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Immigration and Provision of Public Goods: Evidence at the Local Level in the U.S.

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Abstract

Using U.S. county-level data from 1990 to 2010, we study the causal impact of immigration on the provision of local public goods. We uncover substantial heterogeneity across immigrants with different skills, mainly due to the asymmetric impact immigrants have on the per capita tax base and local revenues. In the absence of full insurance through intergovernmental transfers, the changes in per capita revenues are reflected in changes in the provision of local public services: per capita public expenditures decrease with the arrival of low-skilled immigrants and increase with the arrival of high-skilled immigrants. While the two types of immigrants offset each other on average, spatial differences in the population shares of low- and high-skilled immigrants lead to unequal fiscal effects across U.S. counties. We find the estimated impact to differ across various public services and for second-generation immigrants.

Topics: Fiscal policy; International topics; Regional economic developments
JEL codes: F22, H41, H7, J61, J68, R5

Résumé

À partir de données ventilées par comtés des États-Unis pour la période de 1990 à 2010, nous étudions l'effet de causalité de l'immigration sur la mise à disposition de biens publics locaux. Nous constatons une grande hétérogénéité selon les différents niveaux de qualification des immigrants, principalement en raison de leur effet asymétrique sur l'assiette fiscale par habitant et les recettes locales. En l'absence d'assurance sous la forme de transferts intergouvernementaux, les variations des recettes par habitant se traduisent par des variations dans les services publics locaux : l'arrivée d'immigrants peu qualifiés fait diminuer les dépenses publiques par habitant, tandis que l'arrivée d'immigrants hautement qualifiés les fait augmenter. Bien qu'en moyenne les deux catégories d'immigrants se contrebalancent, leur répartition inégale sur le territoire entraîne des répercussions budgétaires différentes d'un comté américain à l'autre. Notre analyse montre que les effets estimés de l'immigration varient selon les différents services publics et selon qu'il s'agit d'immigrants de première ou de seconde génération.

Sujets : Politique budgétaire; Questions internationales; Évolution économique régionale
Codes JEL : F22, H41, H7, J61, J68, R5

1 Introduction

Despite the potential for aggregate economic gains, there has been growing public apprehension in many developed countries regarding immigration. Of particular concern is the impact of immigrants on wages and employment of native workers as well as on the welfare state, specifically the quantity and quality of public services provided by the government. Attitude surveys suggest that the fiscal channel is more important than labor-market effects in shaping public opinion about immigration (Dustmann and Preston, 2007). Voters worry about increases in taxes as well as overcrowding of schools, hospitals and public transportation when immigrants arrive.[1] Despite this, the large and influential body of literature on the impact of immigrants on natives has mainly emphasized the labor market channel, with, surprisingly, much less attention being paid to fiscal effects.[2] In this paper we focus on the latter by studying the impact of immigration on the provision of local public goods in the United States.

There are various channels through which immigration can impact the provision of public goods in a locality. If immigrants differ from natives in terms of skills, their arrival will result in changes in average per capita income due to a compositional change and (potentially) due to changes in factor prices. This will affect the local tax base of income, sales and property taxes. The direction and magnitude of the change in per capita revenue depend on the type of immigrants (low-skilled vs. high-skilled) and the response of governments. For example, the local government may respond by adjusting tax rates and/or per capita benefits. Federal and state governments may choose to fully or partially offset changes in locally raised revenue via intergovernmental transfers. Since most local governments in the U.S. are constrained by a balanced budget requirement, the resulting change in *total* revenue (locally raised revenue plus intergovernmental transfers) determines closely how public expenditures and the provision of public goods are affected. The impact on expenditure will potentially vary across different spending items if the arrival of immigrants alters relative demand for or the cost of providing certain services in a locality.[3]

In this paper, we document a *causal* association between immigration and provision of local public goods at the U.S. county level.[4] We start by outlining a simple framework depicting the fiscal impact of a change in the number of low- and high-skilled immigrants. We then empirically assess the importance of these shocks using detailed county-level

[1] See for example, Dustmann and Preston (2005), Hanson et al. (2007), Facchini and Mayda (2009) and Hainmueller and Hiscox (2010).

[2] The empirical literature on the labor-market impact of immigration is extensive and has been reviewed in a number of recent papers. See Borjas (2014), Lewis and Peri (2015) and Peri (2016), among others.

[3] The change in demand could be due to differences across immigrants and natives in terms of the type of services they demand or because of political economy factors (e.g., a change in preferences for redistribution or for funding certain services). The arrival of immigrants could impact per capita costs due to economies of scale or a change in labor costs.

