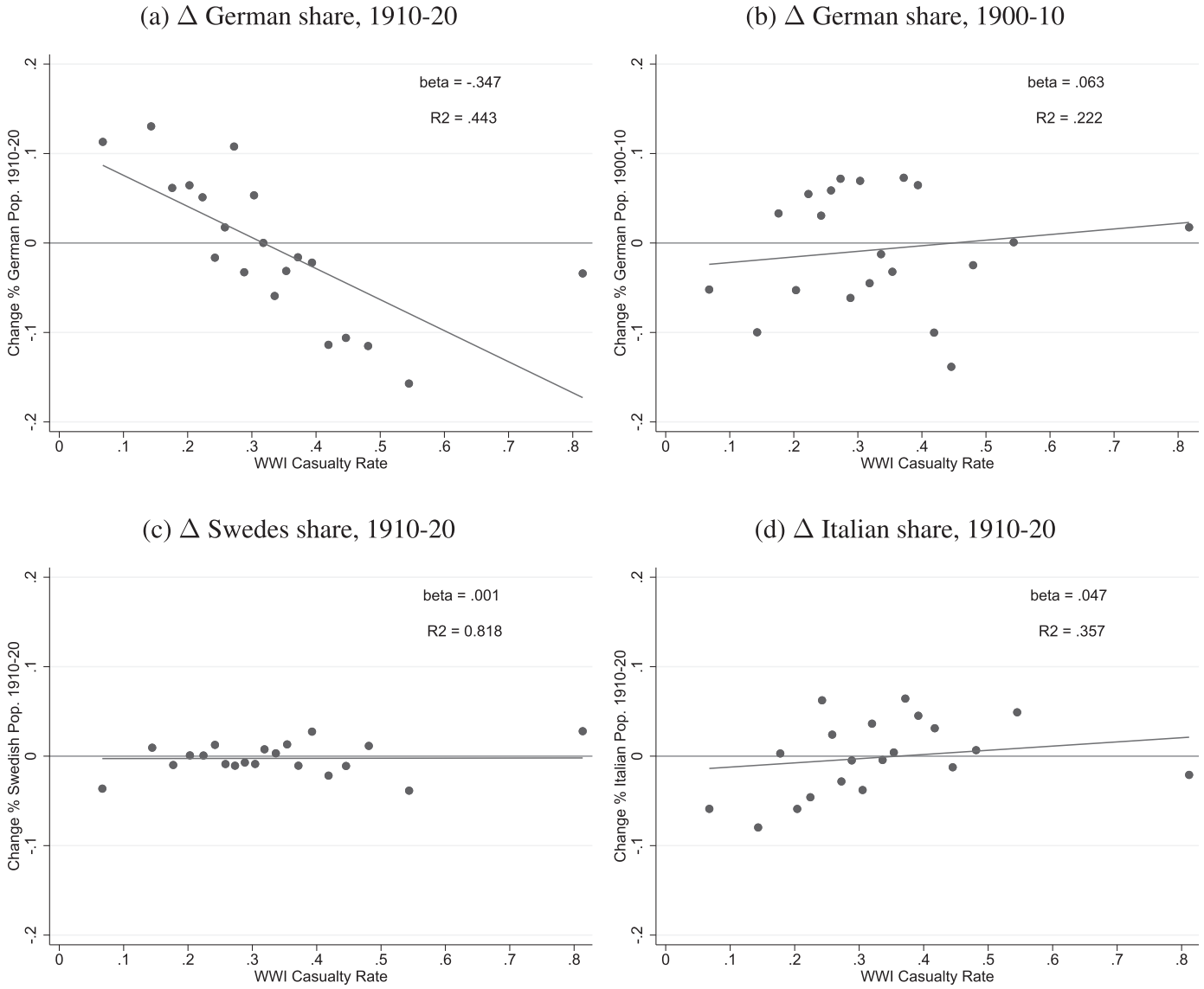
[24] We used the Getis-Ord statistic for local spatial autocorrelation provided by Kondo (2016).

[25] These patterns hold even when baseline population shares are controlled for as seen in figure A7.

[26] Summary statistics for the county level data are reported in table A4.

[27] Table A5 reports the table version of the regression and includes additional specifications using county-specific linear or quadratic time trends to probe for robustness of our findings with respect to underlying differential time trends in high and low casualty rate counties. Figure A8 shows the coefficient plots for all quintiles.

FIGURE 3.—POPULATION CHANGES AND WAR CASUALTIES BY IMMIGRANT GROUP



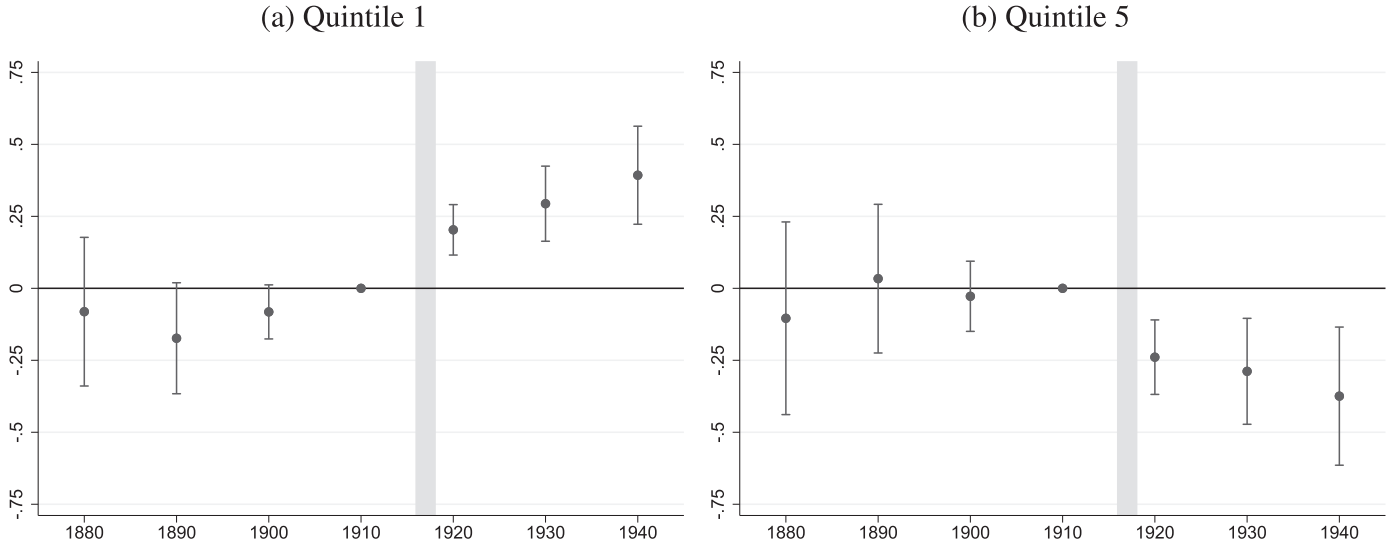
Binned scatter plots for the relation between the change (Δ) in the population share of a given group (individuals born in Germany, Italy, Sweden) and the WWI casualty rate within U.S. states. Measures in the top right corner display the slope coefficient (beta) and fit (R^2) of the regression line in each plot.

