# Gifts of the Immigrants, Woes of the Natives: Lessons from the Age of Mass Migration*

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**Abstract**

In this paper, I show that political opposition to immigration can arise even when immigrants bring significant economic prosperity to receiving areas. I exploit exogenous variation in European immigration to US cities between 1910 and 1930 induced by World War I and the Immigration Acts of the 1920s, and instrument immigrants' location decision relying on pre-existing settlement patterns. Immigration increased natives' employment and occupational standing, and fostered industrial production and capital utilization. However, it lowered tax rates, public spending, and the pro-immigration party's (i.e., Democrats) vote share. The inflow of immigrants was also associated with the election of more conservative representatives, and with rising support for anti-immigration legislation. I provide evidence that political backlash was increasing in the cultural distance between immigrants and natives, suggesting that diversity might be economically beneficial but politically hard to manage.

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# 1 Introduction

The recent migration waves to Europe and the US have generated a heated political debate.[1] Support for right-wing, populist parties is increasing, and proposals to introduce or tighten immigration restrictions are becoming more and more common. The mounting anti-immigration rhetoric rests on two grounds – one economic and one cultural. First, immigrants are blamed for increasing labor market competition and reducing natives' employment. Recently, some prominent scholars have pushed this argument one step further, suggesting that the deteriorating quality of immigrants may slow down productivity in receiving countries (Collier, 2013; Borjas, 2016). Second, immigrants' cultural diversity is viewed as a major obstacle to their assimilation, and is often perceived as a threat to the values and the social cohesion of receiving countries (see, for instance, the discussion in Baker et al., 2015 and in Abramitzky and Boustan, 2016).[2]

In American history, this is not the first time that immigration is such a relevant and controversial issue. Between 1850 and 1915, during the Age of Mass Migration, more than 30 million people moved from Europe to the United States (Abramitzky and Boustan, 2016), and the share of immigrants in the US population was even higher than it is today (Figure 1).[3] Also at that time, anti-immigration sentiments were widespread, and the introduction of immigration restrictions was advocated on both economic and cultural grounds. After 1915, World War I and the Immigration Acts (1921 and 1924) put an end to the Age of Mass Migration, and, crucially, affected migration flows from different sending regions to different degrees. Since immigrants tend to cluster along ethnic lines (Card, 2001), the differential effect of these shocks across European countries generated significant variation in the number as well as in the mix of immigrants received by US cities over time.

Leveraging this variation, I investigate the economic and political effects of immigration across US cities between 1910 and 1930, and study whether political discontent reflects or runs counter to the economic consequences of immigration. The key econometric challenge to my analysis is that cities receiving more immigrants were not randomly selected. On the one hand, immigrants may have moved to places with better employment opportunities and with more appealing tax-public spending bundles. On the other, they could have settled in otherwise declining cities which had lower house prices.

To overcome these and similar concerns, I construct a "leave-out" version of the shift-

[1] See, for instance, Porter (2017).

[2] On fears over immigrants' assimilation see also https://www.vox.com/2016/7/6/12098622/immigration-worries-economy-security.

[3] The total number of foreign-born residents is, however, higher today. Also, contemporary immigration is underestimated because of the presence of large numbers of undocumented immigrants (see the dashed line in Figure 1 and Borjas, 2016).

share instrument commonly adopted in the literature (Card, 2001). The shift-share instrument rests on the empirical regularity that immigrants cluster geographically in receiving countries, and newcomers tend to settle where their ethnic community is larger, due to family ties and social networks, and not because of local economic conditions (Stuart and Taylor, 2016). Starting from this observation, I predict the number of immigrants received by US cities over time by interacting 1900 settlements with subsequent migration flows from each sending region, net of the individuals that eventually settled in a given city's metropolitan statistical area (MSA).[4]

The validity of this instrument hinges on one critical assumption: the city-specific characteristics that attracted early movers from any given ethnic group must not be affecting the evolution of local economic and political conditions in subsequent decades.[5] Below, I perform a number of checks - including testing for pre-trends and interacting year dummies with pre-migration city characteristics - to assess the validity of the instrument. I also deal with the concern that aggregate migration flows (by ethnic group) may be endogenous to local economic conditions in US cities using two alternative strategies. First, I replace actual migration flows (from each sending region) with variation solely induced by World War I and the Immigration Acts. Second, similarly to Sequeira et al. (2017), I construct a measure of predicted immigration determined uniquely by temperature and precipitation shocks in origin countries. In both cases, my findings remain qualitatively unchanged.

I find that immigration had a positive and significant effect on natives' employment as well as on their occupational standing. My estimates suggest that, for every 10 new immigrants, two more natives found a job. Since no comprehensive data on wages is available for this period, as commonly done in the literature (e.g. Abramitzky et al., 2012, 2014), I proxy for natives' income using (log) occupational scores.[6] Consistent with immigrants improving natives' occupational mobility, I find a large and positive effect of immigration on natives' occupational scores. Moreover, using data digitized from the Census of Manufactures, I show that, even in a heavily exposed sector like manufacturing, there was no significant reduction in wages.[7] In the appendix, I present a simple model of directed technical change that underscores the importance of capital adjustments to absorb the inflow of immigrants and generate

[4] In my baseline specification, I consider only immigration from Europe (see Table A1 in the appendix), but results are robust to extending the analysis to all other non-European countries (see online appendix A).

[5] This assumption would be violated if, for instance, immigrants in 1900 settled in a given city in anticipation of subsequent economic growth.

[6] As discussed below, occupational scores assign to an individual the median income of his job category in 1950, and can thus be used as a proxy for lifetime earnings (Abramitzky et al., 2014).

[7] Wage data, digitized from the Census of Manufactures, do not distinguish between immigrants and natives, implying that these results should be interpreted as a lower bound for the effect of immigration on natives' earnings, since new immigrants were closer substitutes for previously arrived immigrants than for natives.

the large economic benefits that accrued to native workers. Consistently with the model, I indeed document that immigration boosted industrial production, capital utilization, and productivity.

However, despite these positive economic effects, immigrants triggered widespread and hostile political reactions. First, cities cut public spending and taxes in response to immigration. The reduction in tax revenues was entirely driven by declining tax rates, while the fall in public goods provision was concentrated in categories where either inter-ethnic interactions are likely to be more salient (e.g. education) or poorer immigrants would get larger implicit transfers (e.g. sewerage, garbage collection). Second, immigration reduced the pro-immigrant party's (i.e., Democrats) vote share, and was associated with the election of more conservative representatives. Third, members of the House representing cities more exposed to immigration were significantly more likely to support the National Origins Act of 1924, which put an end to the era of unrestricted immigration to the US, and governed American immigration policy until 1965.

In the last part of the paper, stitching together the economic and political effects of immigration, I show that political discontent was increasing in the cultural distance between immigrants and natives, suggesting that backlash had, at least in part, non-economic foundations.[8] These findings are consistent with a long-standing idea in the literature that diversity can be economically beneficial because of gains from specialization and complementarity (Alesina and La Ferrara, 2005; Alesina et al., 2016), but may be politically hard to manage, resulting in lower preferences for redistribution (Dahlberg et al., 2012), more limited public spending (Alesina et al., 1999), and higher conflict (Bazzi and Gudgeon, 2016).[9]

My work is also related to at least three other strands of the literature. First, a growing set of studies has investigated the effects of immigration on electoral outcomes in receiving countries (Barone et al., 2016; Dustmann et al., 2016; Halla et al., 2017).[10] In addition to providing evidence from a different historical context, I complement this literature in two ways. On the one hand, I document that political discontent over immigration can arise even when immigrants bring diffused economic prosperity to natives, suggesting that cultural considerations are likely to be as important as economic ones in shaping natives' reactions (see also Card et al., 2012, and Sniderman et al., 2004). On the other, I study the effects of immigration on key policy variables, such as tax rates and public spending – outcomes for

[8] I proxy for cultural diversity with religion and linguistic distance. The use of religion is motivated by the historical evidence that, at that time, nativism often resulted in anti-Semitism and anti-Catholicism - to the point that the revival of the KKK in the 1920s rested on an openly anti-Catholic and anti-Semitic rhetoric (e.g. Higham, 1955).

[9] Nekby and Pettersson-Lidbom (2017) revisit the work by Dahlberg et al. (2012), and argue that findings in the latter paper might be sensitive to the sample used and to measurement of preferences for redistribution.

[10] See also Mayda et al. (2016) for a recent review.

which, as noted in Card (2009) and Borjas (2016) among others, despite the large debate on the consequences of immigration, little is known.[11]

Second, my paper is related to the vast literature on how immigration affects natives' labor market outcomes.[12] My results are in contrast with the negative effects estimated by Borjas (2003) and Dustmann et al. (2017) among others, and somewhat different from the zero effect found by several cross-city studies for the contemporary period (e.g. Card, 2001 and Card, 2005). Relying on the largest episode of immigration in American history, I show that, under certain conditions, immigrants can provide substantial economic benefits to native workers, without harming any specific group. My analysis suggests that two key mechanisms were likely responsible for this. First, in line with Clemens et al. (2017), Lafortune et al. (2016), and Lewis (2011), firms' investment and technology adoption can absorb the immigration-induced labor supply shock, and, in some cases, even increase labor demand for both high and low skilled natives. Second, consistent with Peri and Sparber (2009) and Foged and Peri (2016) for the contemporary period, because of complementarity, immigrants may benefit natives by inducing them to specialize in more skill-intensive tasks and by favoring occupational upgrading.

Finally, several papers have investigated the selection and the assimilation of European immigrants during the Age of Mass Migration (Abramitzky et al., 2012, 2014, 2016), as well as their impact on contemporaneous and long-run economic development (Ager and Hansen, 2017; Lafortune et al., 2016; Sequeira et al., 2017), and on the adoption of state-level compulsory schooling laws (Bandiera et al., 2017). However, to the best of my knowledge, this is the first paper that exploits the dramatic cross-city variation induced by World War I and the Immigration Acts to study the economic and political consequences of European immigration in a unified empirical framework.

The remainder of the paper is organized as follows. Section 2 describes the historical background. Section 3 presents the data. Section 4 lays out the empirical strategy, constructs the instrument for immigration, and presents first stage results. Section 5 investigates the effects of immigration on natives' employment and on economic activity. Section 6 studies how immigrants affected tax revenues, public spending, electoral outcomes, and congressmen ideology as well as their voting behavior on the 1924 National Origins Act. Section 7 shows that the political effects of immigration depended on the cultural distance between immigrants and natives and on immigrants' ethnic diversity. Section 8 concludes.

[11] In a companion paper (Tabellini, 2017), I study how the migration of southern born African Americans affected public goods provision and government finances in northern cities during the first wave of the Great Migration.

[12] See Lewis et al. (2015) for a recent review.

# 2 Historical Background

## 2.1 The Age of Mass Migration

Between 1850 and 1915, more than 30 million people moved from Europe to the US. Until 1890, most immigrants came from the British Isles, Germany, and Scandinavia, but, from the late 1880s, immigration from Southern and Eastern Europe increased steadily, as the costs of migration fell with the advent of steam technology (Keeling, 1999). In 1870, almost 90% of the foreign born came from Northern and Western Europe, whereas less than 5% of immigrants had arrived from Southern and Eastern Europe (Figure 2). By 1920, however, the situation had changed dramatically, with the share of migrant stock from new source countries being as high as 40%. Europeans from new regions were culturally farther from natives and significantly less skilled than those from old sending regions (Hatton and Williamson, 1998, 2006). For instance, while literacy rates of immigrants that entered the US between 1900 and 1910 were very close to one for all old sending countries, they were significantly lower for new source regions (Figure A1).

The shift in the composition of immigrants and concerns over their assimilation induced Congress to establish a commission that, between 1907 and 1911, studied the economic and social conditions of immigrants (Higham, 1955). In 1911, the Immigration Commission recommended the introduction of immigration restrictions, and in 1917, after decades of heated political debate, Congress passed a literacy test requiring that all immigrants entering the United States had to be able to read and write (Goldin, 1994).

Even before the adoption of the literacy test, in 1914, the Age of Mass Migration came to an abrupt end due to the onset of World War I, which drastically reduced European immigration between 1915 and 1919 (see Figure 3). In 1920, despite the literacy test, migration flows increased again to their 1910 levels, fueling nativist movements and generating even stronger political pressure to adopt more effective measures to curb immigration. Figure A2 plots trends of migration flows (right axis) and of the number of articles in local newspapers referring to immigration (left axis) over time, and shows that both fell dramatically during WWI, but then increased again once the war was over. In response to the growing demand for immigration restrictions, in 1921 and 1924 Congress finally passed the Immigration Acts to limit the number of immigrants that could enter the United States in a given year by introducing country-specific quotas based on 1890 immigrants' population.[13]

[13] With the 1924 National Origins Act, the total number of immigrants that could be admitted in a given year was capped at 150,000. In 1921, quotas were specified reflecting the 1910 composition of immigrants. However, they were rapidly changed to 1890 to limit immigration from new sending countries even further (Goldin, 1994).

Both World War I and the Immigration Acts affected different sending countries in different ways. In particular, quotas were set so as to limit the inflow of immigrants from new sending regions, while favoring that from old sources such as the UK, Germany, and Scandinavia. Figure 4 shows the changing composition of immigrants entering the United States during the previous decade between 1900 and 1930. Until 1920, the majority of recent immigrants came from Eastern and Southern Europe, but this trend was abruptly reversed in the 1920-1930 decade, when the share of Anglo-Saxon and Scandinavian immigrants increased as a result of the Immigration Acts. Since immigrants tend to cluster along ethnic lines (Card, 2001), the post-1915 events generated substantial variation in the number as well as in the mix of immigrants received by US cities over time (Figures A3 and A4). This is the variation I exploit in my empirical analysis.

## 2.2 Immigrants and the US Economy

Historical accounts tend to view immigrants as one of the key determinants of American industrialization and economic development during the Age of Mass Migration. When describing the economic impact of European immigrants, historian Maldwyn Jones wrote that "The realization of America's vast economic potential has...been due in significant measure to the efforts of immigrants. They supplied much of the labor and technical skill needed to tap the underdeveloped resources of a virgin continent" (Jones, 1992, pp. 309-310). Similarly, John F. Kennedy argued that "every aspect of the American economy has profited from the contribution of immigrants" (Kennedy, 1964, p. 88).

During the Age of Mass Migration, the US economy had large potentials for growth. Economic historians argue that, in this context, immigrants provided a cheap and unskilled supply of labor which could not only be absorbed, but that may have even allowed industries to expand (Foerster, 1924), in turn creating new job opportunities for native workers. Even though some studies have found a negative effect of immigrants on wages (Goldin, 1994), labor shortage was a recurring theme in this historical period.[14] For instance, in a 1906 article, the New York Times was reporting that "Need of labor is the universal cry. Demand in all parts of the country is greater than supply. Not enough immigrants. Statements from agents show that men are scarce in all the States".

Moreover, since immigrants, especially from Eastern and Southern Europe, were unskilled and had low levels of English proficiency, they may have benefitted natives because of complementarity and gains from diversity (Alesina and La Ferrara, 2005; Foged and Peri, 2016). Along these lines, in his 1971 *The Transformation of the American Economy*, economic his-

[14] Due to data limitation, Goldin (1994) could not distinguish earnings of immigrants from those of natives.

torian Robert Higgs argues that "the rapid pace of industrial expansion has increased the number of skilled and supervisory positions so fast that practically all the English speaking employees have had the opportunity to rise on the scale of occupations" (Higgs, 1971, p. 420).

## 2.3 Immigration and Natives' Backlash

Despite the positive views on the contribution of immigrants to the American economy expressed by economic historians, Europeans, especially from new sending countries, faced strong political opposition. Natives' backlash culminated in the passage of the literacy test of 1917 and, more importantly, of the Immigration Acts of 1921 and 1924, which were explicitly introduced to shut down immigration from "undesirable sources". Goldin (1994) argues that concerns about unemployment and labor market competition were the main motivation for the immigration restrictions of the 1920s. Undoubtedly, the coincidence of large immigration flows with the severe macroeconomic recessions of 1907, 1913-1914, and 1919 increased the perception among native workers that immigrants were threatening American standards of living.

However, while economic considerations certainly played a role, anti-immigration sentiments tended to have deep cultural roots (Higham, 1955; Abramitzky and Boustan, 2016). This idea is very effectively summarized in a 1921 statement by Irving Fisher, who argued that "If we could leave out of account the question of race and eugenics...I should, as an economist, be inclined to the view that unrestricted immigration...is economically advantageous...the core of the problem of immigration is...one of race and eugenics" (Leonard, 2005). On a similar vein, in 1896, the first president of the American Economic Association, Francis A. Walker, claimed that the American standard of living and the quality of American citizenship had to be protected "from degradation through the tumultuous access of vast throngs of ignorant and brutalized peasantry from the countries of Eastern and Southern Europe" (Greenwood and Ward, 2015).[15]

Anti-immigration sentiments were most often directed towards two groups. First, Jews and Catholics, whose values were perceived as being different from the Puritan tradition prevailing in the US at that time.[16] Second, immigrants from Eastern and Southern Eu-

[15] Consistent with this qualitative evidence, using data from local newspapers, D'Amico and Tabellini (2017) find that immigration not only increased the frequency of generic terms related to immigration, but also, induced newspapers to adopt more racist terms when referring to the foreign born.

[16] Around the time of World War I, Jews were deemed responsible for promoting the war in order to make profits out of it. For example, in 1915 Henry Ford claimed he knew "who caused the war: German-Jewish bankers" (Watts, 2009, p. 383). During the Red Scare, and in the inter-war period more generally, Jews were often blamed for being at the origin of Bolshevism and the worldwide diffusion of Communism.

rope, who were culturally and linguistically distant from natives and, because of their lower socio-economic status, were regarded as belonging to inferior races. Countless statements by politicians and newspapers articles provide examples of how Eastern and Southern European immigrants were perceived at the time. For instance, in 1916, congressman Thomas Abercrombie claimed that "The color of thousands of them [i.e. the new immigrants: Mediterraneans, Slavs, Jews] differs materially from that of the Anglo-Saxons" (Higham, 1955), while the editor of the *Saturday Evening Post*, Kenneth Roberts, in a 1920 article wrote that "if a few more million members of the Alpine, Mediterranean and Semitic races are poured among us, the result must inevitably be a hybrid race of people as worthless and futile as the good-for-nothing mongrels of Central America and Southeastern Europe".[17]

# 3 Data

My analysis relies on a balanced panel of 180 US cities for the three Census years 1910, 1920, and 1930. The sample includes all cities with at least 30,000 residents in each of the three censuses, and where at least some Europeans were living in 1900 (see Figure A5 and Table A2 for the complete list of cities).[18] To study the economic and political effects of immigration, I combine data from several sources.

**Immigration and city population**. Data on city population and on the number of immigrants by country of origin at the city and at the national level were taken from the decennial US Census of Population, made available by IPUMS (Ruggles et al., 2015).[19] For 1900, I use the 5% sample, while for 1910, 1920, and 1930, I rely on the full count census datasets. Whenever possible, to increase the precision of the analysis, I complemented the information contained in the 1900 5% sample with original Census documents.

**Natives' labor market outcomes.** Restricting the sample to native men in working age, I compiled data on employment, literacy, and occupation from the US Census of Population.[20] Since until 1940 wage data are not available, I proxy for natives' income using (log) occupational scores, as commonly done in the literature (e.g. Abramitzky et al., 2012 and Abramitzky et al., 2014). Occupational scores assign to an individual the median income of

[17] Again in 1896, Francis A. Walker defined immigrants from Eastern and Southern Europe "beaten men from beaten races; representing the worst failures in the struggle for existence" (Leonard, 2005).

[18] I restrict the attention to cities with at least 30,000 residents because below this population threshold data on public spending and government finances were not reported.

[19] See Table A1 for the list of European countries used in my work. To classify individuals based on their country of origin, I followed the classification made by IPUMS (Ruggles et al., 2015).

[20] In my analysis, I focus on the age range 15-65, but results are unchanged when selecting different age combinations. In 1920, the US Census did not report employment status, but rather only an indicator for holding any gainful occupation. For this year, I imputed values from the latter to proxy for employment. I also report results based solely on labor force participation rather than employment.

his job category in 1950 and, as discussed in Abramitzky et al. (2014), represent a proxy for lifetime earnings.

**Economic activity.** I digitized city-level data from the quinquennial Census of Manufactures between 1904 and 1929 for the following variables for the manufacturing sector: value added by manufacture, value of products, establishment size, capital utilization (proxied by horsepower), total employment, and average wages.[21] Wage data is a potentially valuable piece of information, since, as noted above, the US Census of Population did not collect income data prior to 1940. While manufacturing wages were not separately reported for immigrants and natives, they can nonetheless be used to complement results on employment, skill ratios, and natives' occupational scores.

**Public spending and government finances.** Data on public spending and city finances were digitized from the Financial Statistics of Cities for years 1906, 1910, 1919, and 1930.[22] These are annual reports, available from 1906 onwards for cities with population above 30,000 (until 1934) or 100,000 (from 1934 onwards). From the Financial Statistics of Cities, I obtained data on land area, total and property tax revenues, property values, property tax rates, and public spending (total and by category).

**Presidential elections**. Data on electoral returns (votes shares and turnout) for Presidential elections come from Clubb et al. (1990). Since these data are available only at the county level, I aggregated them up to the MSA, fixing boundaries to 1940, and performed the analysis using MSA-level immigration, matching cities to the corresponding MSA.[23] Because Presidential elections are held every four years, I computed the average between the closest two elections after each Census year. That is, for 1910 and 1930, I averaged electoral results from 1912 and 1916 and from 1932 and 1936 respectively, while for 1920, I considered 1920 and 1924. Results are unchanged when taking the average from the two closest election years, i.e. 1908 and 1912 for 1910, and 1928 and 1932 for 1930 (see online appendix A).

**Legislators' ideology.** I collected data on congressmen ideology between 1910 and 1930 from Voteview, for Congresses 61, 66, and 71 respectively.[24] Following Autor et al. (2016) as well as a vast political science literature, I proxy for politicians' ideology using the first dimension of the Poole-Rosenthal DW Nominate scores, which rank congressmen on an ideological scale from liberal to conservative using voting behavior on previous roll-calls

[21] I use 1909, 1919, and 1929 data to proxy for 1910, 1920, and 1930 respectively. I make use of 1904 data to test if pre-period changes in outcomes are correlated with subsequent changes in predicted immigration.

[22] Since data for 1920 is missing, I digitized the 1919 and 1921 volumes. Results are robust to using 1921 in place of 1919, but 1919 is preferable since 1921 data was not reported for several cities. Data for 1906 is used to test the validity of the empirical strategy.

[23] Matching cities to MSAs lowers the number of units from 180 to 127. However, data on Presidential elections are not available for Washington DC, further reducing the number of MSAs to 126.

[24] To assess the validity of the empirical strategy, I also compiled data for the $56^{th}$ Congress.

(Poole and Rosenthal, 1985; McCarty et al., 2006). To exploit local geographic variation, I restrict my attention to the House of Representatives, and use digital boundary definitions of US congressional districts from Lewis et al. (2013) to match cities to their corresponding district in any given year.

When constructing this dataset, two problems must be dealt with. First, boundaries of congressional districts vary over time. Second, a single congressional district may represent multiple cities, while the same city may belong to more than one district. To address these issues, I follow Autor et al. (2016) and conduct the analysis at the city by congressional district level. The city-to-congressional district mapping is almost identical for the $66^{th}$ and the $71^{st}$ Congress, but redistricting between the $61^{st}$ and the $66^{th}$ Congress, especially in Massachusetts and Pennsylvania, prevents the construction of a balanced panel which includes all the cities in my sample. Below, I present results both for the unbalanced panel and for the balanced panel of cities whose congressional districts were unchanged.[25]

**Representatives' voting behavior.** Data on voting patterns on the National Origins Act of 1924 come from Swift et al. (2000). This dataset includes the name, the district represented, the main demographic characteristics, and the voting behavior on any rollcall of each representative in all US Congress between 1789 and 1989. As for congressmen ideology, I focus on the House of Representatives and conduct the analysis at the city by congressional district, matching each representative to the corresponding city (or cities) in my sample in the $68^{th}$ Congress (when the National Origins Act was passed).[26]

Table 1 reports the summary statistics for the main variables used in my analysis. City population ranges from more than 6.9 million (New York City in 1930) to as little as 30,200 (Pasadena in 1910). There is also wide variation in the fraction of immigrants across cities and over time, which was higher in the northeastern states of New Jersey, New York, Connecticut, and Massachusetts, and lower in the US South. As already discussed in Section 2, immigration fell significantly between 1910 and 1930, because of both World War I and the Immigration Acts: in 1910, the fraction of immigrants over city population was, on average, 0.18, but this number fell to 0.12 in 1930. Even starker was the decline in the fraction of foreign born that entered the United States in the previous decade, which moved from an average of 0.08 in 1910 to 0.02 in 1930.

Immigration and most of the fiscal data are available for all the 540 city-year observations in my sample. However, employment outcomes were missing for Sacramento (CA) and New Bedford (MA) in 1920, whereas data from the Census of Manufactures were not reported

[25] The unbalanced and the balanced panels are composed respectively of 157 and 146 city to congressional district units.

[26] Whenever multiple congressmen represent the same city, I average their votes on the Immigration Act to create a unique value, which is then assigned to that city.

for a handful of cities, leaving me with 538 and 525 observations respectively.[27] Finally, aggregating cities to MSAs (for Presidential elections) and to congressional districts (for legislators' ideology) reduces the number of observations to 378 and 470 respectively.

# 4 Empirical Strategy

In this section, I first introduce the baseline estimating equation (Section 4.1) and construct the instrument for immigration (Section 4.2). Next, I present an alternative specification which explicitly relies on the variation induced by WWI and the Immigration Acts (Section 4.3). Finally, I report first stage results (Section 4.4).

## 4.1 Baseline Estimating Equation

The goal of the paper is to investigate the economic and political effects of immigration across US cities between 1910 and 1930. To do so, stacking the data for the three Census years 1910, 1920, and 1930, I estimate

$$y_{cst} = \gamma_c + \delta_{st} + \beta Imm_{cst} + u_{cst} \tag{1}$$

where $y_{cst}$ is the outcome for city $c$ in state $s$ in Census year $t$, and $Imm_{cst}$ refers to the fraction of immigrants received by city $c$ in the previous decade, over city population. $\gamma_c$ and $\delta_{st}$ are city and state by year fixed effects, implying that $\beta$ is estimated from changes in the fraction of immigrants within the same city over time, compared to other cities in the same state in a given year. Since city population could itself be an outcome of immigration, the number of immigrants is scaled by predicted (rather than actual) city population, constructed by multiplying 1900 population by average urban growth in the US, excluding that of the Census division where the city is located. Below, I also report results obtained when scaling immigration by 1900 population. Standard errors are clustered at the MSA level, and MSA boundaries are fixed to 1940 in order to keep geography constant.

In my baseline specification, I restrict the attention to European immigrants that entered the United States during the previous decade. I do so because, at that time, immigrants could apply for citizenship after 5 years (Shertzer, 2016). While historical accounts suggest that after 1910 immigrants' political engagement fell steadily (Kleppner, 1982), focusing on recently arrived immigrants allows me to more confidently interpret my findings on political

[27] Data from the Census of Manufactures were not available for Superior (WI), Washington DC in 1909 and 1919, and for Flint (MI), Galveston (TX), Huntington (WV), Lexington (KY), McKeesport (PA), Pueblo (CO), Quincy (IL), and Roanoke (VA) in 1929.

outcomes as natives' reactions, rather than as the direct effect of immigrants' preferences (Mayda et al., 2016). As a robustness check, however, I repeat the analysis considering immigrants' stock, and results remain very similar to those obtained in my baseline specification (see online appendix A).

## 4.2 Instrument for Immigration

A priori, we may expect immigrants to be attracted to cities with better job opportunities, or with more appealing tax-public spending bundles. Alternatively, immigrants might settle in otherwise declining cities, where house prices are lower. In either case, OLS estimates of equation (1) will likely be biased. To deal with this endogeneity problem, I construct a modified version of the shift-share instrument (Card, 2001). The instrument predicts the number of immigrants received by US cities over time by interacting 1900 settlements of different ethnic groups with subsequent migration flows from each sending region, excluding individuals that eventually settled in a given city's MSA. Formally, $Imm_{cst}$ in (1) is instrumented with

$$Z_{cst} = \frac{1}{\hat{P}_{cst}} \sum_{j} \alpha_{jc} O_{jt}^{-M} \tag{2}$$

where $\hat{P}_{cst}$ is predicted city population; $\alpha_{jc}$ is the share of individuals of ethnic group $j$ living in city $c$ in 1900; and $O_{jt}^{-M}$ is the number of immigrants from country $j$ that entered the US between $t$ and $t-1$, net of those that eventually settled in city $c$'s MSA.[28]

### 4.2.1 A Graphical Example

The instrument constructed in equation (2) exploits two sources of variation: first, cross-sectional variation in the share of individuals from each ethnic group living in different US cities in 1900 ($\alpha_{jc}$); second, time-series variation induced by changes in the total number of immigrants from any sending region entering the United States in a given decade ($O_{jt}^{-M}$). Figure 5 presents an example for three cities (Chicago, Milwaukee, and San Francisco) and two ethnic groups (Italians and Germans) to illustrate the variation underlying the instrument.