[4] We consider public goods provided by all local governments at the county level, namely counties, cities, townships, special districts, and independent school districts. These include services such as public education, infrastructure, law and order, sanitation, and public amenities, measured in per capita spending terms as well as per pupil spending on education, teacher to student ratios and (property and violent) crime rates.

data from the U.S. for 1990–2010. An important challenge in the analysis of the link between immigration and fiscal outcomes is endogeneity driven by sorting of immigrants into specific localities, potentially as a function of the provision of local public goods. We address this issue by employing a shift-share instrument (Altonji and Card, 1991; Card, 2001) modified to be skill-specific. In particular, we leverage the different timing and size of the *national* inflow of low- and high-skilled immigrants by country of origin, which we apportion to the local level using the pre-sample shares of immigrants from each country of origin across U.S. counties (Mayda et al., 2022).[5]

We uncover substantial heterogeneity in terms of the fiscal effect of immigrants with different skill levels. Per capita public expenditures decrease in localities that experience an increase in the population share of low-skilled immigrants (with less than a college education), while they increase in places where the share of high-skilled immigrants goes up. Importantly, the impact of overall immigration (low-skilled plus high-skilled) on per capita public expenditures is small. In the *average* county, which experienced the same change in low- and high-skilled immigrant shares as the U.S. as a whole in 1990–2010, the adverse impact of low-skilled immigrants on public goods provision was mostly offset by the positive impact of high-skilled immigrants: The net effect was 0.3 percent per year, relative to a county in which there was no immigration during this period. However, most localities in the U.S. do not look like the average county, as they differ in the type of immigrants they attract. Hence, the fiscal effect of immigration is heterogeneous across counties. For example, between 1990 and 2010, in Presidio County, TX, the share of low-skilled immigrants increased by 10 percentage points and that of high-skilled ones by 1 percentage point. In contrast, in Monterey County, CA, the share of low-skilled immigrants increased by 3 percentage points and that of high-skilled ones by 7 percentage points. Based on our estimates, these inflows resulted in a 15 percent *reduction* in the per capita spending on public goods in Presidio and in a 14 percent *increase* in Monterey.

We find that the opposite results for low-skilled vs. high-skilled immigrants are due to their asymmetric effects on the local per capita tax base: An increase in high-skilled immigrants results in a relative increase in average local income and housing values, while the opposite is the case for low-skilled immigrants. In turn, the movement in locally generated per capita revenue, in particular per capita property, sales and income tax revenue, traces changes in the per capita tax base. These results are consistent with a framework in which tax rates do not *fully* adjust to immigration-induced variation in the tax base.[6] Transfers from the federal government partially smooth out the fiscal impact of immigration at the local level, but they do not fully offset it, whereas transfers from the

[5] As we discuss in detail in Section 4.2, we confirm the validity of our instruments by conducting a fairly stringent set of tests. Specifically, we first show that the instrument-predicted changes in immigrant shares over the period of analysis do not predict pre-sample changes in the main outcome variables (Autor et al., 2013). Next, we document that the pre-sample shares, especially those with the highest Rotemberg weights, are not correlated with pre-treatment trends (Goldsmith-Pinkham et al., 2020). Finally, we confirm the robustness of our results using the aggregate shock representation (i.e., the national migration inflows by country of origin), as in Borusyak et al. (2022), and by controlling for lagged changes in outcome variables.

[6] If tax rates were to fully adjust, a change in the tax base would not result in a change in tax revenue.

state government exacerbate the impact of local immigration shocks because the latter are correlated within a state. Absent full insurance and given the balanced budget requirement, the per capita changes in public expenditures trail those of per capita own revenue.

While total per capita expenditures increase (decrease) with the arrival of high- (low-) skilled immigrants, the impact is heterogeneous across spending on various public services, both in direction and in magnitude. For example, high-skilled immigration leads to a *reduction* in law and order spending. Our results suggest that this finding is in part driven by a decrease in (violent and property) crime rates that, we find, is associated with the arrival of high-skilled immigrants. The inflow of low-skilled foreign immigrants reduces expenditures on infrastructure and public amenities, while high-skilled immigrants have the opposite effect. For the largest expenditure item, education, we find no significant impact of either type of immigrant on per capita (or per pupil) spending or on student to teacher ratios. Given the decline in per capita own revenue and in transfers dedicated to education, this finding points to a reallocation of resources across expenditure items for education when low-skilled immigrants arrive.