the country as opposed to leaving for good, which is consistent with robustness checks by Fouka (2019) who finds that her results are also not driven by Germans exiting the United States.

On average, counties in the top quintile experienced an outflow of approximately 0.31 percentage points. The unconditional outflow in the top-casualty rate quintile was 0.7 percentage points, meaning that our estimates can explain almost half of the outmigration from top casualty rate quintile counties. To put the magnitude into perspective, we find that out of the 1.7 million German-born individuals recorded in the 1910 Census around 350,000 German-born individuals relocated between 1910 and 1920. While this is substantially smaller than other well-studied migrations, such as the two Great Migrations of African Americans out of the South during the 20th century, this is nonetheless a nontrivial magnitude given the size of the German-born population. To the best of our knowledge, we are the first to document this migration event.

Our results are not specification dependent and hold when using the casualty rate as continuous measure, in logs, or when splitting the distribution by the median, tercile, or quartile as reported in table A6. As a placebo check, figure A9 plots coefficient estimates for equation (4) using the top- and bottom-quintile of the WWI accident and disease casualty rate distribution. Given our previous argument regarding the reporting of war casualties in relation to deaths caused by fighting the Germans, we would not expect to see an effect from casualties that had a larger element of chance associated with them. The coefficient plot confirms this.

FIGURE 4.—EFFECT OF WWI CASUALTY RATES ON THE SHARE OF GERMANS BY CASUALTY QUINTILE



Coefficient plots from county-level regressions of % German-born on the WWI casualty rate interacted with time fixed effects (base = 1910). All regressions include county and year fixed effects and controls (WWI draft rate and prewar measures of population size, share of Germans, male-to-female ratio, share of manufacturing employment, and urbanization rate). Standard errors are clustered at the county level and represented as 95% error bars. The shaded area marks the years of United States involvement in the war. Panel a shows the impact of the casualty rate on the county share of Germans in counties with the lowest (bottom quintile) casualty rates. Panel b shows the same for counties in the top quintile of the casualty rate distribution.

IV. Outcomes of Migrating Germans

How did the German-born fare when they moved away from counties with the highest discriminatory pressure? To answer this question, we link individual data from the full count Censuses of 1910 and 1920 using the crosswalks from the Census Linking Project (Abramitzky et al., 2021) following the approach developed by Abramitzky et al. (2014).[28] We obtained a matched sample of almost 300,000 individuals. Summary statistics for the linked data are presented in table A7. Tables A8 and A9 report summary statistics for German movers and American stayers, as well as for German and American stayers, respectively.

In our main sample, we use the links that were produced after applying a phonetic name indexation based on NYSIIS codes. We are also interested in name Americanization as outcome, which is precluded when matching exactly on names. For instance, someone changing their surname from *Müller* to *Miller* would be missed in exact matching by construction. We test for robustness of our results to exact name matching as well as other commonly used linking algorithms in tables B2 to B5 in appendix B.5. We further apply the propensity score reweighting method proposed by Bailey et al. (2019) to address concerns that the linked sample may not be representative of the underlying population. This exercise is reported in table B6 and figure B3, and is described in detail in appendix B.4.

We have argued that anti-German sentiment was more pronounced in counties that were in the top quintile of the casualty rate distribution and that those were also the areas that experienced the largest subsequent decline in the German-born population share. To study the outcomes of Germans after their discrimination-induced relocation, we estimate the following regression equation:

$$y_{ict} = \beta\left[Q_5(\text{Casualty Rate})_{c,1910} \times \text{Post-WWI}_t\right] + \alpha_{c,1910} + \lambda_t + X'_{ict}\Gamma + \nu_{ict}, \quad (3)$$

where y_{ict} is the outcome for individual i living in county c in Census year t. The top quintile casualty rate indicator is captured by the $Q_5(\cdot)$ function and is interacted with the 1920 indicator, Post-WWI$_t$. The parameter of interest is β. The outcomes include indicators for moving to a new county between 1910 and 1920, the distance moved between 1910 and 1920 in miles,[29] whether the individual left the Midwest between 1910 and 1920, not being naturalized by 1920, having Americanized their surname, and for switching from a nonagricultural job in 1910 to having a job in agriculture in 1920. To control for time-invariant factors at the county level and nationwide shocks, we include fixed effects for the county of residence in 1910, that is, the county for which the casualty treatment is assigned,[30] and a 1920 indicator λ_t.

The set of controls includes the county level draft rate as well as a large set of individual baseline characteristics

[28] We are linking men only due to the well known issue that women tend to change their surname upon marriage.

[29] Distance is measured as minimum straight line distance, that is, as the crow flies, from the centroid of the county of residence in 1910 to the centroid of the county of residence of an individual in 1920 using the formula in Vincenty (1975) which factors in the curvature of the Earth. The distance for nonmovers is zero.

[30] The correspondence with the empirical strategy in section IIIB could be achieved by collapsing the individual data at the county-year level and weighting observations by cell size. The benefit of the individual data are the additional observables and the ability to trace individuals to their 1920 county of residence.