Between 1910 and 1930, Italian immigration fell monotonically, while German immigration declined between 1910 and 1920 due to WWI, but rebounded after 1920, as the quotas were quite generous with respect to Germany. Chicago (Panel A) had large Italian and

[28] A similar "leave-out" strategy is used in Burchardi et al. (2016). In online appendix A, I also present results for a specification where the endogenous regressor, $Imm_{cst}$, is constructed by scaling the number of immigrants by actual (rather than predicted) city population, and is instrumented with $Z_{cst}$ in (2), i.e. the predicted number of immigrants over predicted city population.

German communities in 1900. In line with the aggregate flows, both the actual (straight lines) and the predicted (dotted lines) number of Italians (yellow lines) and Germans (blue lines) arriving in Chicago fell between 1910 and 1920. However, after 1920, while Italian immigration continued its decline, Chicago experienced a positive immigration shock from Germany.

Milwaukee, instead, had a relatively large German community, but almost no Italians in 1900. Thus, as shown in Panel B, variation in immigration for this city resulted from changes in German, and not Italian, immigration. Finally, while very few Germans were living in San Francisco in 1900, Italian settlements were fairly large in this city. As documented in Panel C, the actual and predicted immigration shock for San Francisco was due to the decline in Italian immigration, and only marginally to the inflow of Germans after 1920.

The instrument in (2) extends this example to many cities and many ethnic groups, but the logic behind it can be grasped by looking at the patterns in Panels A to C of Figure 5.

#### 4.2.2 Geographic Variation in Immigrants' Settlements

The cross-sectional variation underlying the instrument in equation (2) is based on the idea that immigrants cluster geographically and their settlements are highly persistent due to social networks and family ties, and not because of local pull factors (Card, 2001; Stuart and Taylor, 2016). As documented in Sequeira et al. (2017), the gradual expansion of the railroad network during the second half of the nineteenth century is a strong predictor of the geographic distribution of immigrants in the US: places that gained access to the railroad just before an immigration boom received more immigrants in the following decade. Moreover, upon arrival, early settlers tended to locate in places that were relatively more attractive at that time. Since the timing of outmigration varied widely across European countries, depending on local political and economic conditions (Hatton and Williamson, 1998), different US regions were populated by different ethnic groups before 1900. Early settlers then acted as a catalyst for subsequent migrants from the same ethnic group (Lafortune and Tessada, 2014).

The geographic concentration of Europeans in the United States during the Age of Mass Migration is discussed, among others, by Abramitzky and Boustan (2016). For instance, Italians clustered in the north-eastern states of New York, Pennsylvania, and New Jersey, and in California, whereas Germans and Scandinavians settled mainly in the lower and in the upper Midwest respectively. Figure 6 visually confirms these patterns in my data by plotting the share of individuals from different European regions living in selected US cities in 1900. While almost 4% of Swedes living in the US in 1900 were settled in Minneapolis, less than 1% of them were located in north-eastern cities like Philadelphia or Boston. Conversely, while

Italian communities were present in Boston, Philadelphia, and San Francisco, they were practically non-existent in Minneapolis. Even more emblematic is the example of Eastern Europeans: in 1900, more than 8% of them were living in Cleveland, while their share in the other cities displayed in Figure 6 was well below 1%. Appendix Figure A6 presents a similar example for Ohio, and shows that differences in immigrants' settlements existed also within the same state. This is important, for otherwise the instrument in (2) would not have power, since my empirical strategy exploits only within state variation in immigration.

### 4.2.3 Identifying Assumptions and Instrument Validity

The key identifying assumption behind the instrument is that cities receiving more immigrants (from each sending area) before 1900 must not be on different trajectories for the evolution of economic and political conditions in subsequent decades. Said differently, outmigration from European regions must be independent of cross-city pull factors systematically related to 1900 settlers' country of origin. For example, between 1910 and 1920, immigration to the US was higher from Italy than from Sweden. The exclusion restriction would be violated if this happened because cities that in 1900 had attracted more Italians were growing more than cities where more Swedes had moved to in 1900.

Another threat to the validity of the identifying assumption is that the characteristics of cities that attracted early immigrants might have persistent, confounding effects on migration patterns as well as on changes in the outcomes of interest. It is possible, for instance, that larger urban centers attracted more immigrants in the nineteenth century, and that these cities kept growing more also in subsequent decades, introducing a spurious correlation between, e.g. economic activity and immigration. Similarly, one may be worried that the industry mix of cities affected both the location decision of early settlers and subsequent changes in economic and political conditions. To deal with these and similar issues, I perform several robustness checks, which I describe below when presenting my main results. Online appendix A further explores the robustness of my findings.

## 4.3 WWI and Quotas: First and Long Difference Specifications

As discussed in Section 2, WWI and the Immigration Acts induced large and exogenous variation both in the number and in the ethnic composition of immigrants received by the United States over time. In this section, I explicitly rely on such variation to deal with the potential concern that aggregate migration flows by country of origin, $O_{jt}^{-M}$, might be endogenous to city-specific pull factors - something that would invalidate the instrument constructed in equation (2). In particular, I start by taking (stacked) first and long differences of equation (1). Next, I construct two separate instruments for the decadal change (1910 to 1920 and 1920 to 1930) in the number of immigrants received by a given city in the previous ten years. These instruments ($\Delta ZW_{cs}$ and $\Delta ZQ_{cs}$ in equations (3) and (4)) replace actual migration flows with a measure of predicted immigration from each sending region constructed exploiting directly WWI and the Immigration Acts.[29]

Formally, the 1910-1920 and the 1920-1930 changes in immigration are instrumented with, respectively,

$$\Delta ZW_{cs} = \frac{1}{\hat{P}_{cs,1920}} \sum_j \alpha_{jc} \left(1\left[Allies_j\right] \cdot O_{j,1910} - O_{j,1910}\right) \tag{3}$$

and

$$\Delta ZQ_{cs} = \frac{1}{\hat{P}_{cs,1930}} \sum_j \alpha_{jc} \left(Q_j - O_{j,1920}\right) \tag{4}$$

The term $O_{j,1910}$ (resp. $O_{j,1920}$) is the number of immigrants from country $j$ that entered the US between 1900 and 1910 (resp. 1910 and 1920). $1\left[Allies_j\right]$ in (3) is a dummy equal to 1 if sending country $j$ belongs to the Allies in WWI, and zero otherwise. Finally, $Q_j$ in (4) is the sum of the yearly quota for country $j$ specified by the Immigration Acts of 1921 and 1924.

The intuition behind equation (3) is that, if a country was not part of the Allies, its immigration was completely shut down between 1910 and 1920. If, instead, the country belonged to the Allies, there was no change in immigration from that specific country over this period. To visually depict this intuition, in Figure 7, I plot the number of immigrants that entered the United States in the previous decade (relative to 1910) from Germany (dashed blue line) and the UK (red line). While WWI reduced immigration for both countries, the drop in German immigration was twice as large (relative to 1910) as that in immigration from Great Britain.

Interacting (3) and (4) with year (i.e. 1920 and 1930) dummies, I re-estimate equation (1) in stacked first differences with 2SLS. In formulas, the second and the first stage equations become

$$FDy_{cs\tau} = \xi_{s\tau} + \beta_S FDImm_{cs\tau} + FDu_{cs\tau} \tag{5}$$

and

$$FDImm_{cs\tau} = \xi_{s\tau} + \beta_{FW} \left(\Delta ZW_{cs} \cdot \tau\right) + \beta_{FQ} \left(\Delta ZQ_{cs} \cdot \tau\right) + \varepsilon_{cs\tau} \tag{6}$$

where $FD$ refers to the first difference for period $\tau$, and $\xi_{s\tau}$ includes interactions between pe-

[29] Similarly to Sequeira et al. (2017), in online appendix A, I also construct a measure of predicted immigration that only exploits temperature and precipitation shocks in origin countries.

riod dummies and state dummies.[30] Variables $\Delta ZW_{cs}$ and $\Delta ZQ_{cs}$ in (6) are the instruments constructed in (3) and (4) above, and are both interacted with a full set of year dummies ($\tau$). While being econometrically more demanding, this strategy allows me to perform an important placebo check. Effectively, in (6) there are four instruments, but only two of them, i.e. the interactions between $\Delta ZW_{cs}$ (resp. $\Delta ZQ_{cs}$) and the 1920 (resp. 1930) dummy, should be statistically significant. In Section 4.4 below, I explicitly test this implication, and show that, reassuringly, the WWI (resp. the quota) instrument predicts changes in immigration only when interacted with the 1920 (resp. 1930) dummy.

As a further robustness check, below, I also report results from a long differences specification:

$$\Delta y_{cs} = \gamma_s + \beta_L \Delta Imm_{cs} + \Delta u_{cs} \tag{7}$$

where $\Delta$ is the 1910-1930 change, $\gamma_s$ refers to state fixed effects, and the first stage equation is given by

$$\Delta Imm_{cs} = \gamma_s + \beta_W \Delta ZW_{cs} + \beta_Q \Delta ZQ_{cs} + \Delta\varepsilon_{cs} \tag{8}$$

## 4.4 First Stage Results

Table 2 presents first stage results for the relationship between actual and predicted immigration, after partialling out city and state by year fixed effects. In column 1, the dependent variable is the fraction of immigrants over actual city population, and the regressor of interest is the baseline instrument constructed in equation (2). Columns 2 and 3 replicate column 1 by dividing the actual and the predicted number of immigrants by, respectively, 1900 and predicted population. In all cases, the F-stat is very high, and there is a strong and significant relationship between the fraction of immigrants and the instrument.[31]

Figure 8 reports the graphical analogue of column 3, plotting the relationship between the fraction of immigrants and the instrument, after partialling out city and state by year fixed effects. As it appears, the city of Passaic (NJ) experienced a large drop in immigration between 1910 and 1930, and one may be concerned that, for this reason, it influences the strength of the first stage. However, omitting this city barely affects the slope of the regression line (see red dashed line in Figure 8). Online appendix A replicates Table 2, and shows that none of the results is significantly affected when excluding Passaic from the analysis (see Table B2 and Figure B2).

From column 3 onwards, Table 2 presents estimates for specifications where both the

[30] Note that, now, there are two time periods, 1920-1910 and 1930-1920, and all variables refer to the change during that period.

[31] Results, not reported for brevity, are very similar to those presented in column 1 when including only city and year fixed effects.

actual and the predicted number of immigrants are scaled by predicted city population. Column 4 shows that the estimates are barely affected when aggregating the unit of analysis from cities to MSAs. Next, columns 5 and 6 report results for the stacked first differences and for the long differences specifications, i.e. equations (6) and (8) respectively. At the bottom of the table, columns 5 and 6 also present the p-value for the test of overidentifying restrictions. Reassuringly, in both cases, not only the F-stat is well above conventional levels, but also, the null hypothesis of overidentifying restrictions cannot be rejected. Furthermore, in column 5, the interaction between year dummies and the WWI instrument is significant only for 1920, while that between year dummies and the quota instrument is significant only for 1930. Conversely, when interacting the WWI and the quota instruments with, respectively, the 1930 and the 1920 dummies, coefficients are never statistically significant and, especially for WWI, an order of magnitude smaller.

As discussed above, a key condition for the validity of the instrument is that the characteristics of cities that attracted early immigrants did not have a direct effect on the evolution of economic and political conditions. In particular, one may be worried that immigrants before 1900 were attracted by larger industrial centers, that then kept on growing more also in subsequent decades. Moreover, the instrument mechanically predicts larger immigration to cities with a larger foreign born population at baseline. When presenting second stage results below, I check the robustness of the estimates to the inclusion of interactions between year dummies and the 1900 (log of) city and immigrants' population, and the 1904 (log of) value added by manufacture. These additional controls must also be included in the first stage, and results are presented in columns 7 and 8 of Table 2. Not surprisingly, the F-stat falls relative to column 1, but remains well above conventional levels. Similarly, even though the magnitude of coefficients becomes somewhat lower, neither their economic nor their statistical significance is affected.

Overall, Table 2 suggests that there is a strong relationship between actual and predicted immigration, which is robust to the use of different specifications and alternative ways of constructing the instrument.

# 5 The Economic Effects of Immigration

In this section, I show that immigration increased natives' employment and their occupational standing, and that, even in a sector heavily exposed to immigrants' competition like manufacturing, there was no significant reduction in either employment or wages (Section 5.1). In Section 5.2, I provide evidence that this was made possible by two mechanisms: first, because of complementarity, natives tended to specialize in occupations where they had a comparative advantage relative to immigrants; second, firms' investment and industrial expansion absorbed the supply shock brought about by immigration, and provided natives with opportunities for skill upgrading.

## 5.1 Natives' Employment

### 5.1.1 Main Results

In Table 3, I study the effects of immigration on employment outcomes of native men.[32] Throughout the paper, I always report the mean of the dependent variable at baseline as well as the F-stat associated with first stage results shown in Table 2. The dependent variable is the employment to population ratio for native males of working age in Panel A, and the log of natives' occupational scores in Panel B. OLS estimates of equation (1) are reported in column 1, while column 2 presents 2SLS results from my baseline specification, where the fraction of immigrants (over predicted population) is instrumented with the leave-out shift-share instrument constructed in equation (2).

Starting from employment, both OLS and 2SLS coefficients are positive and significant, with the latter being slightly larger than the former. The point estimate in column 2 implies that a one standard deviation increase in the fraction of immigrants (0.05) raises natives' employment probability by 1.5% relative to its 1910 mean. Said differently, for every 10 new immigrants, two more natives found a job. Panel B documents that immigration had a strong, positive effect on natives' log occupational scores. Since occupational scores measure cross-occupational changes in earnings, these findings suggest that the employment effects reported in Panel A likely came from occupational and skill upgrading. Differently from Panel A, in Panel B, 2SLS estimates are an order of magnitude larger than OLS. One possible explanation for this pattern, in addition to the presence of measurement error, is that OLS is downward biased because immigrants tended to move to places with fewer opportunities for skill upgrading.

Subsequent columns of Table 3 explore the robustness of the main results presented in column 2.[33] First, to test for pre-trends, the 1900 to 1910 change in employment and in log occupational scores is regressed against the 1910 to 1930 instrumented change in immigration (column 3). Reassuringly, in both cases, the coefficient on immigration is not statistically significant, very imprecisely estimated, and quantitatively different from the estimates reported in column 2.

[32] In my baseline specification, I consider men in the age range 15 to 65, but results are robust to the use of different age thresholds (see also Carlana and Tabellini, 2017).

[33] Additional checks are reported in online appendix A.

Appendix Figures A7 and A8 provide residual scatterplots for the reduced form estimates of specifications presented in columns 2 and 3 of Panel A. These figures visually confirm the strong association between (predicted) immigration and employment between 1910 and 1930 (Figure A7), and show that there is no significant relationship between the 1900 to 1910 change in natives' employment and the 1910 to 1930 change in the instrument (Figure A8). Passaic (NJ) negatively influences the slope of the regression line, and the effects of immigration on natives' employment become somewhat larger and more precisely estimated when omitting this city (see dashed line in Figure A7 and Table B4 in online appendix A).

In column 4, I document that scaling both the actual and the instrumented number of immigrants by 1900, rather than predicted, population does not alter my findings in a significant way.[34] In addition, to (indirectly) address the potential concern that estimates in column 2 may be partly due to natives' geographic mobility (Borjas, 2016), I replicate the analysis aggregating the unit of analysis to the MSA level (column 5).[35] Reassuringly, results remain quantitatively very similar to those reported in column 2, even though the coefficient in Panel B is no longer significant.[36]

Next, columns 6 and 7 replace the baseline instrument from (2) with that constructed exploiting directly variation induced by WWI and by the Immigration Acts (i.e., equations (3) and (4) in Section 4.3). Column 6 reports results for the stacked first differences regression (equation (5)), and column 7 estimates the long differences specification (equation (7)). Coefficients from the long and the stacked first differences regressions bound respectively from above and from below those obtained using the standard shift-share instrument, and results always remain statistically significant and in line with those reported in column 2.

Finally, I replicate the analysis interacting year dummies with, respectively, the (log of) 1900 city and immigrants' population, and the (log of) 1904 value added by manufacture (columns 8 and 9). This exercise is performed to check if the characteristics of cities that may have attracted more immigrants before 1900 also had persistent effects on the evolution of the economic environment. In either case, results are barely affected: the effects of immigration on natives' employment and occupational scores remain statistically significant

[34] As noted by Card and Peri (2016), dividing the number of immigrants by contemporaneous population may mechanically introduce a negative correlation between changes in the outcomes of interest and immigration. Even though this concern applies to actual (but in general not predicted) population, if predicted and actual population are highly correlated, the estimates presented in column 2 may suffer from the same problem.

[35] Historical accounts suggest that, differently from what happened with the Great Migration of blacks from the South to the North of the United States (Boustan, 2010), natives did not systematically leave cities in response to European immigration. Moreover, in line with this idea, I show below (Table A7) that, if anything, immigration promoted internal in-migration.

[36] The lower precision of these estimates should not be surprising, given that when aggregating observations up to the MSA level the number of units moves from 180 to 127.

and quantitatively similar to the baseline estimates reported in column 2. As discussed in online appendix A, results are also robust to interacting year dummies with 1900 skill ratios, value of industrial production, the employment share in manufacturing, and the fraction of blacks (see Tables B7 to B9).

### 5.1.2 Placebo Checks and Manufacturing Wages

I present additional results for the effects of immigration on natives' employment in Table A4, reporting OLS and 2SLS estimates in Panels A and B respectively. Consistent with findings discussed above, immigration had a positive and significant effect both on the fraction of natives holding any gainful occupation (column 1) and on the ratio of high to low skill natives (column 2).[37] Columns 3 and 4 perform a falsification exercise and show that immigration did not lead to employment gains for either illiterate natives or African Americans, two groups for which leaving unskilled occupations, where most recent immigrants were employed, would have been extremely difficult. Also, and reassuringly, immigration had a negative, although not statistically significant, effect on employment of previously arrived immigrants, which vanished for those that had spent at least 20 years in the United States (see Figure A9).[38]

Similarly, the inflow of immigrants did not significantly increase employment for natives working as manufacturing laborers (Table A4, column 5), an occupation highly exposed to immigrants competition (see Table A3).[39] It is worth noting, though, that even in this heavily exposed occupation, immigration did not lead to employment losses among natives, possibly because manufacturing was able to expand, in turn absorbing the immigration-induced supply shock. In line with this idea, total employment in manufacturing increased almost one for one with immigration (Table A4, column 6).

Even if immigration had a positive effect on natives' employment, and no negative effect even for natives working in highly exposed sectors, it is nonetheless possible that it lowered wages at least for some workers. Unfortunately, the US Census of Population did not collect income or wage data prior to 1940, and so, this issue cannot be directly addressed using census data. While occupational scores can be used to proxy for natives' income, they may not capture short-run, within occupation changes in earnings.

To partly overcome this limitation, in column 7 of Table A4, I estimate the effects of im-

[37]The skill ratio in column 2 is measured as the log of natives holding skilled occupations to the log of natives holding unskilled jobs. To classify workers across skill categories, I follow Katz and Margo (2014). As for occupational scores, also for skill ratios, OLS estimates are an order of magnitude smaller than 2SLS ones.

[38]See online appendix A for a more extensive discussion of Figure A9.

[39]In 1910, recent immigrants were twice as likely as natives to be employed in unskilled occupations. Similarly, while around 21% of natives were working in manufacturing, almost 45% of immigrants were employed in this sector.

migration on (log) average manufacturing wages, digitized from the Census of Manufactures. These data do not distinguish between natives and immigrants. Since new immigrants were closer substitutes for previously arrived immigrants than for natives (see also Figure A9), and because manufacturing was one of the most exposed sectors to immigrants' competition, one can confidently interpret these results as a lower bound for the impact of immigration on natives' earnings.

The coefficient in column 7 is negative but not statistically significant, and standard errors are very large. In addition to being very noisy, the implied magnitude is also relatively small: according to the coefficient in column 7, a five percentage points (equivalent to a one standard deviation) increase in the fraction of immigrants lowers wages in manufacturing by less than 1%. Based on this evidence, one cannot conclude that, even in a heavily exposed sector, immigration lowered wages in receiving cities. This finding is somewhat in contrast with Goldin (1994), who finds that European immigration had a negative effect on earnings of workers in selected industries between 1890 and 1915. This discrepancy may result from the fact that Goldin focuses on a slightly earlier period and on a different sample of cities, or from differences in the empirical strategy.

## 5.2 Mechanisms

The positive employment effects estimated in Table 3 are in contrast with some results from the contemporary immigration literature such as Borjas (2003), Borjas and Katz (2007), and Dustmann et al. (2017) among others, who find a negative and significant effect of immigration on natives' labor market outcomes. My findings are also somewhat different from those of a number of contemporaneous cross-city studies that estimate a zero effect of immigration on natives' wages (e.g. Card, 2001, 2005). However, they are consistent with a recent body of the literature which documents a positive impact of immigrants on natives' wages and occupational mobility (e.g. Ottaviano and Peri, 2012; Foged and Peri, 2016). In particular, the increase in occupational scores and skill ratios is in line with Peri and Sparber (2009) and Foged and Peri (2016) for the contemporaneous period in the US and Denmark respectively.

The appendix lays out a theoretical framework that builds on a standard model of directed technical change (Acemoglu, 2002) where the direct, negative effect of immigration on labor market outcomes of unskilled natives is counterbalanced, and potentially reversed, by two offsetting forces. First, firms' incentives to invest in capital increase with immigration, raising demand for both unskilled and skilled workers. Second, complementarity between immigrants and natives can induce the latter to reallocate their labor from unskilled to skilled occupations, where they might have a comparative advantage. The model can explain the positive effect of immigration on natives' employment and occupational standing as well as the additional results in this section.

### 5.2.1 Occupational Upgrading

I start by investigating the possibility that, because of complementarity, immigration fostered natives' occupational mobility. In particular, in Table 4, I study the effects of immigration on the fraction of natives employed in specific occupations, exploiting the granularity of full count census data. I proxy for the degree of exposure to immigrants' competition using the ratio of the probability that natives and immigrants held a given occupation in 1910, reported at the bottom of Table 4: values below (resp. above) 1 indicate that immigrants were over (resp. under) represented relative to natives (see also Table A3).

Columns 1 to 3 consider three occupations that were heavily exposed to immigrants' competition and required relatively low skills as well as language proficiency (manufacturing laborers, waiters, and blacksmiths). While the coefficient is statistically significant only in column 3, the point estimates are consistently negative, suggesting that natives responded to immigration by moving away from these occupations. In line with this interpretation, columns 4 to 6 document a significant increase in the fraction of natives employed in more skilled and less exposed occupations such as manufacturing foremen (column 4), electricians (column 5), and engineers (column 6). These findings can be effectively summarized using the words of Jewish-American economist and statistician Isaac Hourwich who, in 1912, noted that "the effect of immigration upon the occupational distribution of industrial wage earners has been the elevation of the English-speaking workmen to the status of an aristocracy of labor, while the immigrants have been employed to perform the rough work of all industries" (Meyer, 1981).

Among the occupations considered in Table 4, manufacturing foremen experienced the largest percent increase relative to the 1910 mean in response to immigration (Figure 9). This seems plausible for two reasons. First, becoming supervisors or floor managers did not require significant investment in education, and so even natives that were already in the labor force could be employed there relatively quickly. Second, as I show below, immigration promoted the expansion of manufacturing, not only allowing to absorb the supply shock, but also creating new job opportunities for natives.[40]

If immigration induced natives to specialize in more skilled occupations because of e.g.

[40] Figure A10 in the appendix replicates results presented in Figure 9 focusing on immigrants arrived in the United States more than 10 years before (rather than natives), and reassuringly shows that immigration did not favor occupational upgrading for this group.

complementarity, this effect should be stronger when immigrants were less skilled and had lower English proficiency. To investigate this idea, in online appendix A, I classify immigrants as coming from linguistically close and far countries using the measure constructed by Chiswick and Miller (2005). Consistent with the mechanism discussed above, occupational upgrading occurred only when immigrants were linguistically farther from natives (Table B13, Panel A).

### 5.2.2 Firms' Investment and Industrial Expansion

As noted above, for natives' employment to increase, immigration must have also stimulated economic activity, inducing firms to create new jobs. Otherwise, absent changes in labor demand, it would be hard to reconcile the labor supply shock induced by immigration with the positive employment effects estimated above. To test this idea, in Table 5, I investigate the impact of immigration on (the log of) value added per establishment and (the log of) establishment size in Panels A and B respectively. The structure of the table mirrors that of Table 3: columns 1 and 2 report results from the baseline specification for OLS and 2SLS, while columns 3 to 9 repeat the same checks performed for Table 3.[41]

2SLS estimates are positive, statistically significant, and economically large. Coefficients in column 2 imply that a one standard deviation increase in immigration raised industrial production and establishment size by approximately 10%.[42] Appendix Figure A11 presents the residual scatterplot corresponding to the reduced form estimates of Panel A (column 2), and confirms visually the strong relationship between (predicted) immigration and value added per establishment. Reassuringly, there is no correlation between pre-migration changes in economic activity and subsequent (predicted) changes in immigration (column 3), and results are robust to all checks discussed above (columns 4 to 9).[43] Consistent with the strong industrial expansion documented in Table 5, I also find that immigration had a large effect on capital utilization (Table A5, column 4) and on firms' productivity (Table A5, column 5).[44]

These findings are in line with the historical evidence reviewed in Section 2 and, importantly, can explain the positive employment effects brought about by immigration. First,

[41] As for Table 3, additional robustness checks are presented in online appendix A.

[42] As in Sequeira et al. (2017), who use a very different estimation strategy, OLS estimates are somewhat lower than 2SLS. One possible reason for this pattern is that OLS is downward biased as immigrants endogenously selected places with lower growth potential because of congestion or natives' discrimination.

[43] Results in Table 5 are also robust to using different proxies for economic activity (Table A5, columns 1 to 3).

[44] Consistent with the literature, I proxy for capital utilitazion using the log of horsepower (results are robust to using the log of horsepower per capita or per establishment). To estimate the effects of immigration on productivity, I assumed a Cobb-Douglas production function with two factors of production, capital and (homogeneous) labor.

industrial expansion allowed the economy to absorb the large supply shock by creating new jobs for both high and low skilled workers. Second, it provided natives with opportunities for skill upgrading. For instance, when describing the internal organization of production in the booming auto industry, Stephen Meyer writes that "an ethnic division of labor prevailed that relied on assumed stereotypical traits of different ethnic groups. The most skilled positions were reserved for native-born Americans...The laborers and unskilled workers were mostly the newer immigrants from southern and eastern Europe...".[45]

A related possibility is that the inflow of immigrants encouraged the adoption of new technologies that made intensive use of electricity, e.g. the assembly line, in turn raising the demand for managers and supervisors, and for high skilled workers such as electricians (Goldin and Katz, 2009; Katz and Margo, 2014). Lack of systematic data on electricity use at the city level before 1940 prevents me from investigating this idea directly. However, I digitized data on the share of horsepower coming from electricity reported in the 1929 Census of Manufactures for selected US counties. Aggregating the data to the MSA level, and running cross-sectional regressions, I find that MSAs that received more immigrants between 1910 and 1930 had a larger share of power coming from electricity in 1930 (Table A6). Because of the cross-sectional nature of this exercise, the evidence in Table A6 should be interpreted as only suggestive.[46] Nevertheless, it is consistent with the idea that immigration may have induced a faster adoption of electricity and of related technologies.

If immigrants increased labor market opportunities for natives and made cities economically more attractive, immigration may have also encouraged internal in-migration. Since prior to 1940 statistics on internal migration in the US do not exist, I proxy for the number of internal movers by looking at the fraction of males in working age that were born outside the state of their city of residence (see also Bandiera et al., 2017). As I show in Table A7, immigration had a positive and significant effect on the fraction of internal movers (column 1). Reassuringly, the 1900 to 1910 change in the fraction of natives born in another state does not predict the (instrumented) change in immigration in subsequent decades (column 2).