We also consider heterogeneity in the fiscal effects across generations of immigrants. The fiscal impact of second-generation immigrants could be different than that of first-generation ones due to, for example, differences in income levels and in utilization of locally provided public services. If the location decisions of first- and second-generation immigrants are correlated, as we find to be the case in the data, the estimated impact of first-generation immigrants could be biased. We find that the main results of this paper are robust to controlling for the share of second-generation immigrants: The impact of low-skilled immigrants on provision of local public goods is negative, while the impact of high-skilled immigrants is positive. Consistent with NASEM (2016), second-generation immigrants have a positive and significant impact on per capita own revenue, while their impact on per capita general expenditures is insignificant and small in magnitude.

Considering the emphasis on the fiscal effects of immigration in the public discourse, the academic literature is not extensive.[7] Our paper complements earlier work that uses an accounting methodology to evaluate the fiscal impact by directly calculating benefit take-up and tax contributions of immigrants relative to natives.[8] Also related are the dynamic analyses of fiscal effects that consider both the current and future impact of immigration by calculating the net present value of the stream of taxes and expenditures over the entire life-cycle of a given cohort or flow of immigrants. This is done either through calibration of general equilibrium overlapping-generations models or by using generational accounting techniques.[9] These studies are insightful and have contributed a great deal

[7]See Preston (2014), Vargas-Silva (2015), Dustmann et al. (2017) and NASEM (2016) for comprehensive reviews of the literature on the fiscal effects of immigration.

[8]See Bratsberg et al. (2010) and Bratsberg et al. (2014) for Norway; Hansen and Lofstrom (2003) and Ruist (2014) for Sweden; Riphahn (1999) for Germany; Borjas (1994), Smith and Edmonston (1997) and NASEM (2016) for the U.S.; and Dustmann et al. (2010) and Dustmann and Frattini (2014) for the U.K.

[9]For the former, see for example, Storesletten (2000) for the U.S. and Storesletten (2003) for Sweden. For the latter, see Auerbach and Oreopoulos (1999) and Auerbach and Oreopoulos (2000) for the U.S., Chojnicki (2013) for France, Collado et al. (2004) for Spain, Mayr (2005) for Austria, Busch et al. (2020) for Germany, and Javdani and Pendakur (2014) for Canada.

to our understanding of the fiscal effects of immigration. However, the approaches used require a multitude of assumptions (e.g., the extent to which immigrants increase the cost of public goods like roads, defense, etc.) and often do not incorporate some of the indirect fiscal effects of immigration through other channels, such as the labor, housing and capital markets. A few exceptions that incorporate these channels are Chassamboulli and Liu (2020), Colas and Sachs (2020) and Clemens (2022).

Our paper is novel in its methodological approach, as we *estimate* the fiscal impact of immigration by using variation at the local level in the U.S. Local governments in the U.S. are well-suited for this exercise as they have high levels of fiscal autonomy; they raise revenues from various taxes and fees to finance expenditures on locally provided public goods that are tailored to local priorities.[10] This setting is different than that of many other countries that have a welfare state operating mostly at the national level, where population-based formulas often predictably determine spending at the local level. In addition, our reduced-form approach, applied to total revenues generated from both natives and immigrants at the local level, allows us to capture the indirect fiscal effects of immigration, for example, those working through changes in native income in the labor market and in property values.

The findings of our paper are closely linked to the political economy literature that studies the impact of immigration on "preferences for redistribution" (the size of the welfare state). Theoretically, in the presence of a fiscal leakage from the native to the foreign-born population, low-skilled immigration leads to a smaller welfare state through changes in preferences for redistribution, although immigrants are likely to support greater transfers (Razin et al., 2002); this is especially the case in localities where natives are high-skilled (Facchini et al., 2016). Some papers empirically investigate the impact of immigration on preferences for redistribution. See, for example, Facchini et al. (2016), Jofre-Monseny et al. (2016), Alesina et al. (2018), Alesina et al. (2019) and Giuliano and Tabellini (2020).[11] While these papers focus on attitudes towards redistribution, our contribution to the literature is to show, in the context of the U.S., that at the local level low-skilled immigration reduces *actual* redistribution (per capita public spending) and that an important channel of impact is automatic adjustments through changes in the tax base.[12]

Moreover, our work is related to the literature on attitudes towards immigrants, which provides evidence of the fiscal impact of immigration as *perceived* by public opinion. What is key in these analyses is the type of adjustment that voters believe takes place as a consequence of immigration. In some papers survey respondents seem to perceive the fiscal

[10] Local governments aggregated to the county level account for a substantial fraction, around a quarter, of overall revenues and expenditures of all levels of the U.S. government, including federal and state.