TABLE 2.—WWI CASUALTIES AND OUTCOMES OF GERMANS IN LINKED CENSUS DATA

	Mover (1)	Distance moved (2)	Left the Midwest (3)	Not naturalized (4)	Changed surname (5)	Switched to agriculture (6)
Casualty quintile = 5	0.567***	457.669***	0.544***	0.225***	0.050***	0.087***
	(0.213)	(37.433)	(0.059)	(0.015)	(0.006)	(0.009)
Observations	583,534	293,062	293,062	293,062	293,062	293,062
Adj. R^2	0.495	0.451	0.543	0.224	0.037	0.102
Outcome mean	0.251	219.675	0.312	0.356	0.024	0.044
Mover sample		yes	yes	yes	yes	yes

Regressions using the linked sample of German born individuals from the 1910 and 1920 full count Census files. Individuals were linked using the NYSIIS approach by Abramitzky et al. (2014). Outcomes are regressed on an indicator for whether the individual's county of residence in 1910 was in the top quintile of the World War I casualty rate distribution interacted with a postwar indicator. Mover is an indicator for whether an individual left their county of residence between 1910–1920. Distance moved is the distance between the county of residence in 1910 and 1920 in miles. Left the Midwest is an indicator that equals one if an individual lived in the Midwest in 1910 but did not live there anymore in 1920. Not naturalized equals one for those who did not naturalize by 1920, changed surname is equal to one if a person had a German surname in 1910 but a non-German surname in 1920, and switched to agriculture is an indicator for whether a person was not working in agriculture in 1910 but reported their industry of occupation in 1920 to be in the agricultural sector. The mover sample only includes individuals who moved county between 1910–1920. All regressions include county fixed effects for the county of residence in 1910, a year indicator for 1920, birth year fixed effects, the WWI draft rate, as well as baseline controls measured in 1910 and interacted with the 1920 indicator. The baseline controls include the following measures from the 1910 Census: indicators for urban status, ten skill groups, farm status, employment status, marital status, years since entry to the United States in bins (0–5, 6–10, 11–15, and 16–20 years), school attendance, literacy, labor force participation, and count measures for family size and the number of weeks spent in unemployment in 1909. Standard errors are clustered at the county-level. Significance levels are denoted by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

measured in 1910 which are interacted with the 1920 indicator. The individual controls in 1910 contain binary variables for urban status, birth cohort, place of birth, literacy, occupational skill group,[31] farm status, employment status, marital status, years since entry to the United States in bins of 0–5, 6–10, 11–15, and 16–20 years, school attendance, labor force participation, and count measures for family size and the number of weeks spent in unemployment in 1909. Standard errors are clustered at the county level.

The coefficient estimate in column 1 of table 2 shows that individuals living in a county in 1910 that later had a WWI casualty rate in the top quintile were on average 56.7 percentage points more likely to have left the county by 1920. Relative to the average probability of moving, Germans in the top-casualty rate quintile were twice as likely to move. Columns 2 to 6 focus on the sub-sample of movers to assess the costs of the casualty-induced relocation. According to the result in column 2, Germans who left their county of residence were willing to relocate by 457 miles (735 km) on average. This is comparable to the distance of 480 miles from Pittsburgh (Pennsylvania) to Boston (Massachusetts), or the 479 miles from Milwaukee (Wisconsin) to Nashville (Tennessee). Discrimination against Germans was widespread in the Midwest where they had traditionally been a salient minority group (Breen, 1984). Violence against Germans was significantly lower in the South (Hegi, 2005). This potentially motivates the significant relocation effort made by these individuals and is confirmed in the result in column 3. Germans in high-casualty counties, who lived in the Midwest in 1910, were 54.4 percentage points more likely to have left the Midwest by 1920.

The movers from top-casualty counties were also 22.5 percentage points more likely to not have naturalized by 1920, in line with Fouka (2019), as shown in column 4. Column 5 reports that German movers were more likely to Americanize their surname with a 5 percentage points higher probability. The effect is twice as large as the unconditional mean of 2.4%. Moving and name Americanization are not mutually exclusive substitutes but potential complements. In some cases, movers might have changed their names to conceal their German heritage in the places they moved to in order to start with a clean slate. Lastly, despite mainly being manufacturing workers prior to the war, German movers were 8.7 percentage points more likely to work in agriculture in 1920. This is conditional on having a nonagricultural job in 1910 and compares to an average switching probability of only 4.4% for Germans and of 5.8% in the linked sample of American workers that we use later. Choosing a more secluded rural life might have been an additional mechanism to evade anti-German sentiment.[32]

A. *Determinants of the Relocation Decision*

To unbundle the cross-county migration decision to the WWI casualty shock, we repeat the regressions from column 1 in table 2 and further interact the indicator of having lived in a county in the top casualty rate quintile with the 1920 year dummy, as well as with other observable individual characteristics in the following regression:

$$\begin{aligned} &Pr(\text{Mover} = 1)_{ict} \\ &= \beta\left[Q_5(\text{Casualty Rate})_{c,1910} \times \text{Post-WWI}_t\right] \\ &\quad + \delta_k\left[Q_5(\text{Casualty Rate})_{c,1910} \times \text{Post-WWI}_t \times G_k\right] \\ &\quad + \alpha_{c,1910} + \lambda_t + X'_{ict}\Gamma + \nu_{ict}, \end{aligned} \tag{4}$$

where G_k is one of k interaction variables which are indicators for whether an individual reported that they do not speak

[31] We use the 1950 occupation definitions of the U.S. Census Bureau and divide occupations into ten groups which are professional and technical, farmers, managers as well as officials and proprietors, clerical and kindred workers, sales workers, craftsmen, operatives, service workers, farm laborers, and laborers.

[32] Tables A8 and A9 provide descriptive statistics that compare the characteristics of German movers and American stayers, and those of German and American stayers, respectively. Table A10 reports additional results for German stayers, who were more likely to work in manufacturing but who also saw a larger decline in their occupational income scores.