Somewhat surprisingly, the positive effect of immigration on internal migrants is not driven by growing cities (column 3), but, instead, by cities whose 1910-1930 population growth rate was below the median (column 4). This result suggests that the inflow of immigrants may have acted as a lift for otherwise declining cities.[47] These findings are also

[45] See http://www.autolife.umd.umich.edu/Labor/L_Overview/L_Overview2.htm.

[46] All regressions control for state fixed effects. Columns 2 and 4 also include a number of 1900 controls such as city and immigrants population, skill ratios, and measures of industrial production.

[47] Also consistent with the idea that immigration brought economic prosperity to US cities in this period, Carlana and Tabellini (2017) document that the inflow of immigrants had a large, positive effect on marriage

consistent with the idea that at least part of the employment responses to immigration are due to the behavior of "outsiders", i.e. natives not originally living in the local labor markets exposed to the immigration shock (see also Dustmann et al., 2017).

# 6 The Political Effects of Immigration

In this section I show that, despite its large economic benefits, immigration triggered hostile political reactions. First, cities receiving more immigrants cut tax rates and public spending, especially in categories where either inter-ethnic interactions are more salient (education) or poorer immigrants would get larger implicit transfers (garbage collection, sewerage), suggesting that immigration lowered natives' demand for redistribution (Section 6.1). Second, the inflow of immigrants reduced support for the pro-immigration party (i.e., Democrats) and increased the Republican-Democrat vote margin (Section 6.2). Third, immigration was associated with the election of more conservative representatives who were, in turn, more likely to vote in favor of the 1924 National Origins Act (Section 6.3).

## 6.1 Tax Revenues and Public Spending

At least until the Great Depression, US cities were responsible for the provision of public goods such as education, police, and spending on welfare or on infrastructure (e.g. roads, sewerage, etc.), while the federal (or the state) government played only a marginal role (Monkkonen, 1990). Also, since federal and state transfers were very limited, cities had to independently raise funds to finance their expenditures. More than 75% of cities' resources came from local taxes, with property taxes accounting for around 90% of total tax revenues (Fisher, 1996). Even though cities could issue debt, property tax rates represented the key (fiscal) policy variable at disposal of local public officials.[48] It follows that, if immigration lowered the desired level of redistribution and natives' utility from public goods' consumption, one would expect to find larger reductions in tax revenues, and in particular in tax rates, in cities that received more immigrants.

Motivated by this discussion, in Table 6, I study the effects of immigration on tax rates (Panel A) and public spending per capita (Panel B). As for the key economic outcomes (Tables 3 and 5), columns 1 and 2 report results from the baseline specification for OLS and 2SLS respectively, while columns 3 to 8 repeat all the checks performed for Tables 3 and 5.[49]

rates of both native women and native men, as well as on fertility and on the probability that young adults left the parental house earlier.

[48] Different from today, at the time, spending or tax limits were very rare in US cities.

[49] Data on property tax rates was not reported for the city of Pittsfield (MA) in 1930: for this reason, the

Immigration is associated with a significant decline in both tax rates and public spending per capita, suggesting that the inflow of immigrants lowered (natives') demand for public services. Coefficients in column 2 of Panels A and B imply that a one standard deviation increase in the fraction of immigrants (0.05) reduced property tax rates and public spending per capita by, respectively, 7.5% and 5% relative to their 1910 average.

Reassuringly, the 1906 to 1910 change in neither tax rates nor public spending is correlated with the 1910 to 1930 change in (instrumented) immigration (column 3). Moreover, coefficients in column 3 are close to zero and imprecisely estimated.[50] When performing the additional checks, in columns 4 to 8, the precision of the estimates for the tax rate deteriorates, but their magnitude remains in line with that reported in column 2. Likewise, the relationship between public spending per capita and immigration is quantitatively similar to that estimated in column 2 and always statistically significant. In column 8, which includes interactions between year dummies and the 1904 value added by manufacture, the point estimate is twice as large (in absolute value) as that in column 2. This pattern, however, is due to the slightly different sample for which industrial data were reported in 1904 (see Table B5 in online appendix A).

Table A8 documents that the inflow of immigrants reduced total and property tax revenues per capita (columns 1 and 2). Not surprisingly, since most local government revenues came from property taxes, coefficients in columns 1 and 2 are very similar to each other. 2SLS results (Panel B) are close to OLS ones (Panel A), and imply that a one standard deviation (0.05) increase in the fraction of immigrants lowered property tax revenues per capita by 5% relative to the 1910 mean. Consistent with a net reduction in tax revenues, lower tax rates were not compensated by a significant increase in either property values (columns 3 and 4) or in business taxes per capita (column 5).[51]

Taken together, these findings suggest that the inflow of immigrants lowered (natives') demand for redistribution and induced cities to cut tax rates. In line with the latter interpretation, Table A9 shows that the decline in public spending per capita was larger for categories like education (column 1) and sanitation, sewerage and garbage collection (col-

number of observations in Panel A is 539, rather than 540 as in Panel B. Relative to Tables 3 and 5, Table 6 does not replicate results aggregating the unit of analysis at the MSA level, since tax rates and public spending are the by-product of the political process taking place at the city level. See online appendix A for additional robustness checks.

[50] 1906 is used because this is the first year for which the Financial Statistics of Cities collected data in a way that is comparable to subsequent years. As for Table 3, Figures A12 and A13 in the appendix plot the residual scatterplots of the reduced form estimates of columns 2 and 3 (Panel A).

[51] In a related project, Tabellini (2017), I find that the migration of southern born African Americans lowered tax revenues in northern cities, but that this happened through a reduction in property values, which resulted from whites' decision of moving to the suburbs (i.e., the white flight; see Boustan, 2010, among others).

umn 5) where inter-racial interactions are likely to be more salient or poorer immigrants would get larger implicit transfers. Similarly, even if the coefficient for spending on charities and hospitals (column 4) is not significant, the point estimate is quite large, relative to its baseline mean.

## 6.2 Presidential Elections

I now investigate how immigration affected electoral outcomes in receiving places. Since prior to 1951 systematic data on municipal elections do not exist (see de Benedictis-Kessner and Warshaw, 2016), I focus on Presidential elections between 1910 and 1930, using data from Clubb et al. (1990). Because electoral results are only available at the county level, I aggregate them at the MSA level, using 1940 MSA definitions.[52] In Panel A of Table 7, I focus on the Democrats' vote share, reporting OLS and 2SLS estimates from the baseline specification in columns 1 and 2, and additional robustness checks in columns 3 to 8.

The inflow of immigrants had a negative and statistically significant effect on support for Democrats, which was also economically relevant. In particular, the 2SLS coefficient in column 2 implies that a one standard deviation increase in the fraction of immigrants reduced the Democrats' vote share by approximately 5% relative to its 1910 mean. Reassuringly, no such relationship is found between the 1900-1910 change in the Democrats' vote share and the 1910-1930 change in the instrument (column 3). Subsequent columns of Table 7 (Panel A) document that results are qualitatively unchanged for most robustness checks. However, the coefficient drops to zero when either using the stacked first difference specification (column 5) or interacting year dummies with 1900 city and immigrants population (column 7). Somewhat reassuringly, though, this pattern seems to be confined to these two specifications (see additional results in online appendix A), and does not emerge when considering other political outcomes (see Section 6.3 and Panel B of Table 7).

As I show in Table A10, the negative effect of immigration on the Democrats' vote share was accompanied by increasing support for third parties (column 2) and, to a lesser extent, for Republicans (column 1). Even if the coefficient in column 1 is not statistically significant, immigration had a very strong, negative effect on the Democrats-Republicans margin (column 3). Specifically, the estimates in column 3 (Panel B) imply that a one standard deviation increase in the fraction of immigrants reduced the Democrats-Republicans margin by approximately 12% relative to its 1910 mean - a sizeable effect.

While both Republicans and Democrats tried to win immigrants' support, between 1890

[52] As discussed in Section 3, since Presidential elections are held every four years, I computed the average between the closest two elections after each Census year. Results are unchanged when taking the average from the two closest election years (see Table B12 in online appendix A).

and 1940, most naturalized immigrants tended to vote for the Democratic party (Shertzer, 2016).[53] The Irish are probably the most emblematic example, but this was true also of other ethnic groups such as Italians (Luconi, 1996).[54] I examined the voting behavior of members of the House who represented the 180 cities in my sample between 1910 and 1930, finding that Democrats were significantly less likely to vote in favor of both the literacy test of 1917 and the Immigration Acts of 1921 and 1924. Even after controlling for state fixed effects, immigration, and a number of 1900 city characteristics, Democratic legislators were 20 percentage points more likely to vote against the immigration restrictions.

One possible interpretation for my results is that immigration triggered natives' political backlash, and reduced support for the pro-immigrant party, i.e. Democrats. These ideas are corroborated by historical accounts, which document that, during the Progressive Era, political reformers were often openly racists and directly involved in the eugenic society (Leonard, 2005, 2016). The policy platform of Progressives was centered on radical urban reforms aimed at dismantling the political machines, whose main supporters were precisely the foreign born (e.g. Erie, 1990; Menes, 1999). Since data on votes by ethnicity (or place of birth) are not available, these conjectures cannot be tested directly. However, they are consistent with results obtained for the contemporaneous period by Mayda et al. (2016), Dustmann et al. (2016), and Becker and Fetzer (2016) in the US, Denmark, and the UK respectively.[55]

Finally, immigration had a negative and significant effect on turnout, likely due to the fact that, over time, immigrants obtained citizenship but their political participation was lower than that of natives (Table A10, column 4). This idea is in line with historical accounts documenting that the political engagement of immigrants fell sharply after 1910 (Kleppner, 1982). Also, as I discuss below, it weighs against the possibility that the direct effect of immigrants' preferences is the main channel behind the changes in public spending and in tax rates estimated in Section 6.1.

## 6.3 Congressmen Ideology and Voting Behavior

### 6.3.1 Legislators' Ideology

In Panel B of Table 7, I estimate the effects of immigration on the ideology of members of the House that represented the 180 cities in my sample in each Congress corresponding to

[53] Shertzer (2016) notes that the Democratic party was particularly appealing to foreign born because of its support for ethnic parochial schools and its opposition to the prohibition of alcohol.

[54] Similarly, Kleppner (1979) estimates that more than 80% of Catholics in Iowa voted for the Democratic party by the end of the nineteenth century.

[55] See also Barone et al. (2016) for Italy, and Halla et al. (2017) for Austria.

the three Census years considered in my analysis, i.e. Congress 61 (1909-1911), Congress 66 (1919-1921), and Congress 71 (1929-1931). As discussed in Section 3, following Autor et al. (2016), I proxy for Congress members' ideology using the first dimension of the DW Nominate scores (Poole and Rosenthal, 1985; McCarty et al., 2006), and conduct the analysis at the city by congressional district level.[56] While most of the city-congressional district combinations did not change between 1910 and 1930, redistricting between the $61^{st}$ and the $66^{th}$ Congress prevents the construction of a balanced panel including all cities in my sample. For this reason, I present results for both the unbalanced panel (Table 7) and the balanced panel that includes only cities not affected by redistricting between 1910 and 1920 (Table 8, column 2).[57]

In what follows, I focus on the 2SLS baseline specification, reported in column 2 of Table 7 (Panel B), but, as it appears from subsequent columns, results are robust to all the checks discussed extensively above for other variables. Immigration had a positive and significant effect on legislators' Nominate scores.[58] Quantitatively, this effect is large, and not very different from that in Autor et al. (2016) for the impact of import competition. Specifically, a one standard deviation increase in the fraction of immigrants increases Nominate scores by approximately 0.25 standard deviations.[59] Similarly, Autor et al. (2016) estimate that a one standard deviation increase in trade exposure raises Nominate scores by 0.36 standard deviations.

Since the analysis is conducted at decennial frequency, most of the effect of immigration on legislators' Nominate scores comes from the election of new, more conservative representatives, rather than from changes in the ideology of incumbent politicians.[60] Note that the increase in Nominate scores can come from the election of either more moderate (i.e. less liberal) Democrats or more conservative (i.e. less moderate) Republicans. Moreover, since immigration had a strong impact on the Republican-Democrat vote margin (Table A10, column 3), the rise in Nominate scores may simply reflect a shift from moderate Democrats to moderate Republicans.

[56] DW Nominate scores rank Congress members on an ideological scale from liberal to conservative using voting behavior on previous roll-calls, with higher (lower) values indicating a more conservative (liberal) ideology.

[57] To ease comparisons, column 1 of Table 8 replicates the baseline specification of Table 7 (Panel B).

[58] The difference between OLS (column 1) and 2SLS (column 2) estimates is consistent with immigrants endogenously choosing to locate in cities with a less hostile political environment. Column 2 of Table 8 confirms that results are similar when restricting the analysis to the balanced panel of cities to congressional districts.

[59] This number is obtained by multiplying the coefficient in column 2 (Panel B) by a one standard deviation increase in immigration (0.05), and dividing it through the 1910 standard deviation in the DW Nominate scores (0.372).

[60] Indeed, only in six cases, the same congressman in office in 1910 was also in office in 1930.

Columns 3 to 6 of Table 8 address these issues by studying if immigration affected the probability of electing, respectively, a liberal Democrat (column 3), a moderate Democrat (column 4), a moderate Republican (column 5), or a conservative Republican (column 6). Liberal (resp. moderate) Democrats are defined as legislators with a Nominate score below (resp. above) the median score for Democrats in the $61^{st}$ Congress. Likewise, a Republican legislator is classified as moderate (resp. conservative) if his Nominate score is below (resp. above) the median score for Republicans in the $61^{st}$ Congress. Similar results are obtained when classifying legislators relative to the four quartiles of the overall 1910 distribution of Nominate scores.

The replacement of more liberal Democrats with more moderate Democrats is not responsible for the rise in Nominate scores estimated in Table 7. In fact, even though the point estimate is not significant at conventional levels, there is a negative and quantitatively large effect of immigration on the probability of electing a moderate Democrat (column 4). Also, moderate Democrats are not replaced by moderate Republicans (column 5), but rather by conservative Republicans (column 6). Figure 10 visually displays this pattern, by plotting 2SLS coefficients reported in columns 3 to 6 of Table 8. Interpreting the magnitude of these results, a one standard deviation increase in immigration raises the probability of electing a conservative Republican by 12 percentage points relative to its 1910 mean. This effect is, once again, close to that estimated in Autor et al. (2016), who find that a one standard deviation increase in trade exposure increases the probability of electing a conservative Republican by 17.5 percentage points.

Results presented in Tables 7 and 8 are in line with those from a number of recent studies documenting that the waves of refugees have increased support for right-wing, populist parties as well as political polarization in Europe (Dustmann et al., 2016; Halla et al., 2017). They are also consistent with the idea advanced by McCarty et al. (2006) that immigration could be responsible for the rise in political polarization experienced by the US in the past three decades. However, politicians' ideology, measured on a liberal-conservative scale, may be only an indirect proxy for anti-immigration sentiments. For this reason, in the next section, I explicitly investigate the voting behavior of legislators on the 1924 National Origins Act, the bill that ultimately put an end to the era of unrestricted immigration to the US, and that governed American immigration policy for more than 40 years.

#### 6.3.2 Legislators' Voting Behavior and the National Origins Act

The National Origins Act, approved in 1924 as part of the Johnson-Reed Act, was the last of a series of attempts undertaken by the US Congress to restrict immigration in the early twentieth century, and remained in place until 1965. While Congress approved the literacy test in 1917 and the Emergency Quota Act in 1921, it was not until the passage of the National Origins Act that the inflow of immigrants, especially from Eastern and Southern Europe, was effectively and permanently shut down. On the one hand, even though the literacy test was accompanied by a heated political debate (Goldin, 1994), by the time of its approval it was no longer binding. On the other, the Emergency Quota Act introduced only temporary measures, which were then made permanent (and more stringent) with the National Origins Act of 1924.[61] For these reasons, I focus on the 1924 Immigration Act, and not on its predecessors.

As for Section 6.3.1, the analysis is conducted at the city by congressional district level, and the attention is restricted to members of the House who represented the 180 cities in my sample during the Congress that approved the National Origins Act, i.e. Congress 68. Since I examine voting behavior at a specific point in time, redistricting is no longer an issue. However, precisely because of the cross-sectional nature of the analysis, results should be interpreted as suggestive. With this caveat in mind, columns 7 and 8 of Table 8 document a positive and significant relationship between a legislator's propensity to vote in favor of the National Origins Act and the 1910 to 1920 change in the fraction of immigrants received by the city (or cities) he represented. Column 7 only includes state fixed effects, while column 8 also controls for a number of 1900 characteristics, such as the fraction of Europeans and of African Americans, as well as congressmen party of affiliation. Even if the magnitude of the coefficient in column 8 is somewhat lower, the association between immigration and representatives' voting behavior remains positive and significant.

To indirectly gauge the size and the direction of the potential bias of results in columns 7 and 8 due to the impossibility of including city (and state by year) fixed effects, Table B6 in online appendix A replicates findings in columns 1 to 6 of Table 8 using cross-sectional regressions. To mirror as closely as possible the specification reported in columns 7 and 8, in Table B6, the 1920 DW Nominate score is regressed on the (instrumented) 1910 to 1920 change in immigration and on state fixed effects. Reassuringly, results remain statistically significant and quantitatively close to those reported in the main text.

As in all other columns of Table 8, in columns 7 and 8, OLS estimates are lower (in absolute value) than 2SLS, consistent with immigrants endogenously selecting cities with a more friendly political environment. To interpret the magnitude of these results, the

[61] The 1921 Emergency Quota Act temporarily limited the number of immigrants from any given country that could enter the United States to 3% of the 1910 population of each ethnic group. With the 1924 National Origins Act, which made the 1921 Immigration Act permanent, the ceiling was lowered to 2% and the "base" year was moved to 1890. These two changes were undertaken to shut down the inflow of immigrants from "undesired" sources, such as Eastern and Southern Europe. As the *Saturday Evening Post* put it, "if there is one thing we need more than another it is a little discrimination in our immigration policy" (Spiro, 2009).

coefficient in column 8 implies that, when comparing cities at the $25^{th}$ and $75^{th}$ percentiles of immigration, legislators representing the more exposed city were more likely to vote in favor of the National Origins Act by approximately 10 percentage points. While this is a large effect, it does not seem unreasonable, given that immigration was at that time (as it is today) at the forefront of the political debate. Moreover, these findings are quantitatively in line with those in Mian et al. (2010), who show that a one standard deviation increase in the mortgage default rate during the 2007 Great Recession increases legislators' propensity to support the American Housing Rescue and Foreclosure Prevention Act by 12.6 percentage points.

## 6.4 Interpretation of Results

Taken together, results in Sections 6.1 to 6.3 suggest that immigration triggered widespread political reactions. First, immigration reduced tax rates and public spending, possibly by lowering natives' demand for redistribution. Second, the inflow of immigrants was associated with a fall in the Democrats' vote share and an increase in the Republican-Democrat vote margin, consistently with rising support for the anti-immigration party. Third, cities receiving more immigrants elected more conservative members of the House of Representatives who were in turn more likely to vote in favor of the 1924 National Origins Act.

The idea that immigration lowered natives' demand for redistribution and induced cities to cut taxes is consistent with several historical accounts (e.g. Higham, 1955; Leonard, 2016). For example, in 1907, Prescott Hall, one of the founders of an influential anti-immigration movement, the *Immigration Restriction League*, stated that America was "receiving a great many immigrants who are not only worth nothing to the country, but are a positive [public] expense". The inflow of immigrants may have reduced natives' desired level of public spending for two related reasons. First, most immigrants, at least until 1920, came from relatively poor countries, and may have thus been perceived as a fiscal burden by natives. Second, a large literature has shown that preferences for redistribution and the utility of public goods' consumption are lower when ethnic diversity is higher (e.g. Easterly and Levine, 1997; Alesina et al., 1999). In Section 7 below, I return to this issue and, exploiting variation in immigrants' backgrounds, show that higher cultural and ethnic diversity were associated with larger reductions in tax revenues and in public spending.

While the evidence in Section 6.1 is consistent with the idea that immigration triggered natives' backlash reactions and lowered their demand for public goods provision, there exist a few alternative interpretations. First, at that time, after five years immigrants could apply for citizenship, becoming eligible to vote (Shertzer, 2016). If immigrants had different preferences relative to natives, changes in public spending and in tax rates may have resulted from the direct effect of immigrants' preferences rather than from natives' reactions. This idea, however, is inconsistent with electoral results presented in Sections 6.2 and 6.3, and with the historical literature documenting that, after 1910, the political involvement of foreign born fell steadily.[62] Moreover, it seems somewhat implausible that poorer immigrants, who would have benefitted from higher redistribution, voted in favor of lower tax rates and public spending.

A second interpretation for the findings in Section 6.1 is that immigration altered the income distribution in receiving cities and, for reasons completely unrelated to political backlash, shifted natives' preferences towards a lower tax rate-public spending bundle. In particular, since immigrants fostered economic activity and increased natives' occupational standing (see Section 5), it is possible that the (native) median voter became richer, in turn voting to cut taxes and limit redistribution (e.g. Meltzer and Richard, 1981). Lack of systematic income or wage data, unfortunately, prevents me from testing this interpretation in detail.

However, two pieces of evidence provided in my work suggest that this mechanism alone cannot explain the negative effects of immigration on public spending and tax rates estimated in Table 6. First, legislators representing cities that received more immigrants were more likely to support the passage of the immigration restrictions (Section 6.3). Second, as I show below, immigration had heterogeneous effects on taxes and spending, which depended on immigrants' religious affiliation, and more generally, on the cultural distance between immigrants and natives (Section 7.1).

Yet another possibility is that immigration increased demand for housing and thus rents. While this might have benefitted homeowners, it might have nonetheless increased the cost of living for natives who did not own a house.[63] As discussed in Section 6.1, immigration did not have any significant effect on property values. One problem with these data, however, is that property values available from the Financial Statistics of Cities do not necessarily reflect the contemporaneous market-value of housing, and might thus be a poor proxy for the latter. To directly assess the causal effect of immigration on rents, ideally, one would want to exploit data that vary both over time and across neighborhoods within the same city. Unfortunately, such data are not consistently available for the historical period studied in my paper.

Instead, to indirectly investigate the possibility that higher rents fueled natives' discontent, in Figure A14, I plot the relationship between the 1910 to 1930 instrumented change in

[62] For this reason, Kleppner (1982) refers to this historical period as the "Demobilization Era".

[63] In 1910, only 40% of natives living in the cities in my sample were homeowners.

immigration (x-axis) and 1930 natives' average rents (y-axis), after partialling out state fixed effects.[64] Because of the cross-sectional nature of this regression, results in Figure A14 should be interpreted with some caution, but they suggest that immigration was not correlated with rents paid by natives. This, in turn, weighs against the possibility that natives' backlash was triggered (mainly) by higher rents. One potential explanation for why, despite its positive effect on productivity, immigration did not increase rents is that immigrants represented a *production amenity*, but were perceived as a *consumption disamenity*, as documented for the contemporaneous period by a number of papers in both Europe and the US (e.g. Card et al., 2012; Saiz and Wachter, 2011).

Finally, it is possible that, even if immigration had aggregate positive economic effects, some natives were made worse off, at least in the short run (e.g. Goldin, 1994). Again, lack of detailed earnings data does not allow me to completely rule out this interpretation, but the fact that neither wages nor employment in manufacturing were significantly affected (Table A4, columns 5 and 7) seems to weigh against it. As noted above, manufacturing was the sector most exposed to immigrants' labor market competition, and wage data digitized from the Census of Manufactures do not distinguish between immigrants and natives. Thus, if immigration had any negative effects on natives' income or employment, this is precisely where one would expect to find them. Moreover, as argued below, the heterogeneous effects of immigration, which depended on the cultural distance between immigrants and natives, suggest that natives' responses were not driven only by economic, but also by cultural considerations.

# 7 Backlash, Cultural Distance, and Ethnic Diversity

If immigration was economically beneficial and did not reduce employment even for natives in highly exposed occupations, why did backlash emerge? In this section, I exploit variation across sending regions, and provide suggestive evidence that cultural and ethnic diversity were responsible, at least in part, for natives' anti-immigration reactions.

## 7.1 Cultural Distance

The historical evidence reviewed in Section 2.3 suggests that opposition to immigration during the Age of Mass Migration tended to have deep cultural roots. Anti-immigration sentiments were often directed towards Jews and Catholics, whose values were perceived as a threat to the Puritan tradition prevailing in the US at that time (Higham, 1955; Spiro,

[64] 1930 is the first year in which data on rents were collected by the US Census.

2009). One of the best examples for the strength of these sentiments is the revival of the Ku Klux Klan in the 1920s, which openly embraced an anti-Catholic and anti-Semitic ideology. Similarly, immigrants from non Anglo-Saxon and non English-speaking countries were the main target of the anti-immigration rhetoric at that time (Abramitzky et al., 2016; Leonard, 2016).

Motivated by these observations, I proxy for cultural distance between natives and immigrants using, respectively, religion and linguistic distance from English. Starting from religion, I estimate

$$y_{cst} = \gamma_c + \delta_{st} + \beta_1 Imm_{cst}^{Non-Prot} + \beta_2 Imm_{cst}^{Prot} + u_{cst} \tag{9}$$

where $Imm_{cst}^{Non-Prot}$ (resp. $Imm_{cst}^{Prot}$) is the fraction of Jews or Catholics (resp. Protestant) immigrants. In practice, equation (9) is estimated using two separate instruments, one for each religious group, constructed by summing predicted immigration from each sending region (see (2) in Section 4.2) across non-Protestant and Protestant countries respectively.

Results are reported in Table 9, for both OLS (Panel A) and 2SLS (Panel B). Immigration had a negative and significant effect on taxes and spending only when immigrants came from non-Protestant countries (columns 1 to 4), whereas the coefficient on Protestant immigrants is quantitatively very small (or even positive, as in columns 1 and 2) and never statistically significant.[65] Turning to electoral outcomes, even though both non-Protestant and Protestant immigrants seem to reduce the Democrat-Republican vote margin, results are statistically significant only for the former (column 5).

To more directly investigate the rise of anti-Catholic sentiments, in column 6, I study if the 1910-1930 (instrumented) change in Catholic and Protestant immigration had an effect on the percent of votes received by Alfred Smith in 1928 Presidential elections.[66] Smith was the first Roman Catholic to run for presidency for the Democratic party, and historical accounts consider his religious affiliation one of the main reasons for his defeat (Slayton, 2001). Since results in column 6 are obtained from cross-sectional regressions, they should be interpreted

[65] Since the effects of Protestant immigrants are very imprecisely estimated, and because the AP F-stat is substantially larger for Catholic and Jewish immigration, one may be concerned that results in columns 1 to 4 are mechanically due to the fact that the latter groups are driving most of the variation in immigration between 1910 and 1930. To check that this was not the case, I re-estimated (9) replacing political outcomes with employment. Differently from Table 9, results for both non-Protestant and Protestant immigrants were both positive, statistically significant, and very similar in magnitude: a one standard deviation change in Protestant (resp. non-Protestant) immigration increased natives' employment probability by 0.8 (resp. 1.0) percentage points. When dropping the city of Passaic (NJ), the point estimates were exactly the same.

[66] As for other electoral outcomes, county-level returns were aggregated to the MSA level. Differently from other electoral data, however, the number of votes for specific candidates at the county level were taken from Dave Leip's Atlas of US Presidential elections.

with some caution. However, the strong, negative association between Catholic (but not Protestant) immigrants and the percent of votes received by Smith is consistent with the idea that immigration triggered natives' backlash in receiving areas.

Finally, column 7 indicates that the increase in legislators' ideology documented in Table 7 was entirely due to non-Protestant immigration, while the effect of Protestant immigrants is an order of magnitude smaller and very imprecisely estimated. Likewise, legislators' propensity to support the 1924 National Origins Act is strongly correlated with the 1910-1920 change in Catholic and Jewish immigration (column 8). Conversely, there is a negative, albeit not significant, correlation between the 1910-1920 change in the fraction of Protestant immigrants and the probability of voting in favor of the immigration restrictions.[67]

As an alternative proxy for cultural differences between immigrants and natives, I rely on the measure of linguistic distance constructed by Chiswick and Miller (2005) briefly discussed in Section 5.2.1.[68] First, I compute the weighted average of immigrants' linguistic distance from English, $LD_{cst} = \sum_j \left(sh^j_{cst} \cdot L^j\right)$, where $sh^j_{cst}$ is the share of ethnic group $j$ among the foreign born population of city $c$ in Census year $t$, and $L^j$ is the linguistic distance between country $j$ and English. Then, I re-estimate (1) using as main regressor of interest $LD_{cst}$, always controlling for the (instrumented) fraction of immigrants and instrumenting the actual shares ($sh^j_{cst}$) with the same logic of the instrument in (2).[69] To ease the interpretation of results, presented in Table 10, I standardize $LD_{cst}$ by subtracting its mean and dividing it by its standard deviation.