[11] Also related is the literature on the negative association between "preferences for redistribution" and the greater racial and ethnic heterogeneity of the population that immigration implies. (See, for example, Luttmer (2001), Alesina et al. (2001) and Alesina and Ferrara (2005)).

[12] In this sense, our work is also connected to the papers that analyze the local impact on per capita public spending and provision of public goods of respectively trade-induced income shocks (Feler and Senses, 2017), rising income inequality (Boustan et al., 2013) and the Black Migration within the U.S. after World War II (Boustan, 2007).

impact of immigration as working through changes in tax rates (Dustmann and Preston, 2005; Hanson et al., 2007; Facchini and Mayda, 2009) while in others, they appear to think that immigration leads to changes in per capita benefits (Hainmueller and Hiscox, 2010). Our contribution is to show the actual (as opposed to the perceived) fiscal impact of immigration in terms of per capita revenues and spending on public goods.[13]

The rest of the paper is organized as follows. In the next section, we introduce a simple model to predict the fiscal impact of a change in the number of low- and high-skilled immigrants. Section 3 describes the data on immigration and local public finances. Section 4 introduces the identification strategy and presents our main results. We focus on the channels in Section 5 and document the impact of immigration on various revenue and expenditure items. Section 6 extends our analysis to second-generation immigrants, and Section 7 concludes.

2 Theoretical framework

To guide the empirical analysis of the effect of immigration on local public revenues and expenditures, we consider a two-factor, two-goods Heckscher-Ohlin model of a small open economy, augmented with a redistributive welfare system as in Dustmann and Preston (2005) and Facchini and Mayda (2009).[14] We use this framework to predict the fiscal impact of a change in the number of low- and high-skilled immigrants. An insight of the model is that a change in the skill composition of the population will affect the per capita tax base and is enough to generate a fiscal response even in the absence of any adjustment to immigration in the labor market. This is important since there is still debate in the literature whether immigration has any impact on wages and employment. Related to that, we first develop the model absent labor-market effects and, next, we extend it to incorporate changes in factor prices.

Assume low-skilled (L_L) and high-skilled (L_H) labor are combined using a constant returns to scale technology, $y_i = f_i(L_L, L_H)$, to produce output $i \in 1, 2$. Good 1 is the *numéraire*, and p is the price of good 2. The economy is populated by N (native workers) and M (immigrant workers). Each worker is endowed with one unit of either low-skilled or high-skilled labor. The total supply of each type of labor is

$$L_j = N_j + M_j \quad j \in \{L, H\}. \tag{1}$$

In the benchmark case, we assume a diversified production and abstract away from the impact of immigration on the labor market. With both goods produced in the economy, "factor price insensitivity" holds so that factor returns are not affected by immigration. w_j is the prevailing pre-tax wage rate, with $w_H > w_L$, and $c_i(w_L, w_H)$ is the unit cost function

[13] While we document some evidence of changes in tax rates, most of our data and findings are on per capita government revenues and spending.

[14] Our model differs in that we derive the separate impact of low- and high-skilled immigrants instead of assuming that the skill composition of immigrants and natives is constant. This allows us to account for the impact of any change over time in the skill composition of immigrants.

for good i. The factor-market equilibrium condition for each type of labor is

$$L_j = y_1 \frac{\partial c_1(w_L, w_H)}{\partial w_j} + y_2 \frac{\partial c_2(w_L, w_H)}{\partial w_j} \quad j \in \{L, H\}. \tag{2}$$

Perfect competition implies that firms earn zero profits in equilibrium:

$$1 = c_1(w_L, w_H) \tag{3}$$
$$p = c_2(w_L, w_H). \tag{4}$$

The welfare system is assumed to be redistributive: the government levies a flat income tax rate, τ, which is accompanied by a lump sum per capita transfer (or benefit), b. The transfer is intended to capture the provision of public services, which are assumed to be equally accessible to immigrants and natives. Consistent with the balanced budget requirements commonly imposed on local governments in the U.S., the government budget constraint is assumed to be binding:

$$\tau(w_L L_L + w_H L_H) = b(N + M). \tag{5}$$

The arrival of immigrants impacts the budget constraint by changing the tax base ($w_L L_L + w_H L_H$) and the number of people eligible for benefits ($N + M$). This results in a change in the per capita tax base (in this case, average income) and a fiscal response that involves an adjustment of tax rates and/or per capita benefits, the magnitude and direction of which depend on the skill composition of immigrants. We model the two types of adjustment of the welfare state separately.