TABLE 3.—DETERMINANTS OF THE INDIVIDUAL RELOCATION DECISION

	Moved county between 1910–1920			
	(1)	(2)	(3)	(4)
Casualty Quintile = 5	0.544***	0.544***	0.531**	0.485**
	(0.210)	(0.210)	(0.209)	(0.202)
Does not speak English	0.099***	0.099***	0.103***	0.073***
	(0.011)	(0.011)	(0.010)	(0.009)
First name is Wilhelm		0.129**	0.111*	0.120**
		(0.063)	(0.061)	(0.060)
German surname			0.074***	0.077***
			(0.008)	(0.007)
In U.S. 0–5 years				0.186***
				(0.020)
In U.S. 5–10 years				0.245***
				(0.017)
In U.S. 11–15 years				0.088***
				(0.012)
In U.S. 16–20 years				0.061***
				(0.012)
Observations	583,534	583,534	583,534	583,534
Adj. R^2	0.496	0.496	0.497	0.501

Regressions using the linked sample of German born individuals from the 1910 and 1920 full count Census files. Individuals were linked using the NYSIIS approach by Abramitzky et al. (2014). Outcomes are regressed on an indicator for whether the individual's county of residence in 1910 was in the top quintile of the World War I casualty rate distribution interacted with a postwar indicator. The treatment is further interacted with indicators for whether a person reported to not speak English in 1910 (column 1), having Wilhelm as their first name (column 2), a common German surname (column 3), and for how long they have been in the United States relative to those who have been in the country for more than 20 years (column 4). All regressions include county fixed effects for the county of residence in 1910, a year indicator for 1920, birth year fixed effects, the WWI draft rate, as well as baseline controls measured in 1910 and interacted with the 1920 indicator. The baseline controls include the following measures from the 1910 Census: indicators for urban status, ten skill groups, farm status, employment status, marital status, years since entry to the United States in bins (0–5, 6–10, 11–15, and 16–20 years), school attendance, literacy, labor force participation, and count measures for family size and the number of weeks spent in unemployment in 1909. Standard errors are clustered at the county-level. Standard errors are clustered at the county-level. Significance levels are denoted by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

English in 1910, their first name being Wilhelm, that is, the name of the German emperor, an indicator for having a common German surname,[33] and indicators for how many years an individual had lived in the United States in intervals of 0–5, 6–10, 11–15, and 16–20 years. The omitted group are those who lived in the country for 21 years or more.

The results from this exercise are reported in table 3. Not speaking English adds approximately 10 percentage points to the probability of relocation in response to the top-quintile casualty treatment. Previous work has found that not speaking a language or speaking with a foreign accent has a negative effect on wages (Grogger, 2011), which is particularly problematic when said accent belongs to a discriminated group. Also names appear to have played an important role in the relocation decision. Bearing the emperor's first name, Wilhelm, increased the probability of moving by 11 to 13 percentage points, while having a common and thus easily identifiable German surname increased this probability by 7.4 to 7.7 percentage points. The importance of names in the labor market has been previously studied by Biavaschi et al. (2017). They find substantial returns to name Americanization in the early 20th century in terms of occupational upgrading. Finally, column 4 reports that those who had lived fewer years in the United States were more likely to move when they were in counties in 1910 belonging to the highest casualty rate quintile. Compared to Germans who had lived in the United States for over 20 years, the relocation probability was 18.6 to 24.5 percentage points higher for those who had lived there for less than 11 years, and around 6.1 to 8.8 percentage points higher for those who had lived there for 11 years to 20 years. Observable characteristics were important factors for relocation due to their potential for identifying Germans and thus exposing them to discriminatory behavior.

[33]This is based on the frequency distribution of surnames in 8.5 million German WWI casualty records which were obtained from the Verein fuer Computergenealogie (2021) (Computational Genealogy Association) and from which we extracted the 200 most common surnames.

V. Economic Effects on the Sending Communities

When German migrants left communities where social and economic discrimination increased, the remaining members in the community may also have experienced economic losses. In particular, postwar manufacturing in the "sending" counties that saw more German outmigration might have been less successful because Germans were 1.5 times more likely to work in manufacturing than any other group. They also tended to be more frequently employed in more skilled manufacturing jobs.[34] The loss of these skilled workers would have damaged productivity immediately and required costly and lengthy training of the new workers that eventually replaced them.

Although we would like to study a broad range of aspects of the local economy, we restrict the analysis to manufacturing because nation-wide county-level information on the same measures before and after World War I are only available for this sector. We focus on wages for two reasons. First is the previously mentioned concentration of Germans in manufacturing and the potential productivity and thus wage effects associated with losing these workers. Second, wages are our best measure of social costs given that they affected a large number of workers.

To estimate the effect of German outflows on manufacturing wages, we regress

$$\ln \text{wages}_{ct} = \beta\left[\text{WWI German Outflow}_c \times \text{Post-WWI}_t\right] + \alpha_c + \lambda_t + X'_{ct} + \epsilon_{ct}, \quad (5)$$

where $\ln \text{wages}_{ct}$ is the natural logarithm of the average annual manufacturing wage per capita in county c and decade t.[35] The variable WWI German Outflow_c measures the postwar outflow of Germans from a given county. It is equal to the absolute value of the change in the German-born percentage of the population between 1910 and 1920 when the change was negative. It is equal to zero when the

[34]In the 1910 Census, 24.3% of German-born men aged 15 to 60 were employed in manufacturing compared to 15.9% of men of the same age in the rest of the population. Within manufacturing, 68.5% of German-born men were in operatives or craftsmen positions whereas 56.6% of non-Germans were in such occupations.

[35]County boundaries were harmonized to the year 1940 to account for boundary changes over time using the area-based crosswalks provided by Ferrara et al. (2021).