Consistent with the qualitative evidence discussed in Section 2.3, higher linguistic distance is associated with larger reductions in taxes and public spending (columns 1 to 4). Moreover, and similarly to Table A9, the fall in spending is concentrated in education and, even though the point estimate is not statistically significant, in categories where inter-ethnic interactions are likely to be more salient (columns 5, 7, and 8). These findings are robust to simultaneously including a (standardized) index of average literacy among immigrants, thus reducing concerns that results in Table 10 are capturing not only cultural, but also economic attributes of the foreign born (see Table A11).[70] Not surprisingly, since there are now three

[67] These findings are in line with results in D'Amico and Tabellini (2017), who document that only Catholic and Jewish, but not Protestant, immigration increased the frequency of racist terms in local newspapers.

[68] Chiswick and Miller (2005)'s measure is an increasing function of how difficult it is for English (native) speakers to learn foreign languages. See also Bleakley and Chin (2010) for a study on the effect of English proficieny on immigrants' assimilation in more recent times.

[69] The estimated effect of immigration is not reported to save space. However, I always report the AP F-stat associated with its first stage.

[70] The literacy index was constructed as $LIT_{cst} = \sum_j \left(sh^j_{cst} \cdot Lit^j_t\right)$, where $Lit^j_t$ is the average literacy rate of males in working age from ethnic group $j$ who entered the US in the previous decade. To ease the interpretation of results, I multiplied $LIT_{cst}$ by $-1$, so that higher values of this index can be interpreted as lower average literacy among immigrants, and can be directly compared to $LD_{cst}$. The correlation between

different endogenous regressors and three instruments, the precision of the estimates deteriorates relative to Table 10. Nonetheless, only linguistic distance has a significant effect on taxes and public spending. Moreover, except for columns 7 and 8, the coefficient on linguistic distance is an order of magnitude larger (in absolute value) than that on literacy.

Differently from what one may expect, the correlation between the fraction of non-Protestant immigrants and the index of linguistic distance is as low as 0.05, suggesting that findings for linguistic diversity are unlikely to merely replicate those for religious affiliation. To more directly investigate the relationship between religion and linguistic distance, in online appendix A, I replicate Table 9 including simultaneously both measures to run a horse-race between the two. As documented in Table B14, neither of the two proxies for cultural diversity seems to unambiguously dominate over the other: for taxes and spending, only linguistic distance is statistically significant, whereas for electoral outcomes only religion is associated with a statistically significant reduction (resp. increase) in the Democrats' vote share (resp. in DW Nominate scores).[71]

## 7.2 Ethnic Diversity

A large literature has shown that ethnic diversity is associated with lower public goods provision and with more limited redistribution (e.g. Alesina et al., 1999; Beach and Jones, 2017; Luttmer, 2001). The argument advanced in these works is that both altruism and the utility from public goods' consumption are lower when they involve inter-ethnic interactions. It follows that, if immigration reduced natives' demand for public goods by increasing ethnic diversity, this effect should be stronger when the ethnic composition of foreign born was more heterogeneous. Also, a more diverse foreign born population may reduce immigrants' ability to act as a unified political group, in turn reinforcing the effectiveness of natives' actions.[72] To test these conjectures, I interact immigration, $Imm_{cst}$, with an index of ethnic diversity (Alesina et al., 1999) of the foreign born population, $ED_{cst} = 1 - \sum_j \left(sh^j_{cst}\right)^2$, where $sh^j_{cst}$ is the share of ethnic group $j$ among the foreign born population introduced in the previous section. I then estimate

$$y_{cst} = \gamma_c + \delta_{st} + \beta_1 Imm_{cst} + \beta_2 Imm_{cst} * ED_{cst} + \beta_3 ED_{cst} + u_{cst} \quad (10)$$

$LD_{cst}$ and $LIT_{cst}$ is relatively low, with a value of 0.26.

[71] One possible interpretation of these results is that the salience of different cultural traits may differ across political issues.

[72] An alternative view is discussed in Borjas (2016), who suggests that higher diversity could make immigration less salient, in turn reducing natives' backlash.

As before, to ease the interpretation of results, which are reported in Table 11, I standardize $ED_{cst}$ by subtracting its mean and dividing it by its standard deviation. The coefficient on the interaction between immigration and ethnic diversity, $\beta_2$, can thus be interpreted as the additional effect of immigration for a city with ethnic diversity one standard deviation above the sample mean. When estimating (10), the interaction term, $Imm_{cst} * ED_{cst}$, is instrumented with the interaction between $ED_{cst}$ and predicted immigration, i.e. $Z_{cst}$ in (2).

The (negative) effect of immigration on tax revenues per capita is larger when ethnic diversity among foreign born is higher (columns 1 and 2). Somewhat surprisingly, though, when looking at tax rates (column 3), the coefficient on the interaction between immigration and ethnic diversity is not statistically significant, even if it is negative. Next, in line with columns 1 and 2, column 4 shows that the effects of immigration on public spending are larger (i.e. more negative) when ethnic diversity is higher. This result is consistent with the existing literature (e.g. Alesina et al., 1999), and corroborates the interpretation advanced in Section 6 that immigrants lowered natives' utility from consumption of public goods.

# 8 Conclusions

Today, immigration is at the forefront of the political debate, and immigrants are increasingly opposed on both economic and cultural grounds. In this paper, I exploit variation in the number of immigrants received by US cities between 1910 and 1930 to study the political and economic consequences of immigration. Using a leave-out version of the shift-share instrument (Card, 2001), I show that immigration had a positive and significant effect on natives' employment and occupational standing, as well as on economic activity. However, despite these economic benefits, the inflow of immigrants also generated hostile political reactions, inducing cities to cut tax rates and limit redistribution, reducing the vote share of the pro-immigration party, and increasing support for the introduction of immigration restrictions.

Exploiting variation in immigrants' background, I document that natives' backlash was increasing in the cultural distance between immigrants and natives. These findings suggest that opposition to immigration may arise not only because of economic, but also because of cultural considerations. Moreover, they highlight the existence of a potential trade-off. Immigrants may bring larger economic gains when they are more different from natives. However, higher distance between immigrants and natives may trigger stronger political backlash. Ultimately, by retarding immigrants' assimilation, and favoring the rise of populism and the adoption of inefficient policies, natives' reactions may be economically and socially costly in the medium to long run.

Findings in this paper provide motivation for future work in several directions. First, one key question not addressed here is how the effects of immigration are mediated by the economic, political, and social environment in receiving places. To deal with the recent inflows of refugees, many European countries started to implement allocation policies, and answering this question would thus have first-order policy implications. Second, in light of the contrasting economic and political effects documented in my work, it would be interesting to investigate the intergenerational mobility consequences of immigration. On the one hand, immigration can increase natives' occupational mobility by pushing them up along the occupational ladder. On the other, by inducing receiving places to limit redistribution, immigration may widen inequality not only between natives and immigrants, but also within natives.

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## Table 1. Summary Statistics

| VARIABLES | *Mean* | *Median* | *St. Dev.* | *Min* | *Max* | *Obs.* |
|---|---|---|---|---|---|---|
| | | | Panel A. City Demographics | | | |
| Fr. all immigrants | 0.152 | 0.149 | 0.097 | 0.007 | 0.518 | 540 |
| Fr. recent immigrants | 0.042 | 0.026 | 0.044 | 0.001 | 0.343 | 540 |
| Recent immigrants over 1900 population | 0.074 | 0.048 | 0.078 | 0.002 | 0.678 | 540 |
| City population (1,000s) | 190.1 | 76.05 | 510.4 | 30.20 | 6,930 | 540 |
| | | | Panel B. Economic Outcomes | | | |
| Employed | 0.858 | 0.889 | 0.071 | 0.648 | 0.952 | 538 |
| Log occupational scores | 3.263 | 3.265 | 0.047 | 3.080 | 3.427 | 538 |
| Value added per establishment | 87.66 | 65.92 | 74.47 | 7.945 | 556.3 | 525 |
| Establishment size | 52.86 | 43.09 | 37.98 | 5.465 | 229.9 | 525 |
| | | | Panel C. Political Outcomes | | | |
| Tax rate per 1,000$ of assessed valuation | 29.42 | 25.78 | 16.48 | 6.450 | 114.3 | 539 |
| Expenditures per capita | 14.57 | 12.89 | 7.336 | 3.443 | 49.99 | 540 |
| Democrats' vote share | 0.482 | 0.465 | 0.189 | 0.103 | 0.967 | 378 |
| DW Nominate Score | 0.178 | 0.334 | 0.338 | -0.578 | 0.991 | 470 |

Note: the sample includes a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. *Employed* is the employment to population ratio for native men in the age range (15-65). *Fr. all immigrants* (resp. *Fr. recent immigrants*) is the total number of European immigrants (resp. the number of European immigrants arrived in the last 10 years) divided by city population.

## Table 2. First Stage

| | Dep. Variable: *Fraction of Immigrants* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Z | 0.840*** | 0.968*** | 0.999*** | 0.948*** | | | 0.893*** | 0.900*** |
| | (0.056) | (0.064) | (0.059) | (0.104) | | | (0.091) | (0.081) |
| ZW*1920 | | | | | 0.774*** | 0.838*** | | |
| | | | | | (0.106) | (0.067) | | |
| ZQ*1930 | | | | | 0.771** | 1.236*** | | |
| | | | | | (0.349) | (0.188) | | |
| ZW*1930 | | | | | 0.064 | | | |
| | | | | | (0.082) | | | |
| ZQ*1920 | | | | | 0.464 | | | |
| | | | | | (0.423) | | | |
| 1900 population | | X | | | | | | |
| Predicted population | | | X | | | | | |
| MSA analysis | | | | X | | | | |
| WWI-Quotas IV | | | | | First Diff. | Long Diff. | | |
| Year by 1900 Log | | | | | | | City and imm pop | Value added manuf. |
| F-stat | 225.1 | 226.7 | 288.3 | 82.65 | 106.8 | 207.4 | 96.48 | 124.8 |
| P-value Overid. Test | | | | | 0.456 | 0.432 | | |
| Cities | 180 | 180 | 180 | 127 | 180 | 180 | 180 | 176 |
| Observations | 540 | 180 | 540 | 379 | 360 | 180 | 540 | 528 |

Note: the sample includes a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. In Col 1 the actual number of immigrants is scaled by actual population, and the instrument is the leave-out version of the shift-share IV in equation (2) (Section 4.2). Cols 2 and 3 replicate Col 1 by scaling the actual and predicted number of immigrants by, respectively, 1900 and predicted population. From Col 3 onwards, Table 2 presents results from specifications where both the predicted and the actual number of immigrants are scaled by predicted population. Col 4 replicates the analysis aggregating the unit of analysis at the MSA level. Cols 5 and 6 estimate stacked first differences equation (6) and long differences equation (8) replacing the standard shift-share instrument with those constructed exploiting World War I and the quotas (equations (3) and (4) in Section 4.3). Cols 7 and 8 include the interaction between year dummies and, respectively, the (log of) 1900 city and immigrants population, and the (log of) 1904 value added by manufacture per establishment. F-stat refers to the K-P F-stat for weak instrument. Cols 5-6 report the p-value for the test of overidentifying restrictions. All regressions partial out city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 3. Immigration and Natives' Employment

| | (1) OLS | (2) 2SLS | (3) Pre-Trends | (4) 2SLS | (5) 2SLS | (6) 2SLS | (7) 2SLS | (8) 2SLS | (9) 2SLS |
|---|---|---|---|---|---|---|---|---|---|
| | | | Panel A. Natives' Employment to Population Ratio *(1910 Mean: 0.911)* | | | | | | |
| Fr. Immigrants | 0.287*** (0.043) | 0.299*** (0.064) | -0.117 (0.112) | 0.213*** (0.048) | 0.330*** (0.115) | 0.213*** (0.043) | 0.362*** (0.076) | 0.226*** (0.061) | 0.280*** (0.081) |
| | | | Panel B. Natives' Log Occupational Scores *(1910 Mean: 3.245)* | | | | | | |
| Fr. Immigrants | 0.000 (0.053) | 0.097*** (0.036) | 0.026 (0.066) | 0.070*** (0.026) | 0.060 (0.067) | 0.082** (0.033) | 0.124*** (0.042) | 0.082* (0.042) | 0.112*** (0.039) |
| F-stat | | 251.3 | 313.0 | 175.3 | 82.65 | 102.2 | 207.4 | 82.91 | 107.5 |
| Observations | 538 | 538 | 180 | 538 | 379 | 356 | 180 | 538 | 526 |
| *Covariates & sample restrictions* | | | | | | | | | |
| Immigrants over 1900pop. | | | | X | | | | | |
| MSA analysis | | | | | X | | | | |
| WWI-Quotas IV | | | | | | Stacked FD | Long Diff | | |
| Year by 1900 | | | | | | | | City and immig. pop | Value added manuf. |

Note: this table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930, restricting the attention to native men in the age range 15 to 65 who are not enrolled in schools. The dependent variable is natives' employment to population ratio in Panel A, and natives' log occupational scores in Panel B. Occupational scores are computed by IPUMS, and assign to an individual the median income of his job category in 1950. Col 1 and 2 present OLS and 2SLS results for the baseline specification (equation (1)). Col 3 regresses the 1900-1910 change in the outcomes against the 1910-1930 change in instrumented immigration. Cols 4 and 5 replicate Col 2 by, respectively, scaling the number of immigrants by 1900 population and aggregating the unit of analysis to the MSA level. Cols 6 and 7 estimate stacked first differences equation (5) and long differences equation (7) replacing the standard shift-share instrument with those constructed exploiting World War I and the quotas (equations (3) and (4) in Section 4.3). Cols 8 and 9 include the interaction between year dummies and, respectively, the (log of) 1900 city and immigrants population, and the (log of) 1904 value added by manufacture per establishment. F-stat refers to the K-P F-stat for weak instrument. All regressions include city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 4. Immigration and Natives' Occupational Upgrading

| | High Immigrants' Competition | | | Low Immigrants' Competition | | |
|---|---|---|---|---|---|---|
| <u>Fraction Natives</u>: | (1) Manuf. Laborers | (2) Waiters | (3) Blacksmiths | (4) Manuf. Foremen | (5) Electricians | (6) Engineers |
| *Panel A: OLS* | | | | | | |
| Fr. Immigrants | -0.026 (0.048) | -0.015 (0.011) | -0.008** (0.004) | 0.020*** (0.005) | 0.010** (0.004) | 0.017* (0.010) |
| *Panel B: 2SLS* | | | | | | |
| Fr. Immigrants | -0.057 (0.037) | -0.015 (0.013) | -0.011** (0.005) | 0.028*** (0.006) | 0.011*** (0.004) | 0.031*** (0.008) |
| F-stat | 251.3 | 251.3 | 251.3 | 251.3 | 251.3 | 251.3 |
| Mean dep var | 0.038 | 0.007 | 0.006 | 0.007 | 0.010 | 0.021 |
| Natives/Immigrants Ratio (1910) | 0.220 | 0.583 | 0.750 | 3.500 | 3.667 | 4.200 |
| Observations | 538 | 538 | 538 | 538 | 538 | 538 |

Note: this table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930 (see Table A2 in the appendix). The dependent variable is the fraction of native males in working age (15-65) employed in the occupation reported at the top of each column. Panels A and B report, respectively, OLS and 2SLS results. *Fr. Immigrants* is the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). F-stat refers to the K-P F-stat for weak instrument. *Natives/Immigrants Ratio (1910)* refers to the ratio of native to immigrant workers in a given skill category or occupation in 1910. All regressions include city and state by year fixed effects. The mean of each dependent variable at baseline is shown at the bottom of the Table. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 5. Immigration and Economic Activity

| | (1) OLS | (2) 2SLS | (3) Pre-Trends | (4) 2SLS | (5) 2SLS | (6) 2SLS | (7) 2SLS | (8) 2SLS | (9) 2SLS |
|---|---|---|---|---|---|---|---|---|---|
| Panel A. Log Value Added per Establishment | | | | | | | | | |
| Fr. Immigrants | 2.057*** | 2.889*** | 0.031 | 2.105*** | 4.484*** | 1.778*** | 2.277*** | 2.465** | 2.423** |
| | (0.703) | (0.954) | (0.414) | (0.730) | (1.084) | (0.665) | (0.729) | (1.073) | (1.113) |
| Panel B. Log Establishment Size | | | | | | | | | |
| Fr. Immigrants | 2.195*** | 2.532*** | 0.051 | 1.726*** | 4.539*** | 1.983*** | 2.146*** | 1.945** | 2.590*** |
| | (0.614) | (0.815) | (0.458) | (0.596) | (0.981) | (0.596) | (0.720) | (0.931) | (0.972) |
| F-stat | | 270.5 | 272.6 | 198.2 | 80.23 | 106.0 | 199.4 | 89.38 | 124.7 |
| Observations | 525 | 525 | 176 | 525 | 370 | 347 | 169 | 525 | 519 |
| *Covariates & sample restrictions* | | | | | | | | | |
| Immigrants over 1900pop. | | | | X | | | | | |
| MSA analysis | | | | | X | | | | |
| WWI-Quotas IV | | | | | | Stacked FD | Long Diff | | |
| Year by 1900 | | | | | | | | City and immig. pop | Value added manuf. |

Note: this table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930, and for which data were reported in the Census of Manufacture between 1909 and 1929. The dependent variable is the log of value added per establishment in Panel A, and the log of establishment size in Panel B. Col 1 and 2 present OLS and 2SLS results for the baseline specification (equation (1)). Col 3 regresses the 1904-1910 change in the outcomes against the 1910-1930 change in instrumented immigration. Cols 4 and 5 replicate Col 2 by, respectively, scaling the number of immigrants by 1900 population and aggregating the unit of analysis to the MSA level. Cols 6 and 7 estimate stacked first differences equation (5) and long differences equation (7) replacing the standard shift-share instrument with those constructed exploiting World War I and the quotas (equations (3) and (4) in Section 4.3). Cols 8 and 9 include the interaction between year dummies and, respectively, the (log of) 1900 city and immigrants population, and the (log of) 1904 value added by manufacture per establishment. F-stat refers to the K-P F-stat for weak instrument. All regressions include city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 6. Tax Rates and Public Spending Per Capita

| | (1) OLS | (2) 2SLS | (3) Pre-Trends | (4) 2SLS | (5) 2SLS | (6) 2SLS | (7) 2SLS | (8) 2SLS |
|---|---|---|---|---|---|---|---|---|
| Panel A: Property Tax Rate *(1910 Mean: 19.75)* | | | | | | | | |
| Fr. Immigrants | -28.49*** | -29.44* | -4.204 | -16.09 | -24.29 | -38.16** | -21.42 | -19.38 |
| | (10.60) | (16.95) | (8.224) | (11.56) | (19.35) | (14.88) | (21.22) | (19.73) |
| F-stat | | 292.7 | 320.6 | 230.4 | 106.2 | 204.5 | 97.37 | 124.2 |
| Observations | 539 | 539 | 179 | 539 | 359 | 179 | 539 | 527 |
| Panel B: Public Spending per Capita *(1910 Mean: 12.16)* | | | | | | | | |
| Fr. Immigrants | -5.958 | -8.699* | 0.460 | -5.794* | -5.739* | -11.34* | -12.01** | -17.18*** |
| | (3.900) | (4.453) | (4.135) | (3.178) | (2.970) | (6.197) | (5.490) | (4.421) |
| F-stat | | 288.3 | 318.3 | 226.7 | 106.8 | 207.4 | 96.48 | 124.8 |
| Observations | 540 | 540 | 180 | 540 | 360 | 180 | 540 | 528 |
| *Covariates & sample restrictions* | | | | | | | | |
| Immigrants over 1900pop. | | | | X | | | | |
| WWI-Quotas IV | | | | | Stacked FD | Long Diff | | |
| Year by 1900 | | | | | | | City and immig. pop | Value added manuf. |

Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. The dependent variable is the property tax rate for $1,000 of assessed valuation in Panel A, and public spending per capita in Panel B. Cols 1 and 2 present OLS and 2SLS results for the baseline specification (equation (1)). Col 3 regresses the 1906-1910 change in the outcomes against the 1910-1930 change in instrumented immigration. Col 4 replicates Col 2 by scaling the number of immigrants by 1900 population. Cols 5 and 6 estimate stacked first differences equation (5) and long differences equation (7) replacing the standard shift-share instrument with those constructed exploiting World War I and the quotas (equations (3) and (4) in Section 4.3). Cols 7 and 8 include the interaction between year dummies and, respectively, the (log of) 1900 city and immigrants population, and the (log of) 1904 value added by manufacture per establishment. F-stat refers to the K-P F-stat for weak instrument. All regressions include city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 7. Presidential Elections and DW Nominate Scores

| | (1)<br>OLS | (2)<br>2SLS | (3)<br>Pre-Trends | (4)<br>2SLS | (5)<br>2SLS | (6)<br>2SLS | (7)<br>2SLS | (8)<br>2SLS |
|---|---|---|---|---|---|---|---|---|
| | | | | Panel A: Democrats' Vote Share *(1910 Mean: 0.490)* | | | | |
| Fr. Immigrants | -0.528*** | -0.404*** | -0.147 | -0.313*** | 0.048 | -0.606*** | 0.169 | -0.271 |
| | (0.119) | (0.141) | (0.157) | (0.112) | (0.162) | (0.167) | (0.271) | (0.169) |
| F-stat | | 83.14 | 64.54 | 55.42 | 23.43 | 35.76 | 35.64 | 67.73 |
| Observations | 378 | 378 | 123 | 378 | 252 | 126 | 378 | 378 |
| | | | | Panel B: DW Nominate Scores *(1910 Mean: 0.165)* | | | | |
| Fr. Immigrants | 0.745 | 1.658** | 0.052 | 1.174** | 1.908** | 1.168 | 1.760* | 2.403 |
| | (0.514) | (0.808) | (0.909) | (0.559) | (0.779) | (0.843) | (1.025) | (1.507) |
| F-stat | | 23.11 | 25.92 | 70.30 | 8.571 | 15.39 | 10.75 | 34.13 |
| Observations | 460 | 460 | 135 | 460 | 303 | 146 | 460 | 451 |
| *Covariates & sample restrictions* | | | | | | | | |
| Immigrants over 1900pop. | | | | X | | | | |
| WWI-Quotas IV | | | | | Stacked FD | Long Diff | | |
| Year by 1900 | | | | | | | City and immig. pop | Value added manuf. |

Note: In Panel A, the dependent variable is the Democrats' vote share in Presidential elections, and the sample includes the balanced panel of the 126 metropolitan statistical areas (MSAs) containing at least one of the 180 cities in my sample. In Panel B, the dependent variable is the first dimension of DW Nominate scores of members of the House of Representatives, for the panel of city-to-congressional district units for Congress 61, 66, and 71, for the 180 cities considered in my sample. Cols 1 and 2 present OLS and 2SLS results for the baseline specification (equation (1)). Col 3 regresses the 1900-1910 change in outcomes against the 1910-1930 change in instrumented immigration. Col 4 replicates Col 2 by scaling the number of immigrants by 1900 population. Cols 5 and 6 estimate stacked first differences equation (5) and long differences equation (7) replacing the standard shift-share instrument with those constructed exploiting World War I and the quotas (equations (3) and (4) in Section 4.3). Cols 7 and 8 include the interaction between year dummies and, respectively, the (log of) 1900 city and immigrants population, and the (log of) 1904 value added by manufacture per establishment. F-stat refers to the K-P F-stat for weak instrument. All regressions include MSA (Panel A) or congressional district to city (Panel B) and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 8. Congressmen Ideology and the National Origins Act of 1924

| Dep. Variable: | *DW Nominate Scores* | | *Pr. that Winner has Given Political Orientation* | | | | *1[Restrict Immigration]* | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *Panel A: OLS* | | | | | | | | |
| Fr. Immigrants | 0.745 | 0.603 | -0.045 | -0.804 | -0.290 | 1.238 | 2.121* | 2.024 |
| | (0.514) | (0.521) | (0.317) | (0.711) | (0.991) | (1.135) | (1.189) | (1.362) |
| *Panel B: 2SLS* | | | | | | | | |
| Fr. Immigrants | 1.658** | 1.575* | -0.601 | -1.655 | -0.198 | 2.592* | 3.784** | 3.365* |
| | (0.808) | (0.841) | (0.817) | (1.039) | (1.717) | (1.354) | (1.569) | (1.770) |
| F-stat | 23.11 | 19.56 | 23.11 | 23.11 | 23.11 | 23.11 | 88.05 | 39.34 |
| Mean dep var | 0.165 | 0.150 | 0.167 | 0.161 | 0.359 | 0.314 | 0.676 | 0.676 |
| Observations | 470 | 437 | 470 | 470 | 470 | 470 | 155 | 155 |
| Balanced Panel | | X | | | | | | |
| Political Orientation | | | Liberal Democrat | Moderate Democrat | Moderate Republican | Conservative Republican | | |

Note: Cols 1 to 6 report results for the panel of city-to-congressional district units for Congress 61, 66, and 71, for the 180 cities considered in my sample (see Table A2). Because of redistricting between the $61^{\text{st}}$ and the $66^{\text{th}}$ Congress, it was not possible to construct a balanced panel including all city-congressional district cells in my sample. For this reason, Col 2 restricts the attention to the balanced panel of cities (to congressional districts) that were not affected by redistricting. The unbalanced (resp. balanced) panel is composed of 157 (resp. 146) units of observations. Cols 7 and 8 present results from a cross-sectional regression for the 155 combinations of cities to congressional districts in Congress 68, for the 180 cities considered in my sample. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is the first dimension of the DW Nominate score in Cols 1 and 2, an indicator for electing a politician with a given political orientation (see bottom of the Table) in Cols 3 to 6, and an indicator for voting in favor of the 1924 National Origins Act in the House of Representatives. *Fr. Immigrants* is the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). F-stat refers to the K-P F-stat for weak instrument. Cols 1 to 6 include city by congressional district and state by year fixed effects. Cols 7 and 8 control for state fixed effects. Col 8 also includes the 1900 log of black, immigrants, and total population, as well as the share of Democratic legislators representing the city (to congressional district) in the $68^{\text{th}}$ Congress. Robust standard errors, clustered at the congressional district level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 9. Immigration and Religion

| Dep. Var. | (1)<br>Total tax<br>revenues PC | (2)<br>Property tax<br>revenues PC | (3)<br>Property tax<br>rate | (4)<br>Public<br>spending PC | (5)<br>Dem-Rep.<br>margin | (6)<br>Smith's pct.<br>votes | (7)<br>DW Nominate<br>Scores | (8)<br>1[Restrict<br>Immigration] |
|---|---|---|---|---|---|---|---|---|
| *Panel A: OLS* | | | | | | | | |
| Fr. Non-Prot. | -13.69 | -11.82 | -32.53** | -8.422 | -1.279*** | -2.605*** | 1.053 | 2.888* |
| | (9.424) | (7.979) | (13.68) | (5.149) | (0.269) | (0.542) | (0.822) | (1.571) |
| Fr. Prot. | 25.96 | 17.69 | -4.948 | 9.853 | 1.440 | 2.512 | -0.580 | -2.655 |
| | (23.52) | (22.64) | (50.18) | (21.75) | (1.103) | (1.819) | (1.191) | (3.487) |
| *Panel B: 2SLS* | | | | | | | | |
| Fr. Non-Prot. | -13.56* | -12.73* | -32.11* | -9.645** | -0.571** | -3.027*** | 1.912** | 4.946*** |
| | (8.051) | (7.475) | (17.09) | (4.819) | (0.282) | (0.502) | (0.895) | (1.807) |
| Fr. Prot. | 12.33 | 4.284 | -6.984 | -0.430 | -0.593 | 3.711 | 0.394 | -4.151 |
| | (25.47) | (22.42) | (71.54) | (15.95) | (0.802) | (2.416) | (1.915) | (4.954) |
| KP F-stat | 26.37 | 26.37 | 26.23 | 26.37 | 37.94 | 35.87 | 32.16 | 23.74 |
| F-stat (Non-Prot) | 115.9 | 115.9 | 118.9 | 115.9 | 53.37 | 40.18 | 85.91 | 69.49 |
| F-stat (Prot) | 27.53 | 27.53 | 27.39 | 27.53 | 38.95 | 36.58 | 32.27 | 21.68 |
| Mean of dep var | 12.76 | 12.10 | 19.75 | 12.16 | 0.180 | 0.398 | 0.165 | 0.676 |
| Observations | 540 | 540 | 539 | 540 | 378 | 126 | 460 | 155 |

Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. The analysis is conducted at the MSA rather than at the city level, fixing boundaries using 1940 definitions in Cols 5 and 6, and at the city to congressional district level in Cols 7 and 8. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is displayed at the top of each column. *1[Restrict Immigration]* (Col 8) is an indicator for voting in favor of the 1924 National Origins Act in the House of Representatives. In Cols 1 to 5 and in Col 7, *Fr. Non-Prot.* (resp. *Prot.*) refers to the fraction of immigrants arrived in the previous decade from non-Protestant (resp. Protestant) countries, over predicted city population, for each of the three decades, 1910, 1920, and 1930. In Cols 6 and 8, *Fr. Non-Prot.* (resp. *Prot.*) is the 1910 to 1930 (1910 to 1920) change in the fraction of recent immigrants from non-Protestant (resp. Protestant) countries over predicted city population. Each endogenous regressor is instrumented with the predicted fraction immigrants (see (2) in Section 4.2), obtained by summing (predicted) immigration across non-Protestant and Protestant countries. F-stat (Non-Prot) and F-stat (Prot) refer to the partial F-stats for joint significance of the instruments in the two separate first-stage regressions. KP F-stat is the Kleibergen-Paap F stat for joint significance of instruments. Cols 1 to 4 (resp. 5) include city (resp. MSA) and state by year fixed effects, while Col 7 includes congressional district by city and state by year fixed effects. Cols 6 and 8 present results from a cross-sectional regression and control for state dummies. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 10. Linguistic Distance and Redistribution

| Dep. Var. | (1)<br>Total tax<br>revenues PC | (2)<br>Property tax<br>revenues PC | (3)<br>Property tax<br>rate | (4)<br>Public<br>spending PC | (5)<br>Education | (6)<br>Police | (7)<br>Charities and<br>Hospitals | (8)<br>Sanitation |
|---|---|---|---|---|---|---|---|---|
| *Panel A: OLS* | | | | | | | | |
| Ling. Distance | -0.361* | -0.346 | -1.485* | -0.213 | -0.050 | -0.032 | -0.010 | -0.045 |
| | (0.205) | (0.212) | (0.840) | (0.160) | (0.060) | (0.021) | (0.039) | (0.029) |
| *Panel B: 2SLS* | | | | | | | | |
| Ling. Distance | -0.875* | -0.809* | -2.308 | -0.519* | -0.199* | -0.013 | -0.119 | -0.053 |
| | (0.468) | (0.458) | (1.598) | (0.301) | (0.117) | (0.042) | (0.084) | (0.052) |
| KP F-stat | 21.02 | 21.02 | 21.47 | 21.02 | 21.14 | 21.02 | 16.31 | 21.02 |
| F-stat (Imm.) | 123.1 | 123.1 | 124.7 | 123.1 | 106.9 | 123.1 | 101.6 | 123.1 |
| F-stat (Ling.) | 50.38 | 50.38 | 53.48 | 50.38 | 48.05 | 50.38 | 34.06 | 50.38 |
| Mean of dep var | 12.76 | 12.10 | 19.75 | 12.16 | 4.250 | 1.338 | 0.635 | 1.129 |
| Observations | 540 | 540 | 539 | 540 | 534 | 540 | 516 | 540 |

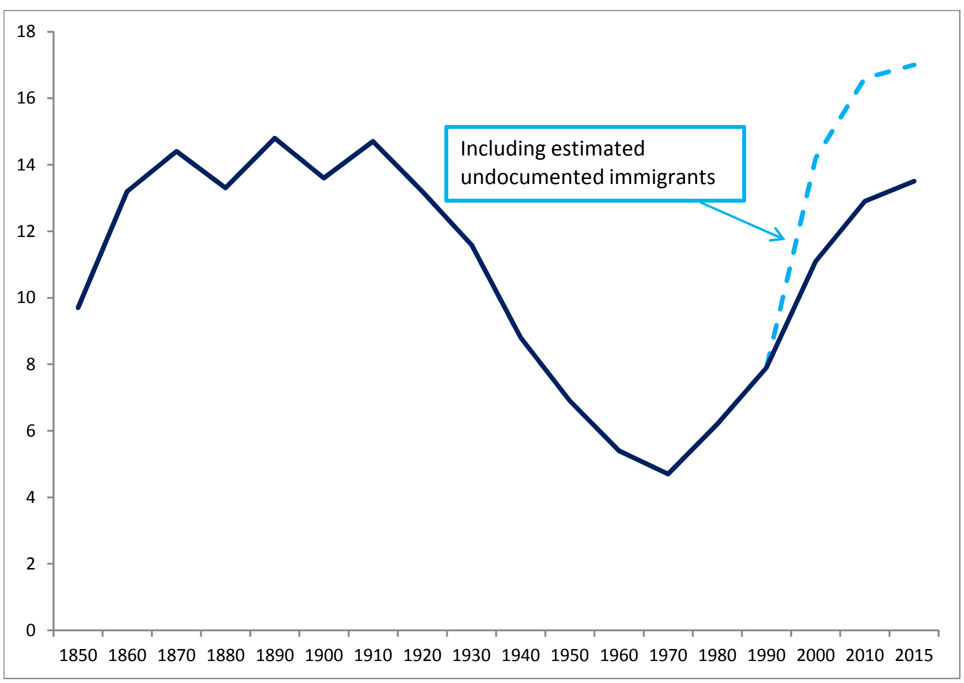
Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is displayed at the top of each column. In Cols 5 to 8, the dependent variable is spending per capita on the category listed at the top of the column. The main regressor of interest is the (standardized) weighted average linguistic distance constructed in Section 7.1.2, instrumented using predicted shares of immigrants from each sending region obtained from (2) in Section 4.2. F-stat is the Kleibergen-Paap F stat for joint significance of instruments. F-stat (Imm.) and F-stat (Ling.) refer to the partial F-stats for joint significance of the instruments in the two separate first-stages. All regressions include the main effect of immigration (instrumented with the baseline shift-share instrument from (2)), and control for city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table 11. Immigration and Ethnic Diversity

| Dep. Var. | (1)<br>Total tax revenues PC | (2)<br>Property tax revenues PC | (3)<br>Property tax rate | (4)<br>Public spending PC | (5)<br>Education | (6)<br>Police | (7)<br>Charities and Hospitals | (8)<br>Sanitation |
|---|---|---|---|---|---|---|---|---|
| *Panel A: OLS* | | | | | | | | |
| Fr. Immigrants | -7.092 | -6.817 | -28.35*** | -4.803 | -7.178*** | 0.263 | 0.828 | -0.433 |
| | (6.030) | (5.055) | (10.82) | (3.705) | (2.248) | (0.586) | (0.701) | (0.667) |
| (Fr.Imm.)*ED | -9.749** | -9.390* | 0.626 | -6.107** | -2.882** | -0.760* | -0.480 | -1.614** |
| | (4.647) | (4.749) | (7.772) | (2.969) | (1.253) | (0.423) | (0.740) | (0.672) |
| *Panel B: 2SLS* | | | | | | | | |
| Fr. Immigrants | -9.885 | -10.133* | -30.31* | -7.564* | -5.933*** | -0.305 | -0.759 | -1.211* |
| | (6.477) | (5.934) | (17.709) | (4.125) | (2.097) | (0.680) | (1.703) | (0.716) |
| (Fr. Imm.)*ED | -15.43*** | -15.28*** | -13.71 | -10.69*** | -1.903 | -0.223 | -0.800 | -0.897 |
| | (4.587) | (4.458) | (11.26) | (3.665) | (1.414) | (0.648) | (0.802) | (0.562) |
| KP F-stat | 21.39 | 21.39 | 21.37 | 21.39 | 20.80 | 21.39 | 15.80 | 21.39 |
| F-stat (Imm.) | 146.4 | 146.4 | 148.4 | 146.4 | 130.3 | 146.4 | 114.4 | 146.4 |
| F-stat (Imm_ED) | 18.31 | 18.31 | 18.30 | 18.31 | 30.06 | 18.31 | 16.00 | 18.31 |
| Mean of dep var | 12.76 | 12.10 | 19.75 | 12.16 | 4.250 | 1.338 | 0.635 | 1.129 |
| Observations | 540 | 540 | 539 | 540 | 534 | 540 | 516 | 540 |

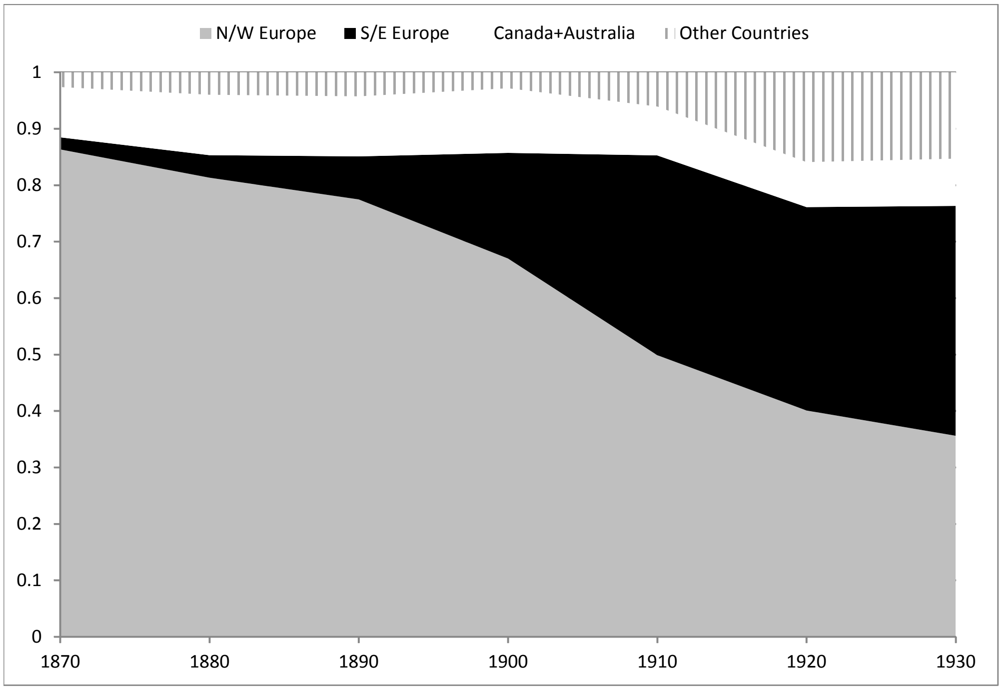
Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is displayed at the top of each column. In Cols 5 to 8, the dependent variable is spending per capita on the category listed at the top of the column. *Fr. Immigrants* refers to the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). (*Fr. Imm.)*ED* is the interaction between the fraction of immigrants and the (standardized) index of ethnic diversity of the foreign born population constructed in the main text (see Section 7.2). It is instrumented with the interaction between predicted immigration and the index of ethnic diversity. F-stat (Imm.) and F-stat (Imm_ED) refer to the partial F-stats for joint significance of the instruments in the two separate first-stage regressions. KP F-stat is the Kleibergen-Paap F stat for joint significance of instruments. All regressions include the main effect of the index of ethnic diversity, and control for city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Figure 1. Immigrants as a Percent of US Population



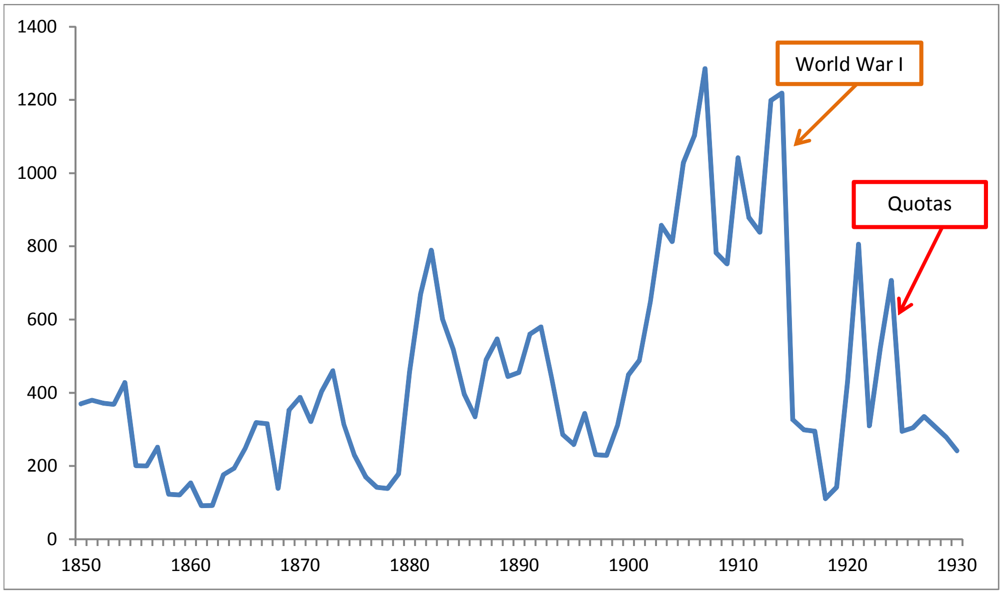

Note: The solid line shows the number of legal immigrants as a percent of US population. The dashed line includes also the estimated number of illegal immigrants, available from 2000 onwards. Source: the number of legal immigrants comes from the Migration Policy Institute, while the number of illegal immigrants was taken from the Pew Research Center tabulations

## Figure 2. Share of Foreign Born in the United States, by Region



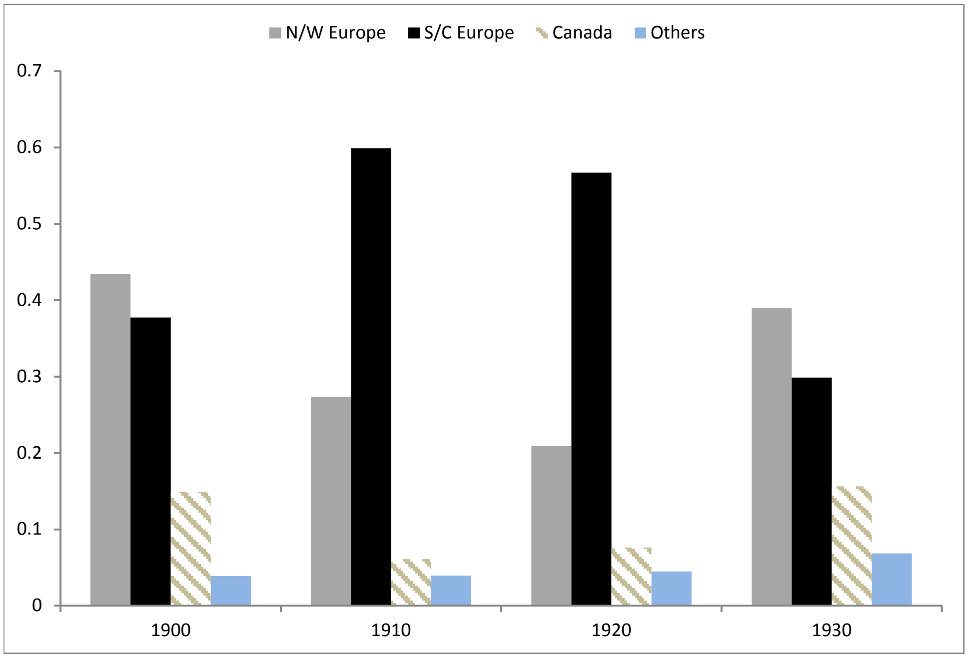

Note: Share of immigrant stock living in the United States, by sending region and by decade. Source: Author's calculations from IPUMS sample of US Census (Ruggles et al., 2015).

## Figure 3. Total Number of Immigrants (in Thousands)



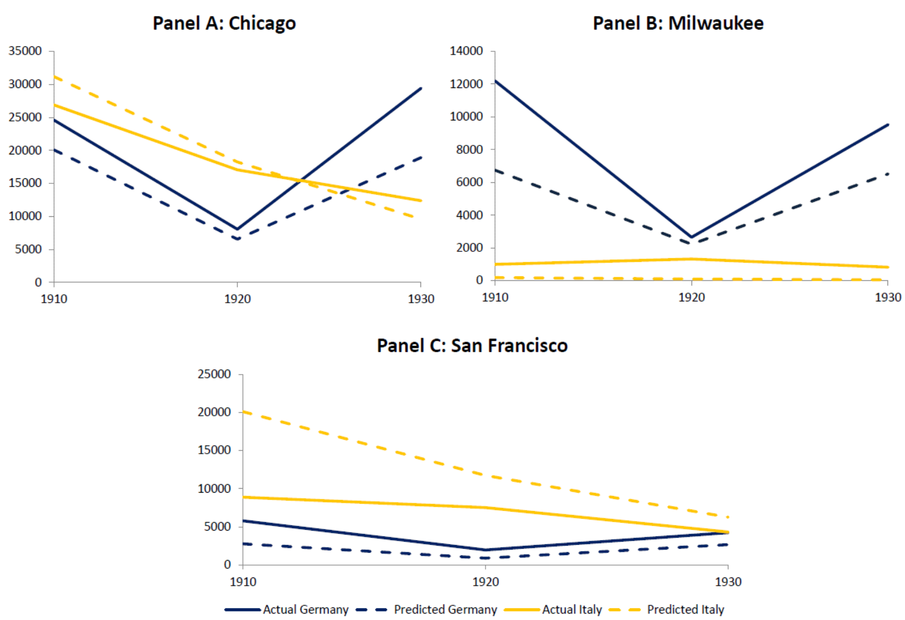

Note: Annual inflow of immigrants to the United States (1850-1930). Source: Migration Policy Institute.

## Figure 4. Share of Recent Immigrants, by Region and Decade



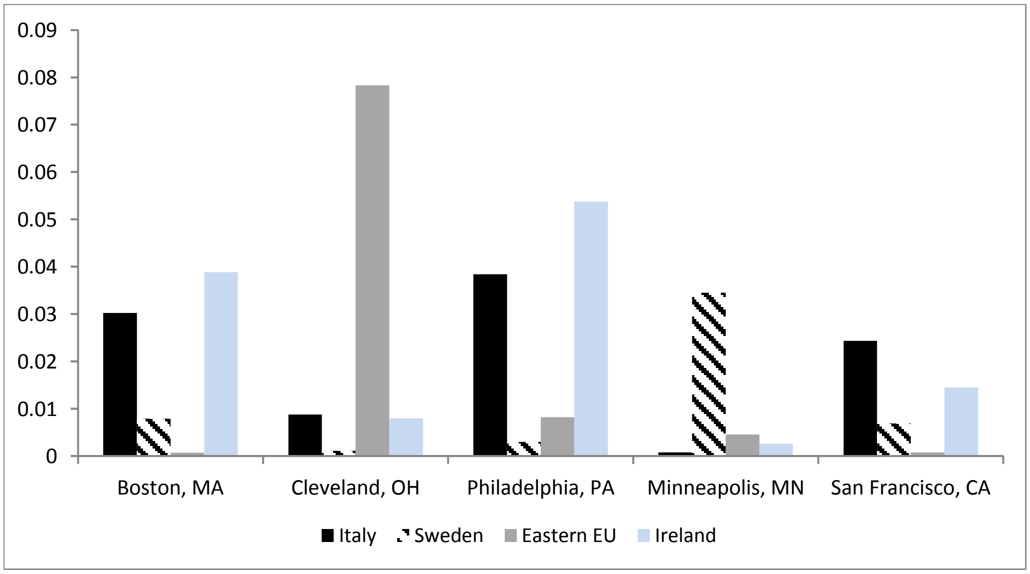

Note: Share of immigrant entering the United States in the previous ten years, by sending region and by decade. Source: Author's calculations from IPUMS sample of US Census (Ruggles et al., 2015).

## Figure 5. A Simple Example: Actual and Predicted Immigration



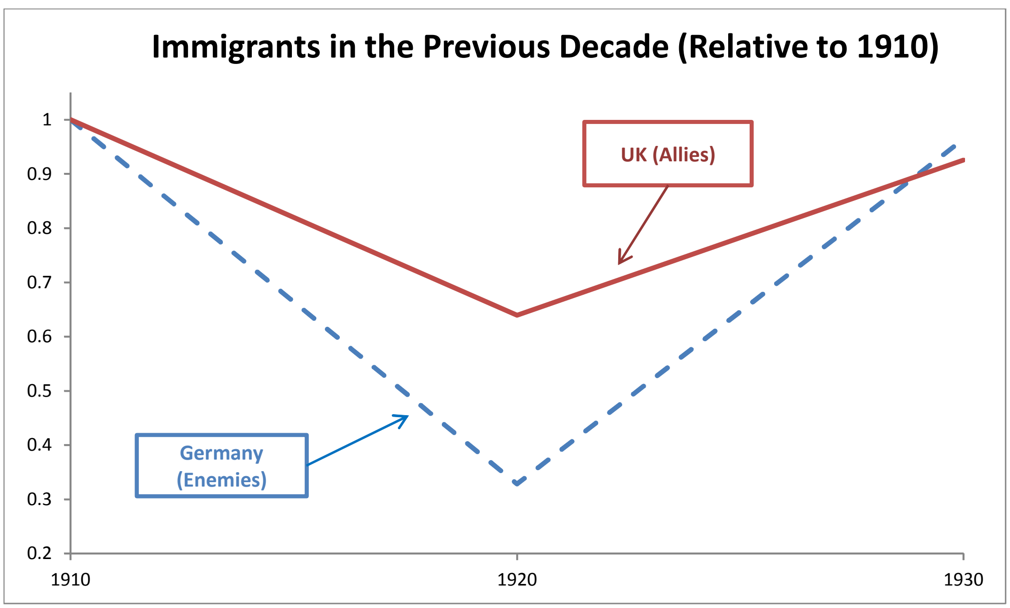

Note: This Figure reports the actual and predicted number of Italians and Germans arrived during the previous decade to Chicago (Panel A), Milwaukee (Panel B), and San Francisco (Panel C), in 1910, 1920, and 1930. Predicted immigration is obtained from the instrument constructed in equation (2) in the main text. Source: from IPUMS sample of US Census (Ruggles et al., 2015).

**Figure 6. Share of European Immigrants in US Cities, 1900**



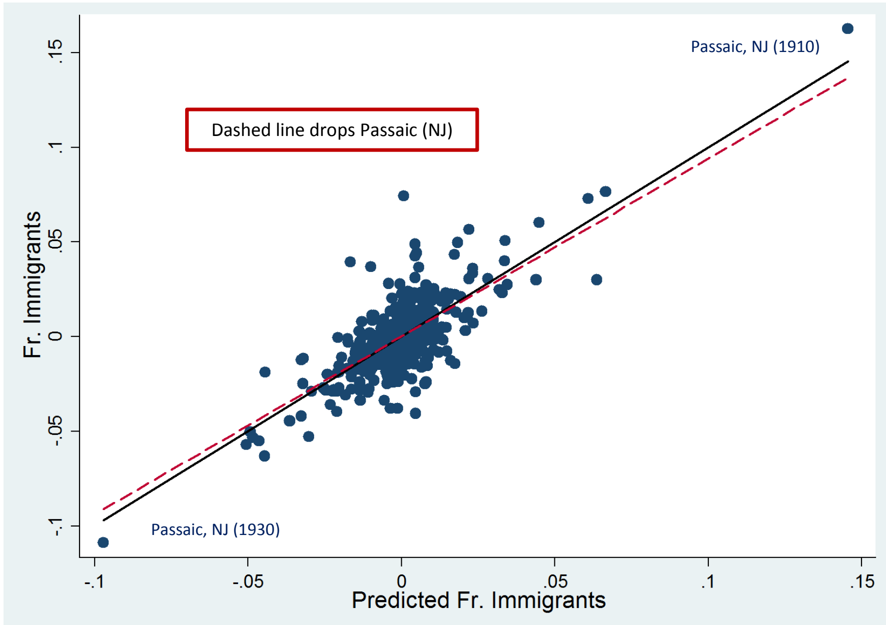

Note: share of individuals of European ancestry living in US cities in 1900, for selected ethnic groups. Source: Author's calculations using IPUMS data.

**Figure 7. The Effect of WWI on Immigration from Allies and Enemies**



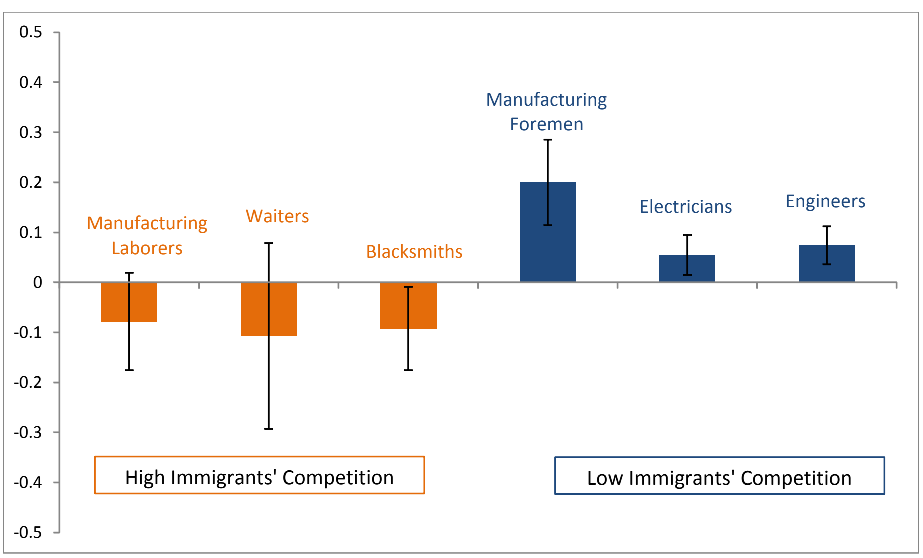

Note: the figure plots the number immigrants from Germany (blue, dashed line) and from the UK (red line) that entered the United States during the previous decade, normalizing them to 1 relative to 1910. Source: author's calculation using IPUMS data.

## Figure 8. First Stage: Actual vs Predicted Immigration



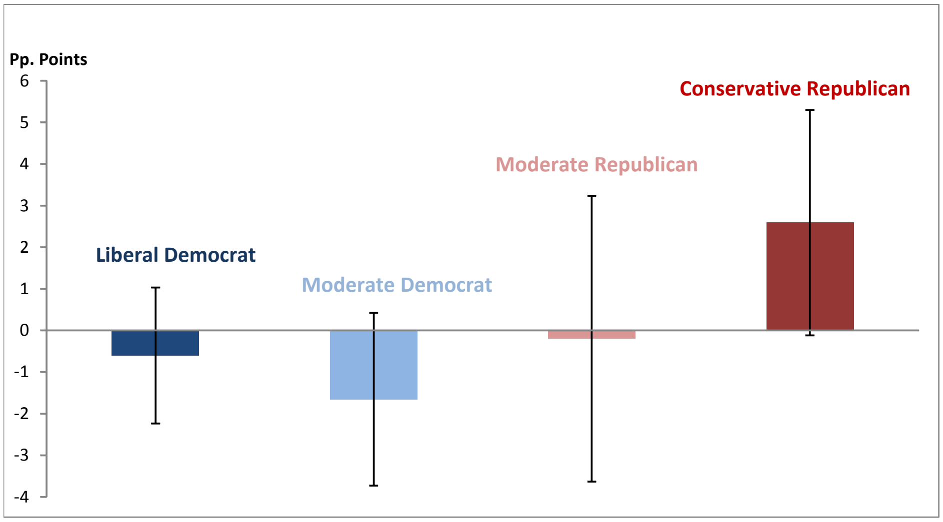

Note: the y-axis (resp. x-axis) reports the actual (resp. predicted) number of immigrants over predicted city population in each of the three Census years, 1910, 1920, and 1930. Each point in the scatter diagram represents the residual change in a city's actual and predicted fraction of immigrants after partialling out city and year by state fixed effects. The predicted number of immigrants is constructed as discussed in Section 4.2 in the text (see (2)). Predicted city population is obtained by multiplying 1900 city population with average urban growth, excluding that of the Census division where a city is located. The solid line shows the regression coefficient for the full sample (coefficient=0.999, standard error=0.059). The dotted (red) line shows the regression coefficient obtained when dropping the city of Passaic, NJ (coefficient=0.940, standard error=0.068).

## Figure 9. Percent Change in Fraction of Natives in Selected Occupations




Note: the figure plots the percent change in the fraction of natives in each occupation (relative to its 1910 mean) implied by a one standard deviation increase in immigration, according to 2SLS estimates (with corresponding 95% confidence intervals) reported in Table 4.

### Figure 10. Probability that Winner Has Given Political Orientation




Note: the figure plots 2SLS estimates (with corresponding 95% confidence intervals) reported in columns 3 to 6 of Table 8 (Panel B) for the probability that the member of the House of Representatives elected has a given political orientation. Liberal (resp. moderate) Democrats are defined as legislators with a Nominate score below (resp. above) the median score for Democrats in the 61st Congress. A Republican legislator is classified as moderate (resp. conservative) if his Nominate score is below (resp. above) the median score for Republicans in the 61st Congress.