Specifically, we start from an initial equilibrium without immigrants and keep the number of natives constant. We first assume that, faced with an inflow of immigrants, the government only adjusts the tax rate to balance the budget, keeping per capita transfers constant (the *tax adjustment scenario*). Totally differentiating the budget constraint (5) at the initial equilibrium, we obtain

$$\hat{\tau} = d\pi_L(1 - \frac{n_L}{\phi_L}) + d\pi_H(1 - \frac{n_H}{\phi_H}), \tag{6}$$

where $\pi_L = \frac{M_L}{N+M}$ and $\pi_H = \frac{M_H}{N+M}$ are the shares of low-skilled and high-skilled immigrants relative to total population, respectively. The percentage change in the tax rate, $\hat{\tau}$, depends on the change in the share of low- and high-skilled immigrants ($d\pi_j$), the income share of low- and high-skilled labor ($n_j = \frac{w_j L_j}{\sum_i w_i L_i}$, with $\sum_j n_j = 1$), and the population share of workers of skill j in the initial equilibrium ($\phi_j = \frac{L_j}{\sum_i L_i}$, with $\sum_j \phi_j = 1$).

Low-skilled immigration results in an increase in the tax rate because the share of low-skilled workers in the initial population (ϕ_L) is larger than their initial income share (n_L). Conversely, the effect of high-skilled immigrants on the tax rate ($1 - \frac{n_H}{\phi_H}$) is negative, since the population share of high-skilled workers (ϕ_H) is smaller than their income share

(n_H).[15] Note that this prediction derives entirely from compositional changes in the population that lead to movements in average income, even absent wage effects.

Next, we consider the *benefit-adjustment scenario*, in which the welfare state adjusts only by changing per capita benefits, while keeping tax rates constant. Totally differentiating the budget constraint (5) at the initial equilibrium, we obtain

$$\hat{b} = d\pi_L(\frac{n_L}{\phi_L} - 1) + d\pi_H(\frac{n_H}{\phi_H} - 1). \tag{7}$$

The effects of low- and high-skilled immigration on the per capita benefit are of the same magnitude but in the opposite direction of the effects on the tax rate. Specifically, low-skilled immigration implies a decrease in the per capita benefit, while high-skilled immigration results in an increase.

While we model the two types of policy adjustment separately, in reality policy makers can adjust both tax rates and per capita benefits simultaneously. The tax rates will decrease and/or per capita benefits will increase following the arrival of high-skilled immigrants who improve the local tax base; exactly the opposite will happen with the arrival of low-skilled immigrants who create a fiscal deficit. In this case, the percent change in each policy tool required to bring the budget back to balance is smaller in magnitude but of the same sign as in equations (6) and (7). Our empirical analysis allows for adjustments in both policy levers in considering the fiscal response to immigration in equilibrium.[16]

Extensions

We consider several extensions of the benchmark case by allowing for labor market effects of immigration, for progressive tax rates, for taxes other than those applied to income (e.g., sales and property taxes), for different types of public services and for intergovernmental transfers. The main insights of the model continue to hold with minor changes in the elasticity expressions.

In the benchmark version of the model, we abstract away from the impact of immigration on wages and focus solely on changes in the per capita tax base driven by skill composition effects. The first extension we consider is to incorporate labor market impacts of immigration by dropping the assumption of diversified production. We now start from an equilibrium in which the locality is specialized in the production of only one good. This means that only one of the two zero profit conditions (either (3) or (4)) holds, implying that factor returns are not pinned down by goods prices alone, but they also depend on factor supplies. In this case, there will be a labor market effect of immigration, assuming that immigrants and natives are not identical in terms of skill composition. Keeping everything else constant, an inflow of low-skilled immigrants will lead to a reduction of

[15] In a more general setting with immigrants present in the initial equilibrium, the qualitative implications are the same, but the marginal effects of low- and high-skilled immigrants are also a function of the initial share of immigrants.

[16] As we detail in the next section, we mainly study changes in per capita revenues ($\frac{\tau(w_L L_L + w_H L_H)}{(N+M)}$) and expenditures ($b$). For both of these outcome variables, the predictions in terms of signs are the same as in equation (7). We also provide some evidence of changes in tax rates (τ) following immigration.

low-skilled wages and an increase in high-skilled wages, while high-skilled immigrants will have the opposite effect (Facchini and Mayda, 2009). If the inflow of immigrants is non-marginal (corresponding to $\Delta\pi_j$), the total remuneration of existing workers will rise. These labor-market gains from migration, or "surplus," as in Borjas (1995), will relax the government's budget constraint. In this case, when low-skilled (high-skilled) immigrants arrive, the increase (decrease) in the tax rate in the tax adjustment scenario and the decrease (increase) in the transfer in the benefit adjustment scenario will be less (more) pronounced.[17]