TABLE 4.—OLS RESULTS FOR GERMAN OUTFLOWS AND MANUFACTURING OUTCOMES

	Panel a: Log average manufacturing wages			
	(1)	(2)	(3)	(4)
Post-WWI × German outflow$_{1910–1920}$	−0.012***	−0.015***	−0.015***	−0.016***
	(0.004)	(0.004)	(0.004)	(0.004)
Observations	10,353	10,353	10,353	10,353
Counties	2,227	2,227	2,227	2,227
Effect at mean outflow	−0.004	−0.005	−0.006	−0.006
Adj. R^2	0.875	0.876	0.876	0.878
Prewar % Germans and draft rate	Yes	Yes	Yes	Yes
Prewar population and sex ratio		Yes	Yes	Yes
Prewar manufacturing and urbanization			Yes	Yes
Time-varying population				Yes

	Panel b: Additional manufacturing outcomes			
	Log firm size (1)	Log firms (2)	Log workers per capita (3)	Log output per capita (4)
Post-WWI × German outflow$_{1910–1920}$	−0.038***	−0.029**	−0.037***	−0.017*
	(0.013)	(0.013)	(0.014)	(0.009)
Observations	10,353	10,353	10,353	10,353
Counties	2,227	2,227	2,227	2,227
Effect at mean outflow	−0.013	−0.010	−0.013	−0.006
Adj. R^2	0.845	0.888	0.833	0.659
Controls	Yes	Yes	Yes	Yes

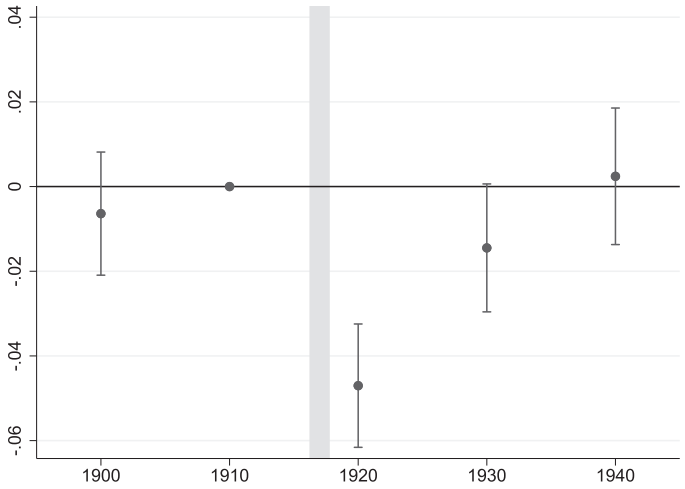
County-level OLS regressions of log manufacturing wages per capita (panel a) and additional manufacturing outcomes (panel b) on the outflow of German population between 1910–1920 interacted with a post-WWI indicator. The sample includes counties for each Census year between 1900 and 1940. Controls in panel a are introduced column-by-column, whereas results in panel b include all of these at once. Controls are the WWI draft rate, population size, and prewar measures of a county's share of Germans, male-to-female ratio, share of manufacturing employment, and urbanization rate, which are interacted with a posttreatment indicator. We also report the effect size at the mean value of German outflows between 1910–1920 to ease interpretation. All regressions include county and Census year fixed effects. Standard errors are clustered at the county-level and significance levels are denoted by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

German-born percentage stayed the same or increased between 1910 and 1920. As result, the minimum of the measure is zero and positive in counties where the German-born share declined between 1910 and 1920.

All other controls in X_c are the same as in equation (2). We also include time-varying measures of the total population size and the male population in the county to shut down any direct labor market effects that might be the direct result of suffering war casualties in the respective counties. This is especially important for the next section where we instrument the outflow of Germans from 1910 to 1920 with being in the top quintile of the WWI casualty rate. Standard errors are again clustered at the county level to account for heteroscedasticity and autocorrelation in the residuals.

According to the results in panel a of table 4, a 1 percentage point increase in the outflow of German-born individuals during the war decade was associated with an approximate 1.2% to 1.6% decline in average annual manufacturing earnings in the decades after the war. However, notice that the average outflow was 0.35 percentage points. The table therefore also reports the effect at average outflows to put the magnitude of the effect size into perspective. Going from zero to the average German outflow is therefore associated with a decline in wages of 0.4% to 0.6%. Columns 1 to 4 provide evidence that this effect is robust to controlling for the prewar share of Germans and the draft rate, prewar controls relating to population, urbanization, and the manufacturing sector, as well as time-varying population controls. The effect is significant at the 1% level in all specifications. This is consistent with our theoretical prediction

FIGURE 5.—THE DYNAMIC EFFECT OF GERMAN OUTFLOWS ON MANUFACTURING WAGES



Coefficient plot from a regression of log manufacturing wages per capita on the % decline in the share of German population from 1910–1920 interacted with year fixed effects (base = 1910). The regression includes county and time fixed effects and controls which contain the WWI draft rate and prewar measures of population size, share of Germans, male-to-female ratio, share of manufacturing employment, and urbanization rate. Standard errors are clustered at the county-level and reported as 95% error bars around the point estimates.

and the previous finding that German and American workers were complements rather than substitutes, meaning that an outflow of German workers would depress wages for the remaining workers in the county.

Figure 5 plots the dynamic specification of equation (5), where we consider the effect of German outflows from 1910 to 1920 on manufacturing wages in each decade

separately.[36] The coefficient plot displays no significant impact of outflows on wages, which serves as placebo given that the outflow of Germans from before to after the war should not have an impact on wages prior to the war. The largest effect on wages is measured directly after the war in 1920 and then fades out over time. It is still marginally significant and negative in 1930. This suggests that retraining costs and duration were large. Considering that discrimination against Germans occurred for a few years during the war, the disproportionately longer impact on wages of over a decade implies that the social costs of discrimination can be substantial.

This negative impact on manufacturing workers' wages was the outcome of Germans leaving in response to the sharp rise in discrimination. In table A12, we estimate the wage effect of outflows among Swedish and Italian immigrants, neither of whom experienced the same discrimination shock as Germans that would have caused relocation on a larger scale. If immigrant workers simply left because of changes in the economy, for instance due to a decline in the manufacturing sector, that would affect wages, then other immigrant groups should see a significant relationship between outflows and wages too. We do not find an effect of Swedish and Italian outflows on manufacturing wages, and they also do not explain away the impact of the German outflow.

Panel b of the same table reports the effect of German outflows on other manufacturing outcomes, that we will later consider as mediators through which German outflows affected wages. We consider the log firm size, log number of firms, log manufacturing workers per capita, and log manufacturing output per capita. The first three outcomes declined by between 1% and 1.3% at the average outflow of Germans from before to after the war. We find that output declined by 0.6% at average outflows, which is close to the magnitude of the decline in wages in the top panel.

A question we tackle in the next section, aside from whether this is a causal relationship, is the possibility that the wage effect is mechanical and driven by the exit of high-earning German workers. We will show that this is not the case and that the outflow effect on wages that is mediated by the reduction in productivity is equally large compared to the reduction in employment. Additionally, we find negative wage effects in the sample of American stayers in the linked individual data where such a possible mechanical relationship does not exist.