# Appendix A. Supplementary Tables and Figures

### Table A1. European Regions

| | |
|---|---|
| UK | Russia |
| Ireland | Eastern Europe (Yugoslavia, Czechoslovakia, etc.) |
| Denmark | Austria-Hungary |
| Finland | Switzerland |
| Norway | France |
| Sweden | Belgium-Netherlands |
| Germany | Greece-Portugal-Spain |
| Poland | Italy |

Note: this table lists the European sending regions used to construct the instrument for immigration.

**Table A2. City List**

| | | | |
|---|---|---|---|
| Akron, OH | Elizabeth, NJ | McKeesport, PA | Saint Joseph, MO |
| Albany, NY | Elmira, NY | Memphis, TN | Saint Louis, MO |
| Allentown, PA | Erie, PA | Milwaukee, WI | Saint Paul, MN |
| Altoona, PA | Evansville, IN | Minneapolis, MN | Salem, MA |
| Amsterdam, NY | Everett, MA | Mobile, AL | San Antonio, TX |
| Atlanta, GA | Fall River, MA | Montgomery, AL | San Diego, CA |
| Atlantic City, NJ | Fitchburg, MA | Mount Vernon, NY | San Francisco, CA |
| Auburn, NY | Flint, MI | Nashville, TN | Savannah, GA |
| Augusta, GA | Fort Wayne, IN | New Bedford, MA | Schenectedy, NY |
| Baltimore, MD | Fort Worth, TX | New Britain, CT | Scranton, PA |
| Bay City, MI | Galveston, TX | New Castle, PA | Seattle, WA |
| Bayonne, NJ | Grand Rapids, MI | New Haven, CT | Sioux City, IA |
| Berkeley, CA | Hamilton, OH | New Orleans, LA | Somerville, MA |
| Binghamton, NY | Harrisburg, PA | New York, NY | South Bend, IN |
| Birmingham, AL | Hartford, CT | Newark, NJ | Spokane, WA |
| Boston, MA | Haverhill, MA | Newton, MA | Springfield, IL |
| Bridgeport, CT | Hoboken, NJ | Niagara Falls, NY | Springfield, MA |
| Brockton, MA | Holyoke, MA | Norfolk, VA | Springfield, MO |
| Buffalo, NY | Houston, TX | Oakland, CA | Springfield, OH |
| Butte, MT | Huntington, WV | Oklahoma City, OK | Superior, WI |
| Cambridge, MA | Indianapolis, IN | Omaha, NE | Syracuse, NY |
| Camden, NJ | Jackson, MI | Oshkosh, WI | Tacoma, WA |
| Canton, OH | Jacksonville, FL | Pasadena, CA | Tampa, FL |
| Cedar Rapids, IA | Jamestown , NY | Passaic, NJ | Taunton, MA |
| Charleston, SC | Jersey City, NJ | Paterson, NJ | Terre Haute, IN |
| Charlotte, NC | Johnstown, PA | Pawtucket, RI | Toledo, OH |
| Chattanooga, TN | Joliet, IL | Peoria, IL | Topeka, KS |
| Chelsea, MA | Kalamazoo, MI | Perth Amboy, NJ | Trenton, NJ |
| Chester, PA | Kansas City, KS | Philadelphia, PA | Troy, NY |
| Chicago, IL | Kansas City, MO | Pittsburgh, PA | Utica, NY |
| Cincinnati, OH | Knoxville, TN | Pittsfield, MA | Washington, DC |
| Cleveland, OH | La Crosse, WI | Portland, ME | Waterbury, CT |
| Columbus, OH | Lancaster, PA | Portland, OR | Wheeling, WV |
| Covington, KY | Lansing, MI | Portsmouth, VA | Wichita, KS |
| Dallas, TX | Lawrence, MA | Providence, RI | Wilkes-Barre, PA |
| Davenport, IA | Lexington, KY | Pueblo, CO | Williamsport, PA |
| Dayton, OH | Lima, OH | Quincy, IL | Wilmington, DE |
| Decatur, IL | Lincoln, NE | Quincy, MA | Woonsocket, RI |
| Denver, CO | Little Rock, AR | Racine, WI | Worcester, MA |
| Des Moines, IA | Los Angeles, CA | Reading, PA | Yonkers, NY |
| Detroit, MI | Louisville, KY | Richmond, VA | York, PA |
| Dubuque, IA | Lowell, MA | Roanoke, VA | Youngstown, OH |
| Duluth, MN | Lynn, MA | Rochester, NY | |
| East Orange, NJ | Macon, GA | Rockford, IL | |
| East St. Louis, IL | Malden, MA | Sacramento, CA | |
| El Paso, TX | Manchester, NH | Saginaw, MI | |

## Table A3. Labor Market Characteristics of Immigrants and Natives

| | Natives | Immigrants | Ratio (Natives to Immigrants) |
|---|---|---|---|
| *Panel A: Industries* | | | |
| Manufacturing | 0.216 | 0.437 | 0.494 |
| Construction | 0.089 | 0.107 | 0.832 |
| Trade | 0.182 | 0.169 | 1.077 |
| Services (excluding personal) | 0.098 | 0.037 | 2.649 |
| Public Sector | 0.034 | 0.005 | 6.800 |
| *Panel B: Skills and Broad Occupational Groups* | | | |
| High Skilled | 0.345 | 0.126 | 2.738 |
| Unskilled | 0.347 | 0.614 | 0.565 |
| Clerical and Sales | 0.198 | 0.065 | 3.046 |
| Laborers | 0.110 | 0.311 | 0.354 |
| *Panel C: Narrowly Defined Occupations* | | | |
| Manuf. Laborers | 0.038 | 0.150 | 0.253 |
| Waiters | 0.007 | 0.012 | 0.583 |
| Blacksmiths | 0.006 | 0.008 | 0.750 |
| Manuf. Supervisors | 0.007 | 0.002 | 3.500 |
| Electricians | 0.010 | 0.003 | 3.667 |
| Engineers | 0.021 | 0.005 | 4.200 |

Note: this table presents the fraction of natives and of immigrants in selected industries (Panel A), skill categories (Panel B), and narrowly defined occupations (Panel C) in 1910. For both natives and immigrants, the sample is restricted to males in working age living in the 180 cities in my sample. The last column on the right shows the ratio of the fraction of natives over the fraction of immigrants in a given industry/skill category/occupation.

## Table A4. Additional Results and Placebo Checks

| | Natives Only | | | | | Natives and Immigrants | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| *Dep. Var:* | In Labor Force | High-Low Skill Ratio | Employed Illiterate | Employed Blacks | Employed Labor manuf | Log workers manuf | Log avg. wage manuf |
| *Panel A: OLS* | | | | | | | |
| Fr. Immigrants | 0.205*** | -0.030 | -0.147 | -0.108 | 0.037 | 1.671*** | -0.091 |
| | (0.050) | (0.034) | (0.217) | (0.273) | (0.098) | (0.557) | (0.237) |
| *Panel B: 2SLS* | | | | | | | |
| Fr. Immigrants | 0.204*** | 0.061* | -0.109 | -0.107 | 0.078 | 1.471*** | -0.186 |
| | (0.065) | (0.036) | (0.332) | (0.269) | (0.114) | (0.527) | (0.291) |
| F-stat | 251.3 | 251.3 | 251.3 | 251.3 | 251.3 | 270.5 | 270.5 |
| Mean dep var | 0.954 | 0.978 | 0.745 | 0.750 | 0.941 | 9.063 | 6.275 |
| Observations | 538 | 538 | 538 | 538 | 538 | 525 | 525 |

Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930 (Cols 1-5), and for which data were reported in the Census of Manufacture between 1909 and 1929 (Cols 6-7). Variables in Cols 1 to 5 refer to native men in the age range 15 to 65 who were not enrolled in schools. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is: an indicator for holding any gainful occupation (*In Labor Force*) in Col 1; the log of high skill natives over the log of low skill natives in Col 2; and the employment rate for illiterate natives, for African Americans, and for natives working as manufacturing laborers in Cols 3 to 5 respectively. Variables in Cols 6-7 refer to the whole labor force in the manufacturing sector (from the Census of Manufacture), and include both immigrant and native workers. The dependent variable is (the log of) the number of workers employed in manufacturing in Col 6; and (the log of) the average wage in manufacturing in Col 7. To classify individuals across skill categories, I use the classification made by Katz and Margo (2013). *Fr. Immigrants* is the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). F-stat refers to the K-P F-stat for weak instrument. All regressions include city and state by year fixed effects. The mean of each dependent variable at baseline is shown at the bottom of the Table. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table A5. Additional Results for Economic Activity

| VARIABLES | (1)<br>Log value added per capita | (2)<br>Log value of products per establishment | (3)<br>Log value of products per capita | (4)<br>Log horsepower | (5)<br>TFP |
|---|---|---|---|---|---|
| *Panel A: OLS* | | | | | |
| Fr. Immigrants | 0.785 | 2.264*** | 0.992* | 1.267*** | 0.295 |
| | (0.580) | (0.704) | (0.556) | (0.475) | (0.358) |
| *Panel B: 2SLS* | | | | | |
| Fr. Immigrants | 1.404** | 3.549*** | 2.065** | 1.906*** | 1.013* |
| | (0.586) | (1.214) | (0.845) | (0.705) | (0.540) |
| F-stat | 270.5 | 270.5 | 270.5 | 270.5 | 270.5 |
| Cities | 178 | 178 | 178 | 178 | 178 |
| Observations | 525 | 525 | 525 | 525 | 525 |

Note: this Table presents results for a balanced panel of the 178 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930, and for which data were reported in the Census of Manufacture between 1909 and 1929. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is: the log of value added per capita in Col 1; the log of value of products per establishment (per capita) in Col 2 (Col 3); the log of horsepower in Col 4; and total factor productivity (TFP) in Col 5. *Fr. Immigrants* is the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). F-stat refers to the K-P F-stat for weak instrument. All regressions include city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table A6. Share of Electric Power in Manufacture (1930)

| | Dep. Variable: *Share of Horsepower from Purchased Electricity* | | | |
|---|---|---|---|---|
| | (1)<br>OLS | (2)<br>OLS | (3)<br>2SLS | (4)<br>2SLS |
| Fr. Immigrants | 2.449*** | 1.799** | 2.520*** | 1.867** |
| | (0.557) | (0.774) | (0.522) | (0.744) |
| F-stat | | | 61.14 | 27.23 |
| Mean Dep. Var. | 0.617 | 0.617 | 0.617 | 0.617 |
| Additional Controls | | X | | X |
| MSAs | 101 | 101 | 101 | 101 |

Note: the sample is restricted to the 101 MSAs spanning counties for which data on purchased electricity used in production was reported in the 1929 Census of Manufacture, and that include at least one of the 180 cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. MSA boundaries are fixed to 1940. Cols 1 and 2 (resp. 3 and 4) present OLS (resp. 2SLS) results. The dependent variable is the share of horsepower coming from purchased electricity in 1930. *Fr. Immigrants* is the 1910 to 1930 change in the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). F-stat refers to the K-P F-stat for weak instrument. All regressions include state fixed effects. Cols 2 and 4 also control for the fraction of immigrants and the fraction of blacks in 1900, and the log of value added per establishment in 1904. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table A7. Immigration and Internal Migration

| | Dep. Variable*: Fr. Natives Born Outside the State* | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| *Panel A: OLS* | | | | |
| Fr. Immigrants | 0.290*** | 0.090 | 0.244 | 0.307*** |
| | (0.097) | (0.126) | (0.224) | (0.099) |
| *Panel B: 2SLS* | | | | |
| Fr. Immigrants | 0.296*** | 0.044 | -0.169 | 0.377*** |
| | (0.096) | (0.115) | (0.190) | (0.113) |
| F-stat | 288.3 | 313.0 | 116.0 | 144.2 |
| Mean dep var | 0.350 | 0.350 | 0.391 | 0.264 |
| Cities | 180 | 180 | 90 | 90 |
| Observations | 540 | 180 | 270 | 270 |
| Sample | Full | Full | High growth | Low growth |
| Pre-period | | X | | |

Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is the fraction of native males in working age that were born outside the state of their city of residence. *Fr. Immigrants* is the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). Col 2 reports results for a regression of the 1900-1910 change in the dependent variable against the 1910 to 1930 change in the fraction of immigrants. Col 3 (resp. 4) restricts the sample to the 90 cities with population growth between 1910 and 1930 above (resp. below) median. F-stat refers to the K-P F-stat for weak instrument. All regressions include city and state by year fixed effects. The mean of each dependent variable at baseline is shown at the bottom of the Table. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table A8. Tax Revenues and Property Values

| Dep. Var. | (1) Total tax revenues PC | (2) Property tax revenues PC | (3) Property values PC | (4) Property values over 1910 pop | (5) Business Taxes PC |
|---|---|---|---|---|---|
| *Panel A: OLS* | | | | | |
| Fr. Immigrants | -8.525 | -8.060 | 372.4 | 240.3 | 0.268 |
| | (6.490) | (5.515) | (740.6) | (562.1) | (1.677) |
| *Panel B: 2SLS* | | | | | |
| Fr. Immigrants | -11.15 | -11.08* | 294.6 | 518.3 | 1.843 |
| | (6.982) | (6.467) | (915.3) | (740.9) | (1.604) |
| F-stat | 288.3 | 288.3 | 288.3 | 288.3 | 288.3 |
| Mean of dep var | 12.53 | 12.04 | 715.9 | 715.9 | 0.889 |
| Cities | 180 | 180 | 180 | 180 | 180 |
| Observations | 540 | 540 | 540 | 540 | 540 |

Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is total (resp. property) tax revenues per capita in Col 1 (resp. Col 2); property values per capita (resp. over 1910 population) in Col 3 (resp. Col 4); and business taxes per capita in Col 5. *Fr. Immigrants* is the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). F-stat refers to the K-P F-stat for weak instrument. All regressions include city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table A9. Public Spending Per Capita, by Category

| VARIABLES | (1) Education | (2) Police | (3) Fire | (4) Charities and hospitals | (5) Sanitation |
|---|---|---|---|---|---|
| *Panel A: OLS* | | | | | |
| Fr. Immigrants | -7.453*** | 0.227 | -0.369 | 0.486 | -0.537 |
| | (2.332) | (0.560) | (0.552) | (0.747) | (0.696) |
| *Panel B: 2SLS* | | | | | |
| Fr. Immigrants | -6.170*** | -0.345 | -0.213 | -1.258 | -1.318* |
| | (2.146) | (0.663) | (0.680) | (1.897) | (0.717) |
| F-stat | 248.6 | 288.3 | 288.3 | 220.3 | 288.3 |
| Mean dep var | 4.250 | 1.338 | 1.485 | 0.635 | 1.129 |
| Cities | 180 | 180 | 180 | 175 | 180 |
| Observations | 534 | 540 | 540 | 516 | 540 |

Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable, in per capita terms, is displayed at the top of each column. Sanitation (Col 5) includes garbage collection, sewerage, and other spending on sanitation. *Fr. Immigrants* is the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). F-stat refers to the K-P F-stat for weak instrument. All regressions include city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table A10. Additional Electoral Outcomes

| VARIABLES | (1) Republicans' vote share | (2) Other parties' vote share | (3) Democrats-Republicans Margin | (4) Turnout |
|---|---|---|---|---|
| *Panel A: OLS* | | | | |
| Fr. Immigrants | 0.337** | 0.191 | -0.866*** | -1.033*** |
| | (0.133) | (0.127) | (0.219) | (0.233) |
| *Panel B: 2SLS* | | | | |
| Fr. Immigrants | 0.169 | 0.235** | -0.573** | -1.422*** |
| | (0.149) | (0.101) | (0.272) | (0.183) |
| F-stat | 83.14 | 83.14 | 83.14 | 83.52 |
| Mean dep var | 0.310 | 0.200 | 0.181 | 0.504 |
| MSAs | 126 | 126 | 126 | 125 |
| Observations | 378 | 378 | 378 | 375 |

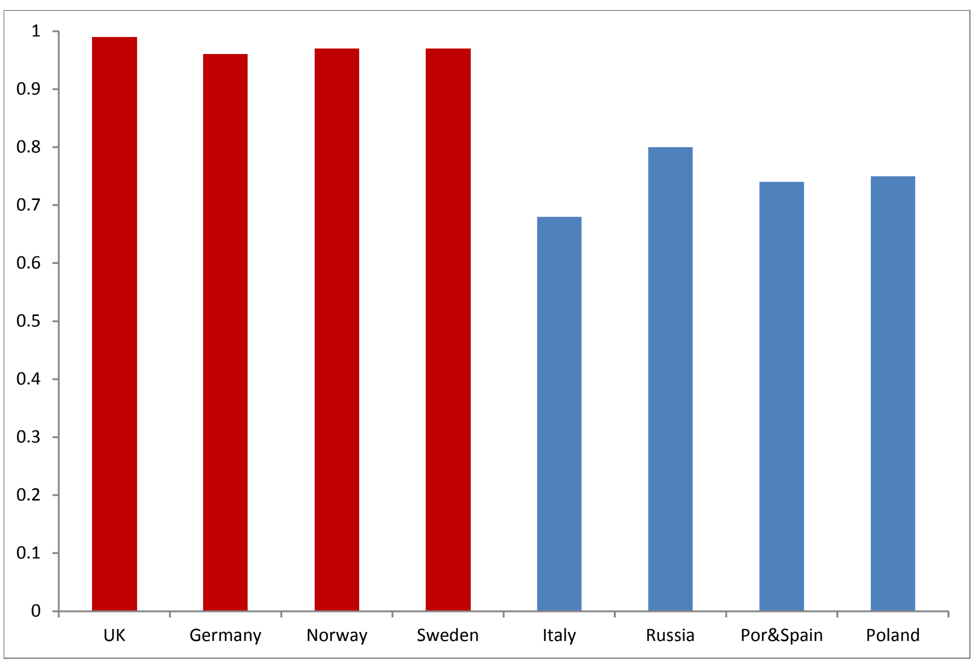
Note: this Table presents results for a balanced panel of the 126 metropolitan statistical areas (MSAs) including at least one of the 180 cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is reported at the top of each column, and refers to Presidential elections. All electoral outcomes were aggregated from the county to the MSA level, using the 1940 MSAs' definitions, and were computed as the average between the closest two elections after each Census year. Results are unchanged when taking the average from the two closest election years (see the online appendix). *Other parties' vote share refers* to the vote share of all parties other than Democrats and Republicans. *Fr. Immigrants* is the fraction of immigrants arrived in the previous decade over predicted city population, and is instrumented using the baseline version of the instrument constructed in Section 4.2 (see (2) in the main text). F-stat refers to the K-P F-stat for weak instrument. All regressions include MSA and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Table A11. Linguistic Distance vs Literacy

| Dep. Var. | (1)<br>Total tax revenues PC | (2)<br>Property tax revenues PC | (3)<br>Property tax rate | (4)<br>Public spending PC | (5)<br>Education | (6)<br>Police | (7)<br>Charities and Hospitals | (8)<br>Sanitation |
|---|---|---|---|---|---|---|---|---|
| *Panel A: OLS* | | | | | | | | |
| Ling. Distance | -0.292 | -0.260 | -0.997 | -0.183 | -0.062 | -0.020 | -0.044 | -0.028 |
| | (0.185) | (0.180) | (0.701) | (0.151) | (0.054) | (0.019) | (0.036) | (0.033) |
| Literacy | 0.058 | 0.160 | 0.404 | 0.093 | 0.099 | 0.026 | -0.060 | -0.028 |
| | (0.181) | (0.169) | (0.327) | (0.132) | (0.063) | (0.020) | (0.041) | (0.026) |
| *Panel B: 2SLS* | | | | | | | | |
| Ling. Distance | -0.946** | -0.861* | -2.340 | -0.575* | -0.177 | 0.001 | -0.131 | -0.065 |
| | (0.458) | (0.450) | (1.553) | (0.314) | (0.128) | (0.046) | (0.092) | (0.054) |
| Literacy | -0.294 | -0.217 | -0.129 | -0.234 | 0.096 | 0.062 | -0.091 | -0.054 |
| | (0.327) | (0.303) | (0.801) | (0.266) | (0.099) | (0.039) | (0.097) | (0.051) |
| KP F-stat | 14.30 | 14.30 | 14.57 | 14.30 | 14.45 | 14.30 | 10.89 | 14.30 |
| F-stat (Imm.) | 101.7 | 101.7 | 102.1 | 101.7 | 87.48 | 101.7 | 83.47 | 101.7 |
| F-stat (Ling.) | 36.48 | 36.48 | 37.87 | 36.48 | 34.74 | 36.48 | 26.10 | 36.48 |
| F-stat (Lit.) | 21.77 | 21.77 | 21.68 | 21.77 | 21.70 | 21.77 | 21.27 | 21.77 |
| Mean of dep var | 12.76 | 12.10 | 19.75 | 12.16 | 4.250 | 1.338 | 0.635 | 1.129 |
| Observations | 540 | 540 | 539 | 540 | 534 | 540 | 516 | 540 |

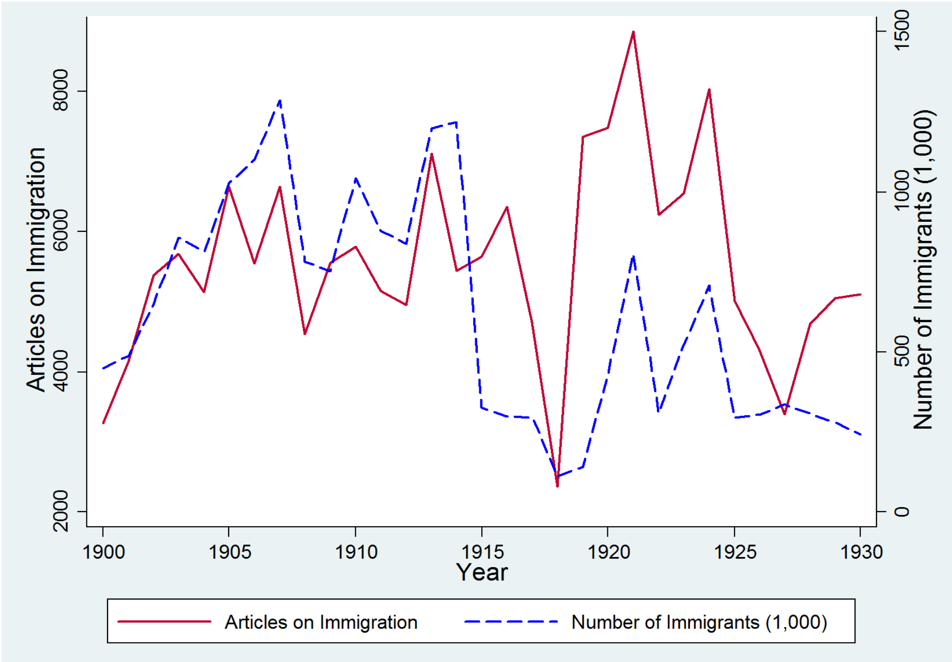
Note: this Table presents results for a balanced panel of the 180 US cities with at least 30,000 residents in each Census year 1910, 1920, and 1930. Panels A and B report, respectively, OLS and 2SLS results. The dependent variable is displayed at the top of each column. In Cols 5 to 8, the dependent variable is spending per capita on the category listed at the top of the column. The main regressors of interest are the (standardized) weighted average linguistic distance and literacy index constructed in Sections 7.1.2 and 7.1.3, instrumented using predicted shares of immigrants from each sending region obtained from (2) in Section 4.2. KP F-stat is the Kleibergen-Paap F stat for joint significance of instruments. F-stat (Imm.), F-stat (Ling.), and F-stat (Lit.) refer to the partial F-stats for joint significance of the instruments in the three separate first-stage regressions. All regressions include the (instrumented) fraction of immigrants, and control for city and state by year fixed effects. Robust standard errors, clustered at the MSA level, in parenthesis. *** p<0.01; ** p<0.05; * p<0.1.

## Figure A1. Literacy Rates, for Selected Sending Regions (1910)



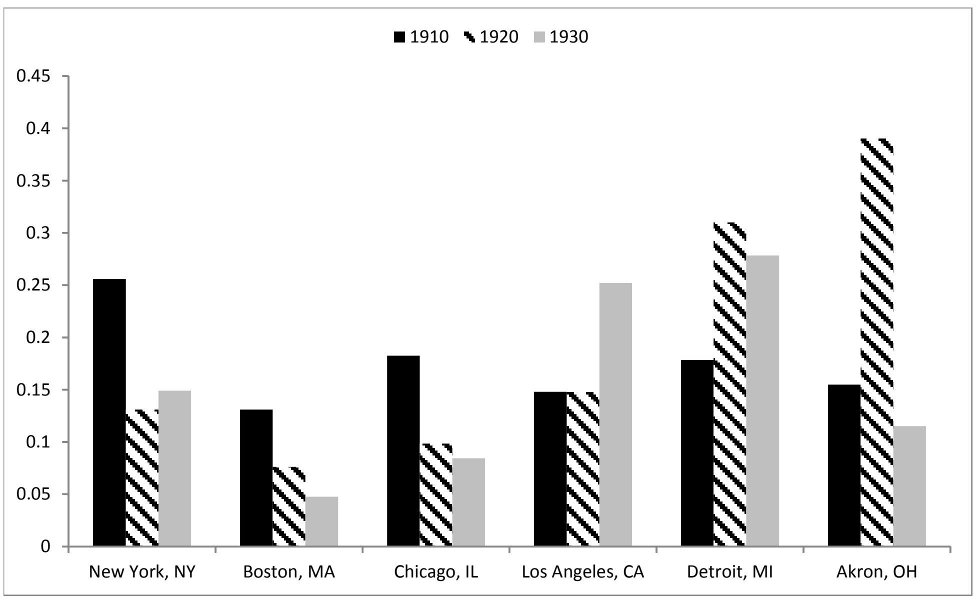

Note: this Figure reports the literacy rate for men in the age range (15-65) for selected immigrants' groups in 1910. Source: Author's calculations using IPUMS data.

## Figure A2. Immigration and Newspapers' Coverage



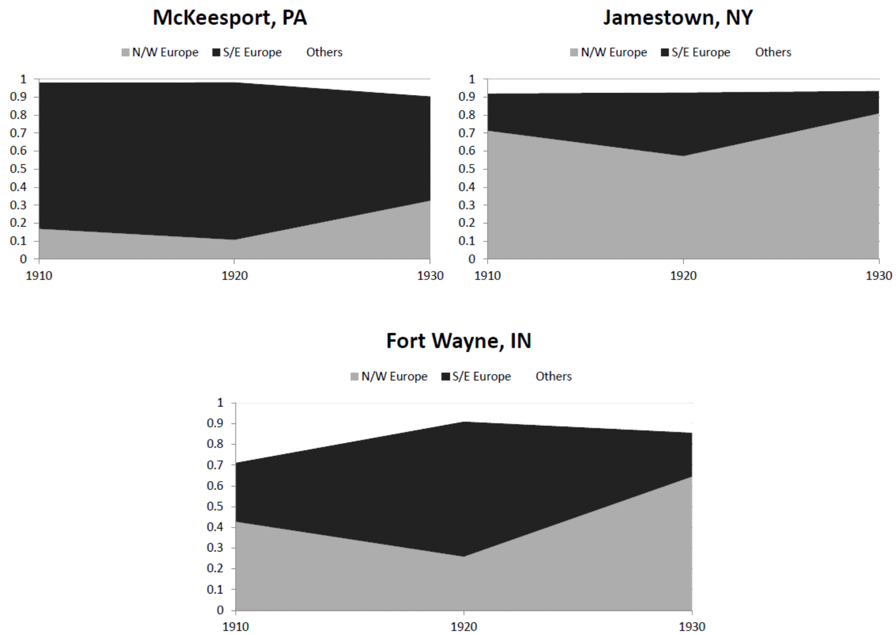

Note: the Figure plots the annual number of immigrants in thousands (dashed blue line, right-axis) and the number of times the words "immigration" and "immigrants" appeared in local newspapers for all cities with at least 30,000 residents and for which data were available in the database of Newspapersarchive (solid red line, left-axis). Source: author's calculation using data from Newspapersarchive.