The model can easily be extended to incorporate progressive income taxes, by modifying (5) as $\tau(\gamma w_L L_L + w_H L_H) = b(N + M)$ where $\gamma < 1$, in order to capture lower tax rates for low-income workers. In this case, (6) and (7) are the same as before, except for an adjustment to the denominator of n_j. In addition, the government can now change γ (keeping τ and b constant) as a way to bring the budget back to balance. Similarly, other taxes such as sales and property taxes, which are important sources of revenue for local governments, can be introduced in the model. Consider the case in which local governments finance themselves entirely via sales taxes. Assume that individuals spend a certain fraction of their income on consumption goods and that this fraction is higher for low-skilled workers. The budget constraint can be written as $sq(\delta w_L L_L + w_H L_H) = b(N + M)$, where s is the sales tax rate and the consumption shares of low-skilled and high-skilled workers are, respectively, δq and q, with $q < \delta q < 1$. Again, (6) and (7) are the same as before, except for the fact that the denominator of n_j is slightly modified and that the relevant tax rate is s. A similar intuition applies for property taxes.[18]

So far, we have assumed that public benefits (b) are defined in per capita terms and are the same for immigrants and natives, and for low-skilled and high-skilled workers. These assumptions best resemble a public good such as public education, for which expenditures may have to increase with utilization in order to keep quantity and quality constant. Both native and immigrant children (independent of legal status) have access to K–12 public education, consistent with the assumption that the per capita benefits are the same for the two groups. The budget constraint (5) can easily be modified to incorporate other types of services provided by local governments. Some of these services are similar to (pure) public goods, such as infrastructure and parks, whose consumption is non-rival and non-excludable. For these, one can consider total expenditure (B), as in $\tau(w_L L_L + w_H L_H) = B$, which implies that the fiscal effect of immigration depends on total income (which always increases with the size of the population) as opposed to average income (which may

[17] On the other hand, since workers are paid the value of their marginal product, a *marginal* inflow of immigrants ($d\pi_j$) will leave the total remuneration of the existing labor force unchanged and will have no effect on the redistribution carried out by the welfare state. This means that, although wages adjust, the change in the tax rate in the *tax adjustment scenario* and in the transfer in the *benefit adjustment scenario* will be the same as they were in the absence of labor-market adjustments (Dustmann and Preston, 2005).

[18] The arrival of immigrants will impact the property tax base by changing property values. In a simplified framework, property values depend on: (i) the local average income and the share of income spent on housing; (ii) the level and composition of housing supply; and (iii) the migration response by natives to the arrival of immigrants. While we do not separately model the housing market equilibrium, we explicitly test for this channel empirically.

increase or decrease, depending on whether immigrants are high- or low-skilled). Since local governments provide both types of services, the budget constraint would then be $\tau(w_L L_L + w_H L_H) = b(N + M) + B$ and the main predictions would be qualitatively similar to the basic model. Public services also differ in terms of their target population. Utilization rates for services such as homeless shelters and public transportation are very different for the rich and poor (high- and low-skilled in the model), which suggests a modified budget constraint that allows for different per capita benefits for high- and low-skilled workers: $\tau(w_L L_L + w_H L_H) = b_L(N_L + M_L) + b_H(N_H + M_H)$, where a higher b_L would further enhance the redistributive character of the welfare state. The same logic applies to benefits for which the take-up rate is likely different for natives and immigrants due to informational asymmetries or eligibility requirements ($b_L(N_L + \delta_L M_L) + b_H(N_H + \delta_H M_H)$ with $\delta_j < 1$).[19]

Our basic model assumes that locally raised taxes are the only revenues of local governments. In reality, state and federal governments make substantial transfers to local public entities. The model can be easily extended by introducing intergovernmental transfers, which affect the budget constraint and create a wedge between locally raised revenues and expenditures. Transfers can be used to offset local shocks, in which case we would expect that immigration would lead to changes in expenditures that are less pronounced than those in locally raised revenues. Our empirical analysis will shed light on this point.

Finally, note that in our model we assume that the size of the welfare state ("preferences for redistribution") is fixed. This is to focus on fiscal effects that take place through changes in the tax base and revenues, which is what we observe in the data. Our framework complements existing work that emphasizes the political-economy channel and, in particular, changes in preferences for redistribution when immigrants arrive.