Another natural question to ask is whether counties that received Germans saw a positive impact on their economic outcomes. We repeat the estimation of equation (5) by replacing the outflow variable with the inflow of Germans. Table A13 reports the results from this exercise. At mean inflows, wages increased by approximately 1.3%. This finding implies that German workers possessed industry-specific human capital, which they brought to the areas where they settled after the war. This result is also in line with the long-run wage benefits of having more German manufacturing workers presented in table A2.

A. *Instrumental Variables Regressions*

The relationship between manufacturing earnings and the German outflow that we measure might be endogenous if Germans migrated out due to conditions that were correlated with unmeasured factors that contributed to a decline in wages. To test whether this relationship is causal, we next use an instrumental variables approach. The instrument for German outflows is the indicator for a county being in the top quintile of the WWI casualty rate distribution. The results from estimating (2) suggest that the indicator will be a strong instrument. The first stage regression for different specifications is reported in table A14. The key question is whether the instrument is uncorrelated with the error in the final manufacturing earnings equation. If higher casualty rates led to a reduction in a county's labor supply or if it shifted the skill composition toward lower skilled workers, this would violate the exclusion restriction. We have taken several steps to eliminate such possibilities.

First, we control for time varying measures of the total population size and male population. These control variables block the labor supply and manufacturing demand channels through which casualties would have influenced manufacturing. We also report specifications without these controls to demonstrate that results are not substantially affected by their inclusion. Additionally, while the casualty shock significantly affected anti-German sentiment through propagation via newspapers, as argued earlier, its magnitude made it unlikely that it had a direct effect on the labor market or wages specifically. The average number of fallen soldiers in counties in the highest casualty rate quintile was 34 men.[37] In 1910, 15% of the non-German-born workforce were in manufacturing. Thus only 5 of these fallen soldiers were likely to have been in manufacturing before the war. Manufacturing employed an average of 1,330 men per county in 1910, so it seems highly unlikely that our casualty rate measure would have had more than a negligible impact on the skill distribution in manufacturing or on the wage-setting mechanisms of the industry itself.

Second, we correlated the county casualty rate and the top-quintile casualty rate indicator with observable county characteristics that were available in the 1910 Census using both OLS and LASSO regressions. The results from this correlation exercise are reported in figure A6. Neither the casualty rate nor being in the top part of the casualty rate distribution could effectively be predicted by prewar observables. While it is impossible to prove the exclusion restriction, this result together with the other robustness and

[36] Table A11 reports the table version of this regression for both the OLS and IV analysis. We introduce the instrument in the next part.

[37] For comparison, the average number of war casualties was 21, 19, 14, and 6 in quintile four to one, respectively.

TABLE 5.—IV RESULTS FOR GERMAN OUTFLOWS AND MANUFACTURING OUTCOMES

	Panel a: Log average manufacturing wages			
	(1)	(2)	(3)	(4)
Post-WWI × German outflow$_{1910–1920}$	−0.058*	−0.054*	−0.059*	−0.082**
	(0.031)	(0.031)	(0.032)	(0.034)
Observations	10,353	10,353	10,353	10,353
Counties	2,227	2,227	2,227	2,227
Effect at mean outflow	−0.021	−0.019	−0.021	−0.029
K-P F-statistic	33.977	34.113	31.437	30.968
Prewar % Germans and draft rate	Yes	Yes	Yes	Yes
Prewar population and sex ratio		Yes	Yes	Yes
Prewar manufacturing and urbanization			Yes	Yes
Time-varying population				Yes

	Panel b: Additional manufacturing outcomes			
	Log firm size (1)	Log firms (2)	Log workers per capita (3)	Log output per capita (4)
Post-WWI × German outflow$_{1910–1920}$	−0.393***	−0.040	−0.302**	−0.299*
	(0.134)	(0.088)	(0.143)	(0.165)
Observations	10,353	10,353	10,353	10,353
Counties	2,227	2,227	2,227	2,227
Effect at mean outflow	−0.140	−0.014	−0.108	−0.107
Causal mediation effect (%)	82.803	50.555	85.211	80.442
K-P F-statistic	30.968	30.968	30.968	29.603
Controls	Yes	Yes	Yes	Yes

County-level IV regressions of log manufacturing wages per capita (panel a) and additional manufacturing outcomes (panel b) on the outflow of German population between 1910–1920 interacted with a post-WWI indicator. The German outflow variable is instrumented with an indicator for whether the county was in the top quintile of the WWI casualty rate distribution interacted with a post-WWI indicator. The sample includes counties for each Census year between 1900 and 1940. Controls in panel a are introduced column-by-column, whereas results in panel b include all of these at once. Controls are the WWI draft rate, population size, and prewar measures of a county's share of Germans, male-to-female ratio, share of manufacturing employment, and urbanization rate, which are interacted with a posttreatment indicator. We also report the effect size at the mean value of German outflows between 1910–1920 to ease interpretation. Panel (b) further reports results from the causal mediation estimator by Dippel et al. (2019), which estimates how much of the effect of German outflows on log manufacturing wages per capita (in panel a) is explained by the other manufacturing outcomes when these are considered as mediators. We use the Stata routine provided by Dippel et al. (2020). All regressions include county and Census year fixed effects. Standard errors are clustered at the county level and significance levels are denoted by * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

sensitivity checks should increase our confidence that the key instrumental variables assumption is likely to hold.

Third, we tried to rule out alternative explanations based on government mandated discrimination via expropriations by the Alien Property Custodian, employment effects related to nearby war production or training facilities which might have systematically excluded German workers, or selection into the military by considering soldier heights. We discuss these in more detail after presenting the main results.

Table 5 reports the instrumental variables results mirroring the structure of table 4. Using the top-quintile casualty rate indicator as instrument for the German outflows from before to after the war yields a strong instrument with a first stage F-statistic of over 30. Panel a estimates that the mean outflow of Germans reduced the average manufacturing wage by around 2%. When controlling for time-varying male and population size, this effect rises to a reduction of wages by approximately 3%. This is significantly larger than the 0.6% found in the OLS results. A possible explanation is that outflows and the corresponding wage effects were the strongest in areas with the most rampant discrimination, in which case the instrument would capture a local average treatment effect in the most impacted places. An alternative explanation is an attenuation bias in the OLS result due to the proximity to war production and training facilities.[38] During the war, Germans were systematically excluded from war related industries. The presence of war production or training facilities would therefore predict a positive outflow of Germans from a county. Given that these facilities were subsidized and generated employment, they would also raise wages. OLS would then underestimate the negative wage effect associated with German outflows.