## Figure A3. Recent Immigrants Over 1900 City Population, by Decade



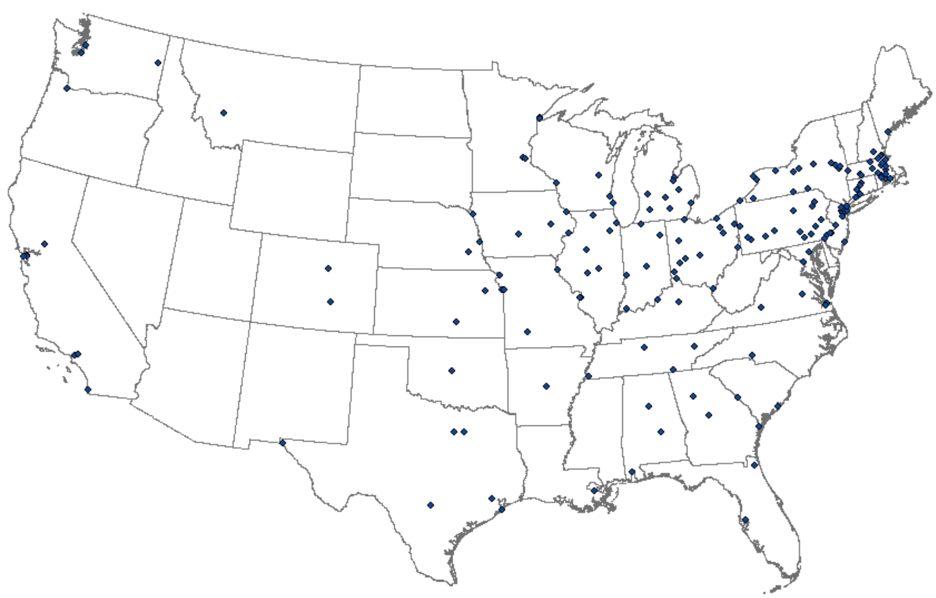

Note: Number of European immigrants that arrived in the United States in the last decade over 1900 city population, for selected cities and by decade. Source: Author's calculations from IPUMS sample of US Census (Ruggles et al., 2015).

## Figure A4. Changing Composition of Immigrants in Selected Cities



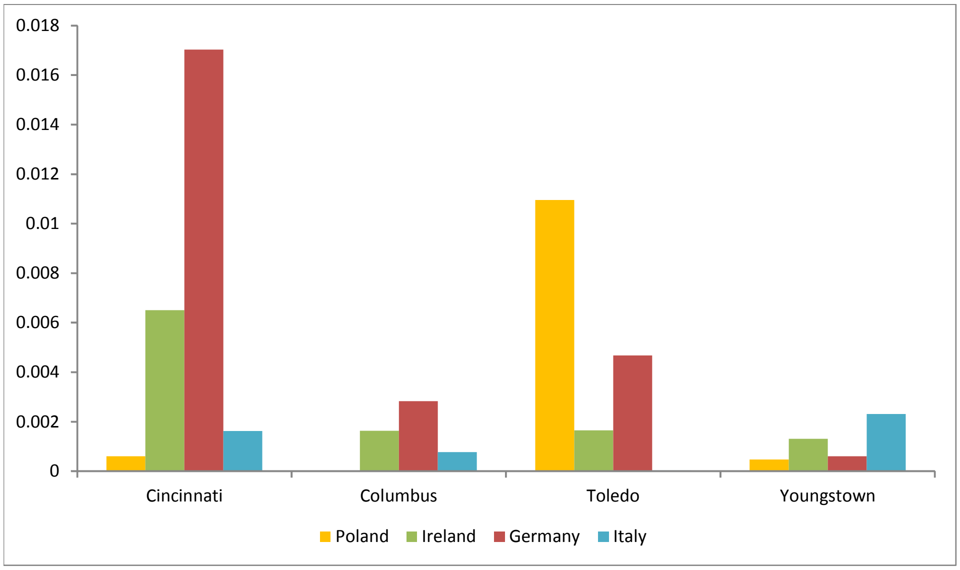

Note: Share of immigrants entering the US in the previous decade from different regions living in selected cities. Source: Author's calculations from IPUMS sample of US Census (Ruggles et al., 2015).

## Figure A5. Map of Cities



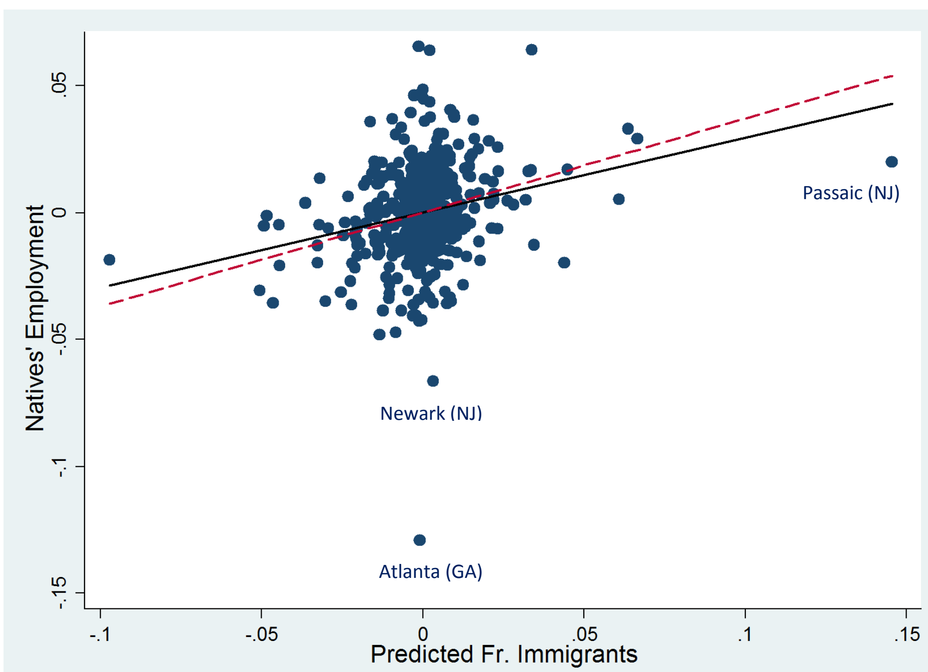
Note: The map plots the 180 cities with at least 30,000 residents in each of the three Census years 1910, 1920, and 1930.

## Figure A6. Share of European Immigrants in Ohio, 1900



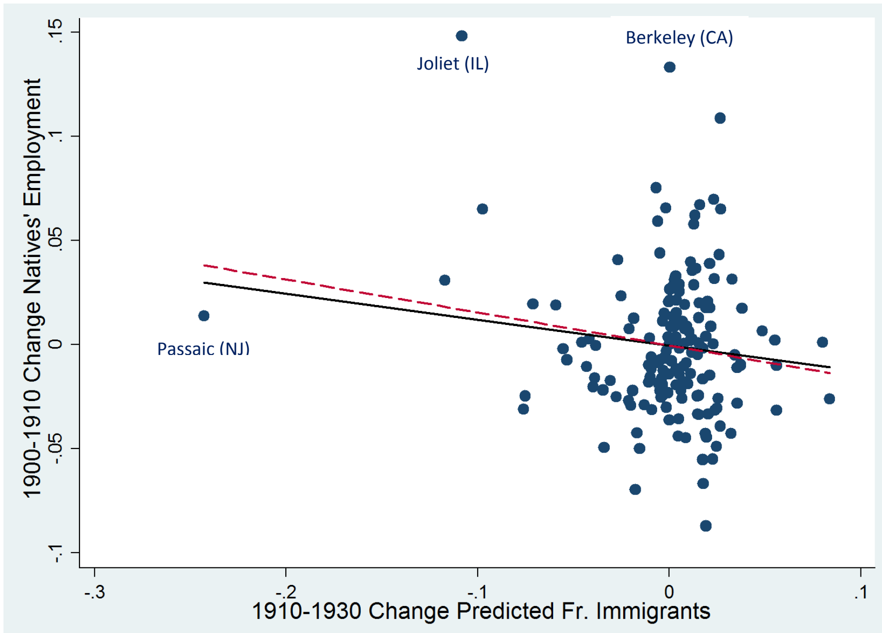

Note: share of individuals of European ancestry living in selected cities of Ohio in 1900, for selected ethnic groups. Source: Author's calculations using IPUMS data.

## Figure A7. Natives' Employment and Immigration: Reduced Form



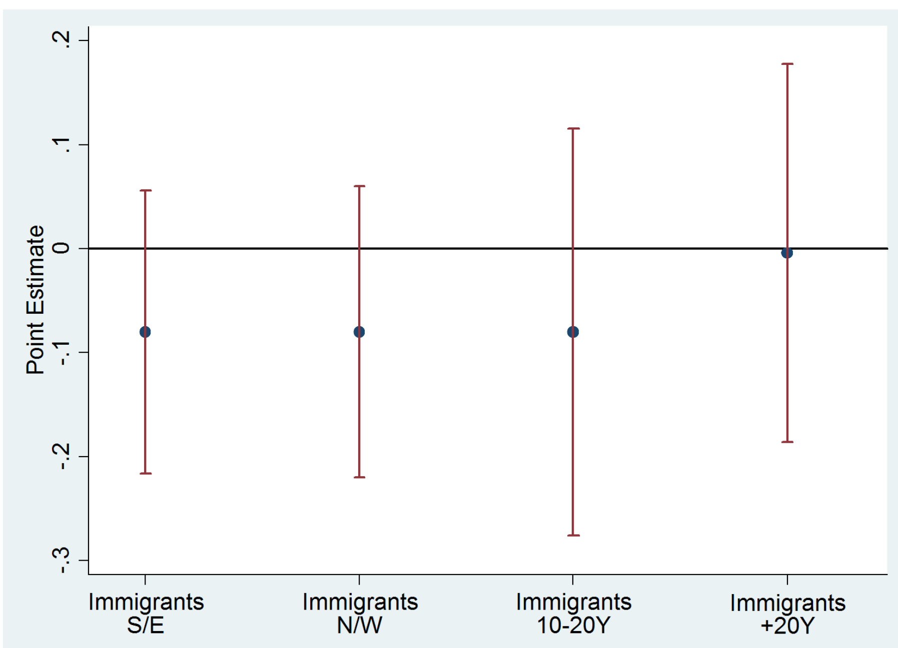

Note: the y-axis and the x-axis report, respectively, the employment to population ratio for native males in working age who were not in school and predicted fraction of immigrants over predicted city population in each of the three Census years, 1910, 1920, and 1930. Each point in the scatter diagram represents the residual change in each of the two variables after partialling out city and state by year fixed effects. The solid line shows the regression coefficient for the full sample (coefficient=0.296, standard error=0.054). The dotted (red) line shows the regression coefficient obtained when dropping the city of Passaic, NJ (coefficient=0.371, standard error=0.065).

## Figure A8. Natives' Employment and Immigration: Placebo Check



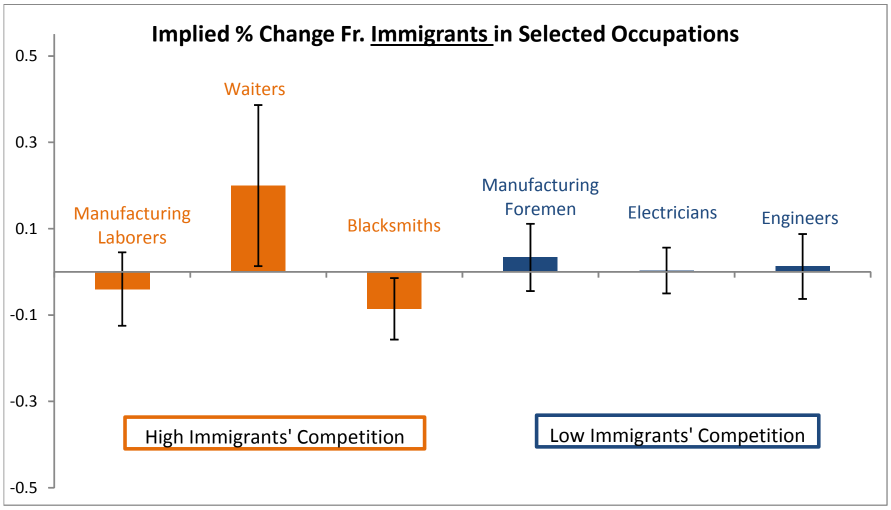

Note: this figure shows the residual plot of the 1900-1910 change in employment to population ratio (y-axis) against the 1910-1930 change in the predicted fraction of immigrants over predicted city population (x-axis) after partialling out city and state by year fixed effects. The solid line shows the regression coefficient for the full sample (coefficient= -0.119, standard error=0.110). The dotted (red) line shows the regression coefficient obtained when dropping the city of Passaic, NJ (coefficient= -0.151, standard error=0.155).

## Figure A9. Effects of Immigration on Previously Arrived Immigrants



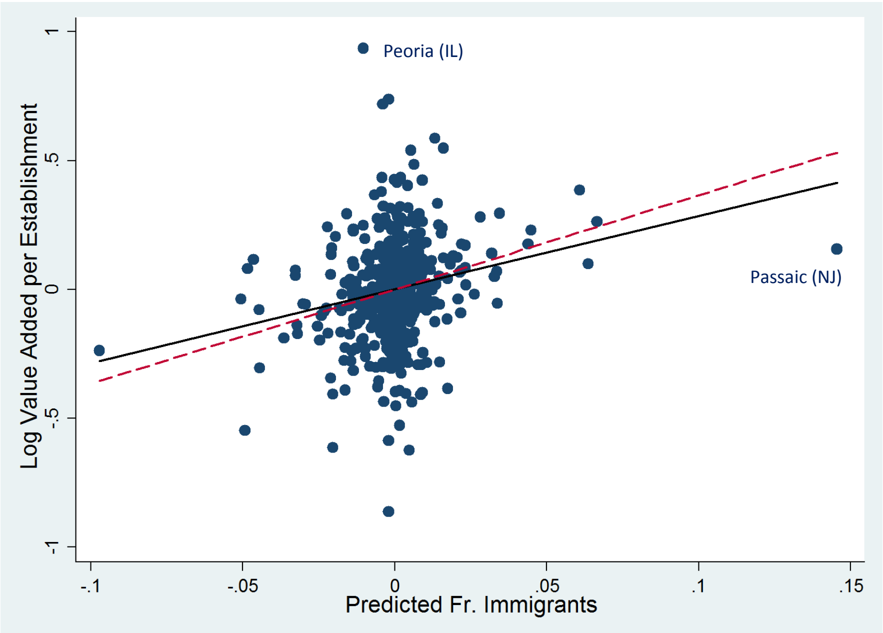

Note: the figure plots the coefficient (with corresponding 95% confidence intervals) from a regression of immigration on employment of different groups of foreign born men of working age (15-65). The fraction of immigrants is instrumented with the instrument constructed in equation (2) of Section 4.2. All regressions control for city and state by year fixed effects, and include interactions between the 1900 fraction of immigrants and year dummies. *Immigrants S/E* (resp. *N/W*) refers to immigrants from Eastern and Southern (resp. Northern and Western) Europe. *Immigrants 10-20Y* (resp. *+20Y*) refers to immigrants that spent between 10 and 20 (resp. more than 20) years in the United States.

## Figure A10. Percent Change in Fraction of Immigrants Across Occupations



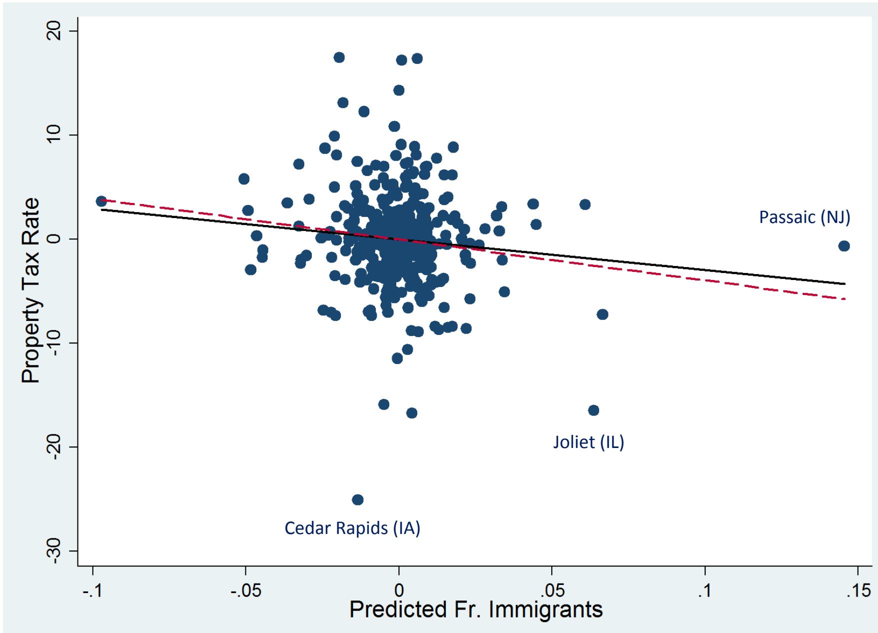

Note: the figure replicates Figure 9 by plotting the percent change in the fraction of immigrants arrived at least 10 year before in each occupation (relative to its 1910 mean) implied by a one standard deviation increase in immigration, according to 2SLS estimates (with corresponding 95% confidence intervals).

## Figure A11. Value Added and Immigration: Reduced Form



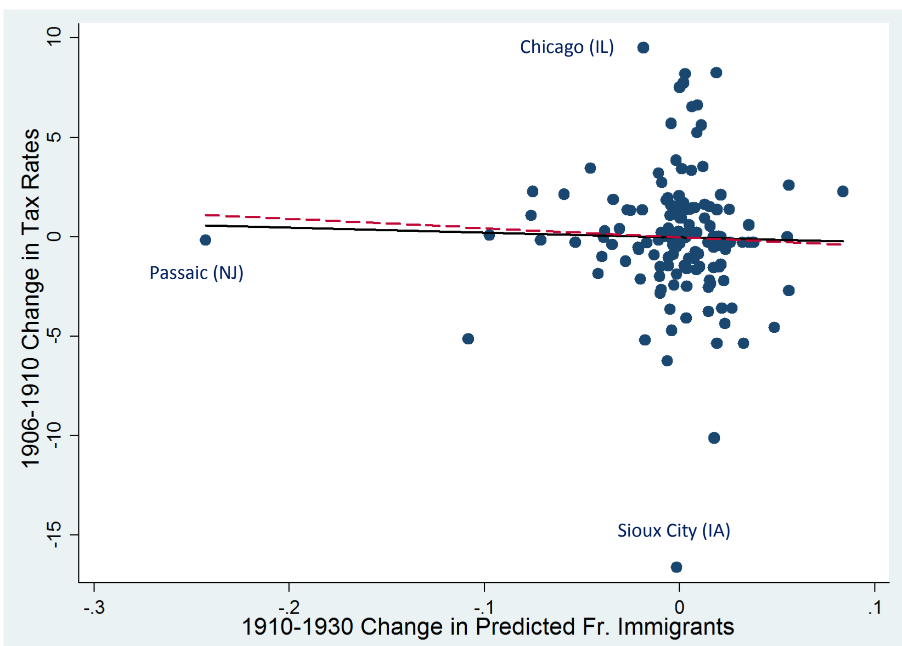

Note: the y-axis and the x-axis report, respectively, the log of value added per establishment and predicted fraction of immigrants over predicted city population in each of the three Census years, 1910, 1920, and 1930. Each point in the scatter diagram represents the residual change in each of the two variables after partialling out city and state by year fixed effects. The solid line shows the regression coefficient for the full sample (coefficient=2.874, standard error=0.868). The dotted (red) line shows the regression coefficient obtained when dropping the city of Passaic, NJ (coefficient=3.685, standard error=0.825).

## Figure A12. Tax Rates and Immigration: Reduced Form



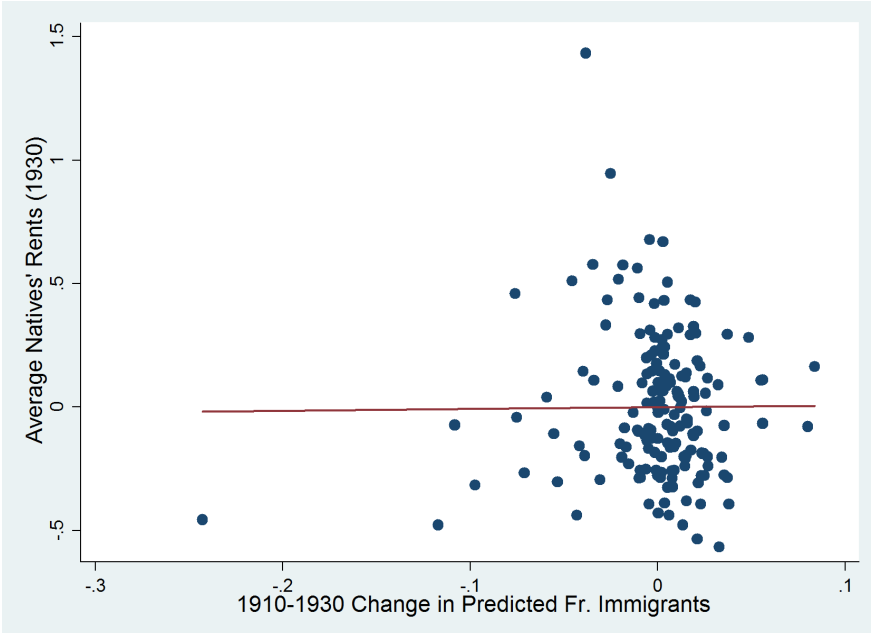

Note: the y-axis and the x-axis report, respectively, the property tax rate and predicted fraction of immigrants over predicted city population in each of the three Census years, 1910, 1920, and 1930. Each point in the scatter diagram represents the residual change in each of the two variables after partialling out city and state by year fixed effects. The solid line shows the regression coefficient for the full sample (coefficient= -29.45, standard error=16.03). The dotted (red) line shows the regression coefficient obtained when dropping the city of Passaic, NJ (coefficient= -39.37, standard error=22.39).

## Figure A13. Tax Rates and Immigration: Placebo Check




Note: this figure shows the residual plot of the 1900-1910 change in the property tax rate (y-axis) against the 1910-1930 change in the predicted fraction of immigrants over predicted city population (x-axis) after partialling out city and state by year fixed effects. The solid line shows the regression coefficient for the full sample (coefficient= -2.279, standard error=6.869). The dotted (red) line shows the regression coefficient obtained when dropping the city of Passaic, NJ (coefficient= -4.518, standard error=8.810).

**Figure A14. 1910-1930 Immigration and 1930 Natives' Rents**




Note: this figure plots the relationship between the log of 1930 average rents paid by natives (y-axis) and the 1910 to 1930 predicted change in immigration (x-axis) after partialling out state fixed effects.

# Appendix B. Theoretical Framework

## B.1 Overview

In what follows, I present a simple model to explain the three key findings of Section 5 in the paper, namely that immigration

1. Increases natives' employment, without generating negative effects even for workers in highly exposed occupations
2. Boosts economic activity, capital utilization, and productivity
3. Increases (reduces) the fraction of natives employed in high (low) occupations, and promotes natives' occupational upgrading

I build on a model of biased technical change (Acemoglu, 2002), where a final good is produced combining two intermediate inputs. One of the two intermediate inputs is produced using only non-production (proxy for high skilled) workers, while the other uses both laborers (proxy for low skilled workers) and capital.[73] Capital is, in turn, endogenously

[73]See Goldin and Katz (2009) for the relationship between production and non-production workers and education or skills in the early twentieth century.

supplied by a continuum of manufacturing establishments, each producing a different variety. In this standard set-up, I formally show under what conditions an immigration shock in the unskilled sector can benefit high skilled natives without harming workers in the more exposed sector. As in the more general model of Acemoglu (2002), the key intuition is that, by increasing the supply of unskilled labor, immigration can induce an endogenous response from the production side (i.e., the entry of new plants), which can partly (or even completely) accommodate the inflow of immigrants.

Next, I present two extensions of the model. First, I assume that immigrants and native laborers are imperfect substitutes, and show that the degree of capital adjustment needed to absorb the immigration shock is lower than in the baseline version of the model. This is intuitive: on the one hand, the negative (competition) effect induced by immigration is lower, since immigrants are only imperfect substitutes for unskilled natives; on the other, the complementarity between the skills of natives and those of immigrants makes firms' investment even more profitable than before. Second, I endogeneize natives' sectoral choice, assuming that natives can work in both the skilled and the unskilled sector, while immigrants are barred from non-production occupations. Following the inflow of immigrants, natives reallocate their labor away from the unskilled (and more exposed) sector and towards more skilled occupations. In this case, immigration is absorbed by two distinct channels: first, through an increase in firms' investment, as before; second, via occupational mobility of natives who tend to take up jobs where they have a comparative advantage relative to immigrants.[74]

## B.2 Set-Up

### B.2.1 Demand Side

I consider a general equilibrium model with two types of workers, skilled and unskilled, who have the same utility function over consumption of the final good

$$U\left(C\left(t\right)\right)=\int_{0}^{\infty}\exp\left(-\rho t\right)\frac{C^{1-\theta}\left(t\right)}{1-\theta}dt$$

where $\rho$ is the discount rate and $\theta$ is the intertemporal elasticity of substitution (or, equivalently, the coefficient of relative risk aversion). To ease notation, whenever possible, I drop

[74] Peri and Sparber (2009) is the first paper that formally shows empirically and theoretically this mechanism. However, the forces highlighted in my model are rather different from those originally proposed in Peri and Sparber (2009).

the time index. The budget constraint is given by

$$C + I + Z \leq Y$$

where $I$ and $Z$ denote respectively investment and expenditures to enter the manufacturing sector and produce capital supplies (introduced below).[75]

### B.2.2 Supply Side

The final good ($Y$) is produced combining two intermediate inputs, $Y_H$ and $Y_L$, according to a CES production function

$$Y = [Y_H^\gamma + Y_L^\gamma]^{\frac{1}{\gamma}} \tag{B1}$$

where $\gamma \leq 1$ governs the elasticity of substitution between the two intermediate goods.[76] The price of the final good is normalized to 1, and both $Y_H$ and $Y_L$ are produced by a large number of perfectly competitive firms. Since I am interested in evaluating the effects of a change in the supply of unskilled labor (induced by an immigration shock), to simplify the analysis, I assume that $Y_H$ is produced using only high skilled workers, while both unskilled labor and capital are used in the production of $Y_L$:[77]

$$Y_H = H$$

and

$$Y_L = KL^\beta \tag{B2}$$

Capital is, in turn, the aggregate of inputs (that I refer to as machines) supplied by a continuum of manufacturing plants, each producing a different variety, $k_L(v)$

$$K = \frac{1}{1-\beta} \int_0^{N_L} k_L^{1-\beta}(v)\, dv$$

where $N_L$ is the number of manufacturing plants (and thus of varieties).

[75] I assume that the standard no Ponzi condition holds, so that the lifetime budget constraint is satisfied.

[76] The elasticity of substitution betwen $Y_H$ and $Y_L$ is given by $\varepsilon = \frac{1}{1-\gamma}$. When $\gamma = 1$, i.e. $\varepsilon \to \infty$, the two intermediate goods are perfect substitutes; when $\gamma \to 0$, i.e. $\varepsilon \to 1$, $Y$ is produced according to a Cobb-Douglas; when $\gamma \to -\infty$, i.e. $\varepsilon \to 0$, $Y_H$ and $Y_L$ are perfect complements.

[77] I assume that the labor markets are competitive and clear at every instant. For now, I also assume that skill supplies are given, but below I endogeneize native workers' occupational choice (see Section B.5.2).

### B.2.3 Production of Machines

As in Acemoglu (2002), machines are assumed to fully depreciate after use, and are supplied by monopolists at price $p_L^k(v)$ for all $v \in [0, N_L]$. Once a specific machine is invented, the monopolist has full property rights over that variety, and can produce it at marginal cost $\lambda \equiv 1-\beta$. Finally, I assume that one unit of the final good used in the development of machines directed towards $Y_L$ generates $\eta_L$ new varieties of $L$-complementary machines. That is,

$$\frac{dN_L(t)}{dt} = \eta_L Z(t) \tag{B3}$$

## B.3 Equilibrium

An equilibrium is defined as a set of prices of machines, $p_L^k$, that maximizes monopolists' profits, demand for machines, $x_L$, that maximizes profits of producers of intermediate good $Y_L$, factor and product prices, $w_L$, $w_H$, $p_L$, and $p_H$, such that markets clear, and number of machine varieties, $N_L$, that satisfies the free entry condition.