3 Immigration and Local Public Finances

Guided by the model, we use data on local government budgets and immigrant inflows to identify the impact of immigration on public finances and the provision of public goods. Local governments in the U.S. are well-suited for this exercise as they have high levels of fiscal autonomy; they raise revenues from various taxes and fees to finance expenditures on locally provided public goods that are tailored to local priorities. In this section, we introduce the data sets we use to construct the immigration and public finance variables at the county level.

[19] Empirically, we separately examine per capita spending on different types of public services (such as infrastructure, education, law and order) that likely differ along the dimensions highlighted here. However, since we do not observe take-up rates by different segments of the population, our results on per capita expenditures for each type of spending reflect the experience of the average resident of a county.

3.1 Immigration

Given our interest in the impact of immigrants with different skill levels, we focus on adult immigrants, who are more likely to have completed their formal schooling. Adult immigrants are also more likely to work and pay taxes and, therefore, impact the tax base, which is the main channel highlighted in the model. The total number of adult immigrants in county i at time t (M_{it}) is defined as the number of foreign-born individuals who are at least 25 years old. Low-skilled immigrants are immigrants who do not have a college degree (M_{Lit}), and high-skilled immigrants are those with at least a college degree (M_{Hit}). We construct the shares of immigrants by skill group at the county level as

$$\frac{M_{jit}}{Pop_{it}} = \frac{M_{jzt}}{M_{zt}} \frac{M_{it}}{Pop_{it}}, \tag{8}$$

where (M_{jzt}/M_{zt}) is the share of adult immigrants of skill level j ($j \in \{L, H\}$) within the total number of immigrants in commuting zone z at time t, and (M_{it}/Pop_{it}) is the share of adult immigrants in the total population of county i at time t. Pop_{it} includes all adults and children of both natives and immigrants.[20]

Panel (a) of Table 1 shows the population weighted means and standard deviations of immigrant shares in 1990 and 2010. The share of (adult) immigrants increased from 5.7 percent to 10.6 percent of the total population between 1990 and 2010. The majority of immigrants in the U.S. are low-skilled. The share of low-skilled and high-skilled immigrants of the total population was 4.6 percent and 1.2 percent in 1990 and 7.6 percent and 3 percent in 2010, respectively, corresponding to a 3 percentage point increase of low-skilled immigrants and a 1.8 percentage point increase of high-skilled ones.

The average statistics reported in Table 1, although informative, hide important heterogeneity *across U.S. counties* in terms of the change in the number and type of immigrants during our sample period. In Figures 1 and 2 we depict the change in the share of low- and high-skilled immigrants by U.S. county between 1990 and 2010. A few facts stand out: First, although on average the share of immigrants of each type increased, several counties experienced an increase in the share of low-skilled immigrants (e.g., Garza County, TX, by 22 percentage points), while others faced a decline (e.g., Real County, TX, by 5 percentage points) during this period. A similar type of heterogeneity is evident for high-skilled immigration: For example, the share of high-skilled immigrants increased by 9 percentage points in Santa Clara County, CA, while it decreased by 0.6 percentage points in Columbia County, WA. Second, while there is some overlap, in general, counties and states that experienced a large increase in the share of low-skilled immigrants are not the same as those that received a greater share of high-skilled immigrants. The increase in the latter tends to be more concentrated in urban areas, particularly in the northeast, Florida, southern California and Arizona, while the share of low-skilled immigrants increased

[20]The skill composition of immigrants is available only at the commuting zone level and is constructed using IPUMS in 1990, 2000 and 2010 (Flood et al., 2020). The total number of immigrants at the county level is from tabulations by the U.S. Census Bureau for the years 1980 (Adams, 1980), 1990 and 2000 (United States Census Bureau, 2000), and from the 5-year (2009–2013) sample of the American Community Survey for 2010 (United States Census Bureau, 2010).

throughout the country, except in the northern states and in the Rust Belt.

3.2 Local Public Finances and Public Goods Provision

Detailed information on local government budgets for every five years (those ending with 2 and 7) in 1967–2012 is from the U.S. Census Bureau's State and Local Government Finances. The dataset includes detailed revenue and expenditure information on individual local governments, including counties, cities, townships, special districts, and independent school districts. We aggregate all these government records to the county level and match the two-year lead in the fiscal data (i.e., years 1982, 1992, 2002 and 2012) with the share of immigrants measured in 1980, 1990, 2000 and 2010, at the county level. Our final dataset includes 3,079 counties representing all U.S. states except Alaska and Hawaii.