Panel b of the same table reports the IV results for the additional manufacturing outcomes. At the average outflow of Germans that is induced by our instrument, firm sizes declined by approximately 14%. To put this result into perspective, the average firm size in 1920 was 17 workers. Hence a 14% reduction implies a loss of two workers. While firms reduced their workforce, we find no statistically significant effect on the number of manufacturing establishments but the decline in firm size corresponds to an overall drop in manufacturing workers in the county of around 10%. We also find a marginally significant impact on productivity with output per capita declining by approximately 10% at the average outflow of Germans between 1910 and 1920. If production scales linearly with labor, then the drop in output corresponds to the reduction in manufacturing workers.

As mentioned in the previous section, we consider these additional manufacturing outcomes as mediators through which German outflows affect wages. To test this formally, we use the causal mediation effects estimator by Dippel et al. (2019). Their framework does not require a separate instrument for the mediator as long as the treatment and mediator lie on the same causal path, assuming that any unobserved

[38] We thank an anonymous referee for highlighting this possibility to us.

factors that potentially give rise to endogeneity in the mediator and the treatment are uncorrelated. In table 5, we report the causal mediation effect of each of the additional manufacturing variables on wages in percent. Results show that 82% to 85% of the impact of German outflows on manufacturing wages works through changes in the average firm size and the number of manufacturing workers per capita as reported in columns 1 and 3. This might suggest that the effect of German outflows on wages is mainly mechanical and due to the relocation of German workers. However, 80% of the wage effect are also mediated by changes in manufacturing output as seen in column 4. The causal mediation framework does not allow for multiple mediators simultaneously and if mediator variables are correlated, these percentages do not sum up to 100%. Despite these drawbacks, the results are instructive to argue against a purely mechanical effect of German outflows on wages. We will revisit this argument in the next section when studying the impact on American stayers using the linked Census data.

B. Robustness

We test whether our IV estimates could be confounded by the distance to war production and training facilities in appendix B.5.[39] If patriotism was related to higher casualty rates in the war as well as with German outflows and wages, this would violate the exclusion restriction. We find no evidence for such a relationship when controlling for the distance to the nearest training camp or war production facility that received a war production contract of one million dollars or more. Likewise, controlling for the total value or types of contracts does not explain away our IV coefficient. The results are reported in table B7.

Appendix B.6 provides evidence that state mandated discrimination in the form of German patent expropriations by the Alien Property Custodian is not driving our results either. Using data on all expropriated German patents, we crosswalk these to the respective industries in 1910 and weight them by the share of Germans in each industry at the county level. Our results are robust to controlling for the average share of expropriated patents across industries, the average share of Germans in industries in 1910 which saw above average expropriations, or the average total number of patents and the total number of expropriated patents weighted by the number of workers in each industry in 1910. OLS and IV results are reported in tables B8 and B9, respectively.

In appendix B.7, we rule out that selection into the military is a driver of our results by considering the soldier heights data from Haines and Steckel (2000), which might correlate with wages and the share of Germans in a county. Both our migration results, as well as the wage effects from the OLS and IV estimations are robust to controlling for the average height of soldiers. Results are reported in table B10.

As a final robustness check, we adjust the previous estimates for potential spatial autocorrelation. Table A15 reports the OLS and IV results from estimating equation (5) and the corresponding first stage using the standard error correction proposed by Conley (1999).

C. Effects on American Workers in the Linked Census Data

Lastly, we attempt to generalize the wage effects stemming from the outflow of German workers found in the previous section to outside of manufacturing using a linked sample of American-born stayers. The sample was linked in the same way the German movers were linked in section IV with the exception that the stayer sample only retains those who remained in the same county in both 1910 and 1920. We focus on nonfarm employed American workers for this exercise due to the difficulties in quantifying wages of farm and agricultural workers prior to 1940.[40] Even though wages are not directly observable, we can study changes in individuals' occupational income scores. To complement this outcome, we also consider the LASSO-adjusted industry, demographic, and occupation (LIDO) score by Saavedra and Twinam (2020). The occupational outcomes are indicators for whether a worker is employed in the manufacturing sector, for employment in a managerial or professional job, a craftsman occupation, or as operative. The specification for the American stayers is the same as for the German movers regression in equation (3), excluding the 1910 controls for years since entry to the United States.

Table 6 reports the results from the OLS and IV regressions of the different outcomes of American stayers on the outflow of German-born population from before to after the war. As in the previous section, the IV regressions use an indicator for being in a top-casualty rate quintile county as instrument for German outflows. The OLS results in panel a show that the increased departure of German workers between 1910 and 1920 was associated with a negative impact on both occupational income and LIDO scores, as well as with the probability of being employed in a craftsman position. We find no significant effect on the probability of working in manufacturing, or on the probability of being employed in managerial and professional, or operative occupations.

The IV results in panel b confirm this pattern with larger negative effects than what was found in the OLS results. At the average outflow of Germans from before to after the war, the OLS regression estimates a drop in income and LIDO scores by 0.5% and 0.3%, respectively, while the IV estimates a decline in the same outcomes by 2.4% and 1.1%. The outflow IV coefficient in the LIDO score regression was not significant at conventional levels. Despite these scores not being perfectly representative of actual wage measures,

[39] The location of training facilities is mapped in figure B4. Figure B5 shows a snipped of the war contract data we used to locate wartime production facilities.

[40] For a discussion see Saavedra and Twinam (2020).