First, because of perfect competition, prices of $Y_H$ and $Y_L$, $p_H$ and $p_L$, are equal to their marginal products:

$$p_H = Y_H^{\gamma-1}\left[Y_H^{\gamma} + Y_L^{\gamma}\right]^{\frac{1}{\gamma}-1} \tag{B4}$$

and

$$p_L = Y_L^{\gamma-1}\left[Y_H^{\gamma} + Y_L^{\gamma}\right]^{\frac{1}{\gamma}-1} \tag{B5}$$

The price ratio is thus[78]

$$p \equiv \frac{p_H}{p_L} = \left(\frac{H}{Y_L}\right)^{\gamma-1} \tag{B7}$$

Since $Y_H = H$, it follows directly that

$$w_H = p_H \tag{B8}$$

Next, from the maximization problem of producers of good $Y_L$, it is possible to derive the demand for machines:

$$k_L(v) = \left(\frac{p_L}{p_L^k(v)}\right)^{\frac{1}{\beta}} L \ \forall v \tag{B9}$$

The profit maximization of monopolists, in turn, implies that the price of each variety is

[78] It should be noted that normalizing the price of the final good to 1 is equivalent to write

$$\left[p_H^{\frac{\gamma}{\gamma-1}} + p_L^{\frac{\gamma}{\gamma-1}}\right]^{\frac{\gamma-1}{\gamma}} = 1 \tag{B6}$$

given by

$$p_L^k(v) = 1 \;\forall v \tag{B10}$$

so that

$$k_L(v) = p_L^{\frac{1}{\beta}} L \;\forall v \tag{B11}$$

Using $(B11)$ and $(B10)$, monopolists' profits are then

$$\pi_L = \beta p_L^{\frac{1}{\beta}} L \tag{B12}$$

implying that the net present discounted value of profits for a monopolist is

$$V_L = \frac{\beta p_L^{\frac{1}{\beta}} L}{r} \tag{B13}$$

where $r$ is the interest rate. Even though, in principle, the interest rate can be time-varying, I focus on a balanced growth path (BGP), where $r$ is constant and equal to $(\theta g + \rho)$, where $g$ is the steady state growth rate of output (see below).

Replacing $(B11)$ in $(B2)$, we get

$$Y_L = \frac{N_L L}{1-\beta} p_L^{\frac{1-\beta}{\beta}} \tag{B14}$$

Using $(B14)$, and solving the maximization problem of intermediate producers in sector $L$, one can derive the unskilled wage, given by

$$w_L = \frac{N_L}{1-\beta} p_L^{\frac{1}{\beta}} \tag{B15}$$

Finally, the free entry condition in the machine-producing market implies that

$$V_L \eta_L = 1$$

Or,

$$\eta_L \beta p_L^{\frac{1}{\beta}} L = r$$

The previous expression pins down the price of $Y_L$ as a function of $r$, $\eta_L$, $\beta$, and $L$:[79]

$$p_L = \left(\frac{r}{\eta_L \beta L}\right)^{\beta} \tag{B16}$$

[79] Note that, once we have $p_L$, it is immediate to get $p_H$ from $(B6)$: $p_H = \left(1 - \left(\frac{L}{\psi}\right)^{\frac{\gamma\beta}{1-\gamma}}\right)^{\frac{\gamma-1}{\gamma}}$.

In online appendix B, I show that, using $(B16)$ in $(B14)$ and combining the resulting expression with $(B5)$ and $(B6)$, it is possible to derive an equation that characterizes the relationship between the equilibrium number of plants, $N_L$, and the supply of both high and low skilled workers ($H$ and $L$):

$$N_L = \frac{H(1-\beta) L^{\frac{\beta\gamma}{1-\gamma}}}{\psi^{(1-\beta)} \left[\psi^{\frac{\beta\gamma}{1-\gamma}} - L^{\frac{\beta\gamma}{1-\gamma}}\right]^{\frac{1}{\gamma}}} \tag{B17}$$

where $\psi \equiv \frac{r}{\eta_L \beta}$.

The last step to fully characterize the steady state equilibrium of the economy is to determine the BGP growth rate, $g$. As noted above, along the BGP, $r = \theta g + \rho$. Using the free entry condition into the monopolist sector, it can be shown that (see also Acemoglu, 2002)[80]

$$g = \frac{1}{\theta}\left[\beta \eta_L L - \rho\right] \tag{B18}$$

Before turning to the comparative statics exercise of the next section, where I study the effects of immigration on the economy, let me highlight three important results, which will be used extensively below. Direct inspection of $(B16)$ and of $(B17)$ shows that

$$\frac{\partial p_L}{\partial L} < 0 \tag{B19}$$

$$\frac{\partial N_L}{\partial H} > 0 \ \forall \gamma \tag{B20}$$

and, most importantly,

$$\gamma > 0 \implies \frac{\partial N_L}{\partial L} > 0 \tag{B21}$$

The three results, $(B19)$, $(B20)$, and $(B21)$, are standard in the biased technical change literature (Acemoglu, 1998, 2002). However, especially $(B21)$ will be very important when studying the effects of immigration in the next section, so it is worth briefly discussing the intuition behind it. Specifically, incentives to enter the manufacturing sector depend on two forces - a price and a market size effect. When the former dominates, an increase in the supply of a given factor reduces incentives to introduce technologies complementary to that factor. When the latter prevails, instead, higher supplies of a factor will make it more profitable to develop technologies biased towards that factor. As stated in $(B21)$ (see the proof in online appendix B), if $\gamma > 0$, i.e. when the degree of complementarity between high and low skilled workers is not too high, the market size effect will be stronger, and an

[80] Note that, from the No Ponzi condition it directly follows that $\rho > g(1-\theta)$.

increase in the supply of unskilled labor will induce capital accumulation in the unskilled sector, by increasing the number of plants producing technologies that are unskill-biased.

## B.4 Evaluating the Effects of Immigration

In this section, I study how an exogenous increase in immigration affects the economy. To mirror the empirical setting considered in my paper, I assume that immigrants can only be employed in the unskilled sector, and do not have access to high skilled jobs (see Table A4), either because of skill mismatch or because of discrimination. For the moment, I assume that unskilled natives and immigrants are perfect substitutes, and that natives' labor supply in each sector is fixed. Below, I relax both these assumptions. Before turning to the analysis, note the followings. First, it is trivial to see that an increase in $N_L$ mechanically favors capital accumulation. Second, from $(B15)$ it is immediate to verify that the unskilled wage is increasing in $N_L$ and decreasing in $L$. Third, from $(B6)$, it follows directly that an increase in $p_L$ will lower $p_H$, so that higher (lower) $p_L$ will depress (increase) the high skilled wage.

Now, assume that the economy experiences an exogenous inflow of immigrants, which increases $L$. What happens to capital, wages, and the skill premium?

**Capital Accumulation**. First, from $(B21)$, we know that if

$$\gamma > 0 \tag{B22}$$

$N_L$ is increasing in $L$. Hence, the first result is that, if $(B22)$ holds, immigration favors capital accumulation in the unskilled sector.[81]

**High Skilled Wages**. Second, it is immediate to see from $(B16)$ that higher immigration will reduce the price of $Y_L$, $p_L$, and, in turn raise $p_H$ and $w_H$ (see $(B6)$). Thus, immigration has a positive and unambiguous effect on high skilled wages.

**Unskilled Wages.** Turning to the impact of immigration on wages of unskilled workers, there are two countervailing forces. First, immigration has a negative effect on unskilled wages - the standard *substitution effect* that takes place as the economy moves along the (downward sloping) demand curve. Second, if $\gamma > 0$, there is a *directed technology effect* (Acemoglu, 1998): the increase in skill supplies (induced by immigration) increases incentives to open new plants and develop skill-complementary technologies, in turn exerting positive pressure on $w_L$. Remember that

$$w_L = \frac{\psi N_L}{L\,(1-\beta)} \tag{B23}$$

Then, from the previous expression, it is immediate to see how the two channels (the sub-

[81] This result follows directly from the fact that, in equilbrium, $K = \frac{N_L}{1-\beta}\psi$.

stitution effect and the capital response) just described affect the unskilled wage. Online appendix B provides an expression showing for which parameter values the directed technology effect prevails over the substitution effect. In line with Acemoglu (2002), this happens when $\gamma$ is sufficiently large.[82] The main take-away from this discussion is that, when technology is allowed to be directed and as long as $\gamma > 0$, the standard (substitution) negative effect of immigration on earnings of unskilled natives will be partly (or even completely) offset by the endogenous technology response.

**Skill Premium.** Finally, I evaluate the effects of immigration on the skill premium, $\omega \equiv \frac{w_H}{w_L}$. Using the equilibrium conditions derived above, the skill premium can be written as

$$\omega = \left(\frac{1-\beta}{\psi}\right) \frac{\left(1 - \left(\frac{L}{\psi}\right)^{\frac{\gamma\beta}{1-\gamma}}\right)^{\frac{\gamma-1}{\gamma}}}{N_L\left(L\right)} L \tag{B24}$$

where I am emphasizing the fact that, in equilibrium, $N_L$ is a function of $L$ (see $(B17)$). From $(B24)$, it is clear that an increase in $L$ (induced by immigration) has two separate effects on the skill premium. First, higher $L$ reduces $w_L$ because of substitution and increases $w_H$ because of complementarity (at least as long as $\gamma < 1$). Second, there is an indirect effect, operating through changes in $N_L$. Whenever $\gamma > 0$, the latter will tend to offset (and, if $\gamma$ is sufficiently high even reverse) the positive effect of immigration on the skill premium. In online appendix B, I explicitly derive expressions for each of the two forces, and provide a sufficient condition (in terms of $\gamma$ and $\beta$) under which immigration reduces the skill premium.[83]

To summarize, when technology is endogenous and $(B22)$ holds, an exogenous shock to immigration:

1. Increases capital accumulation in the unskilled sector
2. Raises the high skilled wage
3. Has ambiguous effects on both the unskilled wage and the skill premium. If the degree of substitutability between factors (i.e. $\gamma$) is sufficiently high, immigration can even be beneficial to unskilled natives.

Of course, one should not conclude that immigration is necessarily beneficial to *all* natives. In fact, the previous analysis makes it clear that, for immigration to benefit (or at

[82] In particular, a sufficient (but not a necessary) condition for the total effect of immigration on the unskilled wage to be positive is that $\gamma > \frac{1}{1+\beta}$. This condition can be equivalently expressed in terms of the derived elasticity of substitution, $\sigma \equiv \left(\frac{1}{1-\gamma} - 1\right)\beta + 1$, as $\sigma > 2$ (Acemoglu, 2002).

[83] As in Acemoglu (2002), a sufficient condition for $\omega$ to fall with $L$ is that $\gamma > \frac{1}{1+\beta}$.

least not to harm) natives in the more exposed sector, specific conditions - in particular, scope for capital accumulation and technological upgrading - must be satisfied.

## B.5 Extensions

Thus far, I have neglected two potentially important mechanisms that, in addition to the capital response highlighted above, can help natives in more exposed occupations to cope with a sudden increase in immigration. First, I assumed that immigrants and unskilled natives are perfect substitutes in production; second, I fixed natives' labor supply in each sector. Yet, a large body of the literature has documented that neither condition is likely to hold in practice (Card, 2005; Peri and Sparber, 2009; Ottaviano and Peri, 2012; Foged and Peri, 2016). For this reason, and to more thoroughly analyze the channels through which immigration affects natives' labor market outcomes, I now relax each of the two assumptions.

### B.5.1 Imperfect Substitutability Between Immigrants and Natives

I start by relaxing the assumption that immigrants and unskilled natives are perfect substitutes. In particular, I specify the total supply of unskilled labor as

$$L = [I^{\alpha} + U^{\alpha}]^{\frac{1}{\alpha}} \tag{B25}$$

where $I$ and $U$ refer, respectively, to immigrants and unskilled natives, and $\alpha \leq 1$ governs the elasticity of substitution between the two. When $\alpha \rightarrow 1$, we are in the limit case of perfect substitutability considered above. Since immigrants and unskilled natives are likely to display at least some degree of substitutability, I assume that $\alpha > 0$, but do not restrict this parameter any further.

When $\alpha \in (0, 1)$, an increase in immigration will raise the unskilled labor aggregate in $(B25)$ more than one for one. To see this, note that

$$\frac{\partial L}{\partial I} = \left[1 + \left(\frac{U}{I}\right)^{\alpha}\right]^{\frac{1-\alpha}{\alpha}} \tag{B26}$$

As long as $\alpha \in (0, 1)$, the term inside the square brackets is strictly greater than 1, and elevating this to $\left(\frac{1-\alpha}{\alpha}\right)$ will never yield a number below 1 (in the limit case of $\alpha = 1$, the increase in $I$ will imply a one for one increase in $L$). It follows that

$$\frac{\partial L}{\partial I} \geq \frac{\partial L}{\partial L} = 1 \tag{B27}$$

with a strict inequality whenever $\alpha \in (0,1)$. The result in $(B27)$ is going to be important for some of the comparative static exercises below.

From now onwards, let us consider only the (empirically relevant) case in which $0 < \alpha < 1$. As before, I now study the effects of an exogenous increase in immigration on capital, wages, and on the skill premium.

**Capital Accumulation**. Remember from above that as long as $\gamma > 0$, $\frac{\partial N_L}{\partial L} > 0$. Hence, $(B27)$ immediately implies that

$$\frac{\partial N_L}{\partial I} > \frac{\partial N_L}{\partial L} > 0 \tag{B28}$$

In words, once we allow for immigrants and unskilled natives to be imperfect substitutes (i.e. $\alpha \in (0,1)$), if $\gamma > 0$, not only immigration has a positive effect on the number of plants producing machines complementary to unskilled workers, but also, this effect is going to be larger than in the baseline case of perfect substitutability.

**High Skilled Wages.** Since

$$w_H = \left(1 - \left(\frac{L}{\psi}\right)^{\frac{\gamma\beta}{1-\gamma}}\right)^{\frac{\gamma-1}{\gamma}}$$

it follows that $\frac{\partial w_H}{\partial L} > 0$. From $(B27)$ we know that $\frac{\partial L}{\partial I} > \frac{\partial L}{\partial L}$, and so

$$\frac{\partial w_H}{\partial I} = \frac{\partial w_H}{\partial L}\frac{\partial L}{\partial I} > \frac{\partial w_H}{\partial L}\frac{\partial L}{\partial L} > 0 \tag{B29}$$

That is, as for capital accumulation, also the high skilled wage increases more in response to immigration when immigrants are imperfect (and not perfect) substitutes for unskilled natives.

**Unskilled (Natives) Wages.** Differently from above, we now have to distinguish between wages of unskilled natives and those of immigrants. In particular, it can be shown that, in equilibrium,[84]

$$w_U = \frac{\psi N_L}{(1-\beta)}\frac{L^{-\alpha}}{U^{1-\alpha}} \tag{B30}$$

As in Section B.4, it is immediate to see how the two channels (the substitution effect and the capital response) affect the wage of unskilled natives: on the one hand, higher

[84] To see this, note that

$$\begin{aligned} w_U &= \frac{\partial (p_L Y_L)}{\partial U} = \frac{\partial (p_L Y_L)}{\partial L}\frac{\partial L}{\partial U} \\ &= w_L \left(\frac{L}{U}\right)^{1-\alpha} \end{aligned}$$

immigration increases competition for unskilled natives, thereby lowering their marginal product; on the other, when $\gamma > 0$, immigration favors the entry of establishments producing unskilled-complementary technologies, in turn exerting positive pressure on unskilled wages. By comparing ($B30$) to ($B23$), it is clear that, because of imperfect substitutability between immigrants and natives (i.e. $\alpha < 1$), the (negative) substitution effect is now smaller than in the baseline model presented above.

In online appendix B, I provide a sufficient condition for the directed technology effect to prevail over the substitution effect, and show that the range of values of $\gamma$ for which immigration raises the wage of unskilled natives is larger than in the case of perfect substitutability between immigrants and natives.[85] More formally, defining $\tilde{\gamma}$ (resp. $\tilde{\gamma}'$) the threshold value of $\gamma$ above which immigration increases earnings of unskilled natives when $\alpha = 1$ (resp. $\alpha < 1$), online appendix B shows that

$$\tilde{\gamma} > \tilde{\gamma}' \ \forall \alpha \in (0,1) \tag{B31}$$

This result is intuitive: when immigrants and natives are imperfect substitutes, the direct negative (competition) effect of immigration on natives' wages is counterbalanced by two distinct forces. First, as before, capital accumulation and the development of (unskilled) biased technologies. Second, complementarity between the skills of immigrants and natives and the resulting gains from diversity (e.g. Peri and Sparber, 2009; Foged and Peri, 2016, among others).

**Skill Premium.** The skill premium can be now expressed as

$$\omega = \frac{w_H}{w_U} = \left(\frac{1-\beta}{\psi}\right) \frac{\left(1 - \left(\frac{L}{\psi}\right)^{\frac{\gamma\beta}{1-\gamma}}\right)^{-\frac{1-\gamma}{\gamma}}}{N_L\left(L\right)} L^{\alpha} U^{1-\alpha} \tag{B32}$$

As before, it is possible to show that the direct effect of immigration on the skill premium is positive. This result is intuitive, and follows directly from the assumption that immigrants are closer substitutes for unskilled than for high skilled natives. Also, similar to Section B.4, the indirect effect of immigration mediated by capital deepening tends to lower the skill premium. The total effect of immigration is, as usual, given by

$$\left(\frac{\partial \omega}{\partial I}\right)^{TOT} = \left[\frac{\partial \omega}{\partial L} + \frac{\partial \omega}{\partial N_L}\frac{\partial N_L}{\partial L}\right]\frac{\partial L}{\partial I}$$

[85] In particular, a sufficient condition for the wage of unskilled natives to increase with immigration is that $\gamma > \frac{\alpha}{\alpha+\beta}$.

and, as already noted above, is ambiguous. In online appendix B, I derive an explicit condition that shows under which parameter values the skill premium falls with immigration.[86] As for the unskilled wage, also in this case, introducing the assumption of imperfect substitutability between immigrants and natives ($\alpha < 1$) increases the range of values of $\gamma$ for which immigration can reduce income inequality, relative to the scenario of perfect substitution ($\alpha = 1$).

To conclude, assuming (consistent with the empirical evidence) that immigrants and unskilled natives are imperfect substitutes in the production of $Y_L$ lowers the degree of capital adjustment needed for the economy to absorb an immigration shock . Even in this case, however, whether or not there is room for major technological change is probably a key condition for immigration to benefit native workers, without harming even those in more exposed jobs.

### B.5.2 Endogeneizing Natives' Occupational Choice

In this sub-section I formalize the idea that, in response to immigration, natives might reallocate their labor away from occupations more exposed to immigrants' competition and take up more skilled jobs. As argued in Peri and Sparber (2009) among others, such labor reallocation can take place because natives and immigrants differ in terms of skills, language proficiency, and education. As a result, natives may be induced to specialize in occupations where they have a comparative advantage relative to immigrants.

The structure of the model is as before, but I now assume that there are two types of domestic labor: first, native whites; second, African Americans and previously arrived immigrants. Native whites can be employed in both sectors, whereas African Americans and immigrants can only work in the unskilled sector, due to skill mismatch and discrimination. To simplify the analysis, I assume, as in the baseline model, that native whites working in the unskilled sector are perfect substitutes for immigrants and African Americans.[87]

Wages are allowed to differ across sectors, but all workers are paid the same within each sector. I denote native whites working in the high and low skilled sectors respectively with $H$ and $U$, and, without loss of generality I normalize $H + U = 1$. The assumption of perfect substitutability between unskilled natives and immigrants implies that $L = U + I$, where $I$ refers to immigrants and African Americans. It is straightforward to verify that native whites choose the sector paying the higher wage, and so, for them to work in both sectors, wages must be equalized, i.e.

$$\omega \equiv \frac{w_H}{w_L} = 1 \tag{B33}$$

[86] Specifically, if $\gamma > \frac{\alpha}{\alpha+\beta}$, immigration will reduce income inequality among natives.

[87] Relaxing this assumption does not alter any of the results below.

Suppose that, before the immigration shock, $(B33)$ holds so that native whites are employed in both sectors. Combining $(B33)$ with $(B24)$, we get

$$1 = \left(\frac{1-\beta}{\psi}\right) \frac{\left(1 - \left(\frac{L}{\psi}\right)^{\frac{\gamma\beta}{1-\gamma}}\right)^{\frac{\gamma-1}{\gamma}}}{N_L} L \tag{B34}$$

Replacing $(B17)$ in $(B34)$, it is possible to determine the equilibrium number of native whites working as laborers (before the immigration shock), which is given by[88]

$$U = \frac{\psi^{\frac{\gamma\beta}{\gamma(1+\beta)-1}}}{(1+I)^{\frac{1-\gamma}{\gamma(1+\beta)-1}}} - I \tag{B35}$$

Having determined $U$ from $(B35)$, and noting that $H = 1 - U$, all other equations follow as in the baseline model of Section B.3, with the only difference that, now, skill supplies (of native whites) are endogenously determined according to $(B34)$.

In what follows, I investigate how an immigration shock affects capital, wages, and the distribution of native workers across the two sectors. Two cases can arise. First, even after the immigration shock, wages are equalized across sectors, and native whites continue to work in both sectors.[89] Second, after the immigration shock $(B34)$ no longer holds, and all native whites move to the high skilled sector. To keep the analysis close to my empirical results, I focus on the second scenario, and show that, in this framework, after the immigration shock: *i*) all native whites work in the high skilled sector and earn a higher wage (relative to the pre-migration equilibrium); *ii*) the number of manufacturing plants in the new equilibrium is higher; *iii*) it is possible even for wages of African Americans and previously arrived immigrants not to fall (or, to experience only a small decline).

**Sector and Wages of Native Whites.** First, by assumption, the new equilibrium entails $H = 1$, $U = 0$, and $\omega > 1$. Second, when the immigration shock is sufficiently large relative to the initial (native) labor force in the unskilled sector, it is possible for the high skilled wage to be higher after the immigration shock (relative to its pre-immigration level). Remembering that

$$w_H = \left(1 - \left(\frac{L}{\psi}\right)^{\frac{\gamma\beta}{1-\gamma}}\right)^{-\frac{1-\gamma}{\gamma}}$$

and denoting with the subscript 1 (resp. 0) the equilibrium variables after (resp. before) the

[88] See online appendix B.

[89] It is easy to check that, even in this case, the fraction of natives in the unskilled sector falls when $\gamma$ is sufficiently high.

immigration shock, the condition $w_{1,H} > w_{0,H}$ can be written as

$$\left(1 - \left(\frac{I_0 + U_0}{\psi}\right)^{\frac{\gamma\beta}{1-\gamma}}\right)^{\frac{1-\gamma}{\gamma}} > \left(1 - \left(\frac{I_1}{\psi}\right)^{\frac{\gamma\beta}{1-\gamma}}\right)^{\frac{1-\gamma}{\gamma}}$$

Or, after a few rearrangements,[90]

$$I_1 - I_0 > U_0 \tag{B36}$$

That is, for natives' wage to increase, the immigration shock must be sufficiently *large* (relative to the fraction of native whites initially working in the unskilled sector).[91]

**Unskilled Wages.** Next, using $(B23)$, the new and the old equilibrium wages in the unskilled sector are given by

$$w_{1,L} = \frac{\psi N_{1,L}}{I_1 (1-\beta)} \tag{B37}$$

and

$$w_{0,L} = \frac{\psi N_{0,L}}{(I_0 + U_0)(1-\beta)} \tag{B38}$$

where $N_{0,L}$ and $N_{1,L}$ are the pre and post immigration number of manufacturing plants (determined below). For wages in the unskilled sector to be equal before and after the immigration shock, it must be that

$$\frac{N_{1,L}}{I_1 - I_0} = \frac{N_{0,L}}{U_0} \tag{B39}$$

From $(B36)$, it is clear that for both the high skilled wage to rise and the unskilled wage not to fall, the number of manufacturing plants must be higher in the post-immigration equilibrium, i.e. $N_{1,L} > N_{0,L}$. Moreover, the endogenous capital response needed to absorb the immigration shock is increasing in the term $\frac{I_1 - I_0}{U_0}$.

**Capital Accumulation.** The latter observation already anticipated that, in the new equilibrium, the number of manufacturing plants must be higher than before the immigration

[90] Using $(B35)$, $(B36)$ can be equivalently written as

$$I_1 > \left(\frac{\psi^{\gamma\beta}}{(1+I_0)^{1-\gamma}}\right)^{\frac{1}{\gamma(1+\beta)-1}}$$

[91] The intuition for this result is discussed below.

shock. Using $(B17)$, we know that

$$N_L = \frac{(1-U)(1-\beta)(I+U)^{\frac{\beta\gamma}{1-\gamma}}}{\psi^{(1-\beta)}\left[\psi^{\frac{\beta\gamma}{1-\gamma}} - (I+U)^{\frac{\beta\gamma}{1-\gamma}}\right]^{\frac{1}{\gamma}}}$$

Then,

$$N_{1,L} = \frac{(1-\beta) I_1^{\frac{\beta\gamma}{1-\gamma}}}{\psi^{(1-\beta)}\left[\psi^{\frac{\beta\gamma}{1-\gamma}} - I_1^{\frac{\beta\gamma}{1-\gamma}}\right]^{\frac{1}{\gamma}}}$$

and

$$N_{0,L} = \frac{(1-U_0)(1-\beta)(I_0+U_0)^{\frac{\beta\gamma}{1-\gamma}}}{\psi^{(1-\beta)}\left[\psi^{\frac{\beta\gamma}{1-\gamma}} - (I_0+U_0)^{\frac{\beta\gamma}{1-\gamma}}\right]^{\frac{1}{\gamma}}}$$

Combining the latter two expressions, $N_{1,L} > N_{0,L}$ whenever

$$\frac{I_1^{\frac{\beta\gamma}{1-\gamma}}}{\left[\psi^{\frac{\beta\gamma}{1-\gamma}} - I_1^{\frac{\beta\gamma}{1-\gamma}}\right]^{\frac{1}{\gamma}}} > \frac{(1-U_0)(I_0+U_0)^{\frac{\beta\gamma}{1-\gamma}}}{\left[\psi^{\frac{\beta\gamma}{1-\gamma}} - (I_0+U_0)^{\frac{\beta\gamma}{1-\gamma}}\right]^{\frac{1}{\gamma}}}$$

Taking logs on both sides and rearranging, we get

$$\frac{\beta\gamma}{1-\gamma}\log\left(\frac{I_1}{I_0+U_0}\right) > \log(1-U_0) + \frac{1}{\gamma}\log\left(\frac{\Phi_1}{\Phi_0}\right) \tag{B40}$$

where $\Phi_1 \equiv \psi^{\frac{\beta\gamma}{1-\gamma}} - I_1^{\frac{\beta\gamma}{1-\gamma}}$ and $\Phi_0 \equiv \psi^{\frac{\beta\gamma}{1-\gamma}} - (I_0+U_0)^{\frac{\beta\gamma}{1-\gamma}}$. Note that, from $(B36)$,

$$I_1 > I_0 + U_0$$

implying that $\log\left(\frac{I_1}{I_0+U_0}\right) > 0$. Similarly, $\Phi_1 < \Phi_0$, and so $\log\left(\frac{\Phi_1}{\Phi_0}\right) < 0$. Finally, since $U_0 \in (0,1)$, $\log(1-U_0) < 0$. But then, if $(B36)$ holds, $(B40)$ is always satisfied.

**Discussion.** The previous analysis showed that, if natives can reallocate their labor across sectors (but immigrants cannot), and if capital endogenously adjusts after the immigration shock, the followings can happen: $i$) all natives end up working in the high skilled sector; and $ii$) even workers that are prevented from entering the high skilled sector might experience only limited wage losses. Two mechanisms are responsible for ($i$) and ($ii$). First, natives' endogenous occupational choice allows them to move away from the sector most exposed to immigration and, potentially, take advantage of the complementarity between their skills and those of immigrants. Second, and crucially, capital endogenously adjusts to the inflow of immigrants - this is the capital response that was already operating in the previous versions of the model.

When the inflow of immigrants is *sufficiently large*, capital accumulation will not only boost wages in the skilled sector, but also, will partly or completely offset the direct, negative effect of immigration on earnings of workers in the unskilled sector. When analyzing these results from the lenses of a neoclassical framework, the latter observation might seem somewhat counterintuitive: the economy should be better able to cope with immigration when the latter is relatively contained. But, this line of reasoning misses the key point.

Specifically, the neoclassical framework fails to incorporate the endogenous (directed) technological response, which is key for the economy to absorb the immigration shock. By raising the supply of unskilled workers, immigration increases firms' incentives to invest. Capital accumulation, in turn, increases the marginal productivity of both high and low skilled workers, compensating (or reversing) the initial negative effect of immigration on wages.

## B.6 Taking Stock

In this note, building on a standard model of biased technical change (Acemoglu, 2002), I presented a tractable framework to study the effects of immigration on natives' labor market outcomes, incorporating three important mechanisms. First, the degree to which firms can expand (or enter the market) and the scope for major capital adjustments. Second, complementarity in the skills, the language proficiency, and in education of immigrants and natives. Third, the potential decision of natives to reallocate their labor away from more exposed occupations, and into sectors where they have a comparative advantage relative to immigrants. I derived conditions under which the model is able to deliver the key findings documented in my paper, namely that immigration can: *i*) increase natives' employment, without harming any specific group; *ii*) promote capital accumulation and boost economic activity; and *iii*) favor natives' occupational mobility, by increasing (lowering) the fraction of natives in high (low) skilled occupations.