TABLE 6.—GERMAN OUTFLOWS AND ECONOMIC OUTCOMES OF AMERICAN STAYERS

	Panel a: OLS					
	Log occ score (1)	Log LIDO score (2)	Manufact. worker (3)	Manager. job (4)	Craftsman (5)	Operative (6)
Post-WWI × German outflow$_{1910–1920}$	−0.014***	−0.007***	−0.001	0.001	−0.009***	0.003
	(0.004)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Observations	640,333	640,333	640,333	640,333	640,333	640,333
Outcome mean	3.142	3.075	0.180	0.206	0.257	0.138
Effect at mean outflow	−0.005	−0.003	−0.000	0.000	−0.003	0.001
Adj. R^2	0.284	0.316	0.125	0.260	0.215	0.191
	Panel b: IV					
	Log occ score (1)	Log LIDO score (2)	Manufact. worker (3)	Manager. job (4)	Craftsman (5)	Operative (6)
Post-WWI × German outflow$_{1910–1920}$	−0.068*	−0.032	0.035*	−0.010	−0.034*	0.003
	(0.038)	(0.024)	(0.021)	(0.012)	(0.020)	(0.019)
Observations	640,333	640,333	640,333	640,333	640,333	640,333
Outcome mean	3.142	3.075	0.180	0.206	0.257	0.138
Effect at mean outflow	−0.024	−0.011	0.012	−0.003	−0.012	0.001
K-P F-statistic	10.246	10.246	10.246	10.246	10.246	10.246

Regressions using the linked sample of U.S.-born individuals from the 1910 and 1920 full count Census files who were living in the same county in both years. Individuals were linked using the NYSIIS approach by Abramitzky et al. (2014). Outcomes are regressed on the percentage points reduction in the share of German-born individuals in the county between 1910 and 1920 interacted with a postwar indicator. Outcomes are the log occupational income score, the lasso-adjusted industry, demographic, and occupation (LIDO) score by Saavedra and Twinam (2020), and indicators for employment in the manufacturing sector, in a managerial occupation (professional, technical or managers, officials, proprietors classification), in a craftsman occupation, and in an operative occupation. All regressions include county fixed effects for the county of residence, a year indicator for 1920, birth year fixed effects, the WWI draft rate, as well as baseline controls measured in 1910 and interacted with the 1920 indicator. The baseline controls include the following measures from the 1910 Census: indicators for urban status, ten skill groups, employment status, marital status, school attendance, literacy, labor force participation, and count measures for family size and the number of weeks spent in unemployment in 1909. Standard errors are clustered at the county level. Significance levels are denoted by $^{*}p < 0.1$, $^{**}p < 0.05$, and $^{***}p < 0.01$.

they broadly resemble the patterns and magnitudes found in the county-level manufacturing data. The results indicate that wage effects extended to beyond the manufacturing sector. Notice that, unlike the OLS regression in panel a, the IV results find a positive effect on the probability to be employed in manufacturing for American stayers, however, they are still significantly less likely to be employed in craftsmen occupations. This suggests that there might have been an attempt to replace German workers in areas that saw the largest discrimination-induced outflows of Germans, but that their American substitutes entered into less skilled occupations with lower pay. This potentially explains the negative wage effect experienced by these workers.

VI. Conclusion

How does a relatively short-lived discrimination shock against a certain group impact their relocation decisions, their future economic outcomes, and the outcomes of the local communities where such discrimination occurred? These are the questions we sought to address in this paper by studying the case of Germans in the United States during and after World War I. Germans, an economically well-integrated, large, and respected minority group, became widely unpopular in the United States for the duration of the war, and especially once the United States entered the conflict. Previous work on this topic has studied the adverse effects of this discrimination shock on the Germans themselves, including their labor market outcomes at the New York stock exchange (Moser, 2012), the assimilation efforts of Germans after prohibition of their language in schools (Fouka, 2019, 2020), or the effects of compulsory licensing via the Trading with the Enemy Act (Moser & Voena, 2012; Baten et al., 2017).

We add to this literature by studying the internal migration of Germans within the United States in response to increased local discrimination and anti-German sentiment during the war. For this purpose, we propose a new measure of an exogenous shifter of anti-German sentiment which is the county-level WWI casualty rate. The main idea is that war casualties suffered abroad by local communities increased the animus against Germans in those communities. We show that higher casualty rates were significantly correlated with Germans being mentioned as *enemies*, or *huns*, that is, the derogatory term for Germans during the war, as well as a higher frequency of reported tarrings and featherings of Germans. Unlike the newspaper data, WWI casualties can be fairly accurately measured for all counties.

Using county level data from the Census, we show that Germans moved away from counties in the top quintile of the WWI casualty rate. Counties in the bottom quintile saw an increase in their German population share from before to after the war. Interestingly, Germans moved away from areas in which they were a historically salient minority group such as the Midwest, and towards areas with low shares of Germans and rural areas. The relationship between WWI casualties and changes in the share of German-born individuals does not exist before the war, and it does not exist for other groups such as Swedes or Italians. This provides further confidence in the interpretation of our casualty rate as a measure of shifting anti-German sentiment.

We then link German-born individuals using the full-count Census files of 1910 to 1920 to understand the postwar outcomes of cross-county migrants as well as the characteristics that determined their relocation decision. Germans who lived in a county in 1910 that would end up being in the top quintile of the casualty rate distribution were again significantly more likely to move and were willing to relocate over a substantial distance. Movers had an increased probability of leaving the Midwest, of resisting naturalization by 1920, of Americanizing their surname, and of moving into a job in the agricultural industry in 1920 after having worked in a nonagricultural job in 1910. As in the literature on physical characteristics and labor market outcomes (Hamermesh & Biddle, 1994; Biavaschi et al., 2017), observable characteristics significantly amplified the relocation decision of Germans in response to the casualty shock.

The final contribution of the paper is the estimation of the effect of German outmigration on the sending economies, that is, the counties that likely saw the highest levels of anti-German sentiment. Using county-level Census data from 1900–1940, we provide evidence that counties that saw a larger outflow of Germans from 1910–1920 experienced a drop in average manufacturing wages per worker. The dynamic wage effect was strongest in 1920, smaller but still present in 1930, and eventually dissipated by 1940. Instrumenting the German outflow with a county-level indicator for being in the top quintile of the WWI casualty rate distribution confirms this result. We find that the decline in wages is mediated through both the loss of workers as well as decreased productivity. Using a linked sample of American stayers who did not relocate between 1910 and 1920, results indicate that the outflow of German workers might have had broader wage and employment effects that extended beyond manufacturing.

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