3.2.1 Revenues

In Panel (b) of Table 1, we report population weighted means and standard deviations of per capita total revenue and its main sub-categories.[21] All values are in 1999 U.S. dollars. In 1990, the total revenues of the average U.S. county was $2517 per person. About 58 percent ($1544) of this revenue was generated locally: mostly from property taxes, which on average accounted for about 43 percent of revenue from own sources, with the remainder sourced from sales and income taxes (about 8 percent), other taxes (e.g., license taxes, death and gift taxes, accounting for 2 percent), charges and administrative revenue (on education, hospitals, highways, etc., accounting for 33 percent) and revenues from liquor stores, the utility sector and insurance trust (about 14 percent). The remainder of the revenue (on average $973 per person) was from intergovernmental transfers, a large portion of which was from state governments ($858); transfers from the federal and other local governments were small at around 6 percent each. While on average per capita revenues increased between 1990 and 2010 in every category in real terms, the relative contribution of each revenue item to total (and own) revenue on average remained relatively stable.[22]

3.2.2 Expenditures

In Panel (c) of Table 1, we report population weighted means and standard deviations of per capita expenditure and its main sub-categories. About 90 percent of expenditures are general expenditures on public goods and service provision and are the main focus of this paper; the remaining 10 percent of expenditures are devoted to liquor stores, utilities and the insurance trust sector and are mainly financed by dedicated revenue sources. On average, about half of general expenditures (52 percent or $1122 per capita in 1990)

[21] See Table A1 for the share of each budget item in (total and own) revenue and (total and general) expenditure.

[22] Local governments in the U.S. differ significantly in terms of their reliance on different forms of revenue: while some counties do not collect sales and income taxes, for other counties these taxes account for over 40 percent of locally generated revenues. Similarly, reliance on property taxes varies from only 3 percent of own revenues to over 90 percent.

are allocated to public education. Spending on "law and order" (fire, police, protective inspection, corrections and judiciary) accounts for 8 percent of general expenditures ($178 per capita), while expenditures on "public amenities" such as libraries, parks and recreation, natural resources, health and hospitals, public welfare, housing and community development account for 15 percent at $380 per capita in 1990. The remaining categories are "sanitation" (sewerage and solid waste management), "transportation and building infrastructure" (air, water and highway transportation, transit subsidies, parking and public buildings), "administration" (financial administration, employment security administration, miscellaneous commercial activities, central staff services, interest on general debt) and "other general expenditure," with each item accounting for 4–8 percent of general expenditures (between about $85 and $205 per capita in 1990). Following the pattern of per capita revenues, per capita expenditures increased in real terms for each category between 1990 and 2010 with, on average, little change in the relative importance of each expenditure item in the budget. Note that in both 1990 and 2010 most counties broke even, consistent with the balanced budget requirement.[23]

3.2.3 Public Goods Provision

It is difficult to measure quantity and quality of locally provided public services. Our main measure is *per capita* spending, which is consistently available and is comparable across different services. Despite its advantages and common use, this measure of provision is an imperfect proxy for the quantity and quality of locally provided public services. One problem is that a given service is not always used by everyone in the population; for example, only enrolled children take advantage of public school services and only (a segment of) the poor use homeless shelters. We partially address this issue in the case of education spending by analyzing direct measures of quality of service provision, student to teacher ratios, and education spending per pupil. Another problem is that while a decrease in per capita expenditures may reflect a deterioration of a particular public service provision, it may also be an indication of a decline in demand for that service. For example, a decrease in per capita spending on policing may be due to a decrease in crime rates and hence a decline in demand for these services. A decline in per capita spending together with a finding of a decline in crime rates would then be more consistent with this type of interpretation. Finally, *per capita* public expenditures would be an imperfect proxy for the quantity and quality of public services in situations where scale matters. For example, in the case of education, higher enrollment might lead to worse quality and outcomes in public schools, even if per capita education spending remains constant, due

[23]School districts and municipalities account for most local public expenditures (in 2010, 31.2 percent and 30.8 percent, respectively), followed by county governments (22.9 percent), special districts (12 percent), and townships (3.1 percent). School and special districts tend to focus on specific functions. Education spending is done almost entirely by school districts (about 80 percent). About 45 percent of all expenditures of special districts are in public welfare (libraries, natural resources, parks, housing, community, health and hospitals), with the remainder in utilities, insurance trust, liquor stores and sanitation. Cities, towns, and counties spend on law and order, education, infrastructure, government administration and public welfare. Some services are provided by more than one level of government. For example, public safety could include a municipal police force and a county police force.

to capacity constraints or difficulty in hiring good teachers. In contrast, a larger scale may be advantageous in the case of certain services that require a minimum scale of activity, such as school libraries, sports fields or specialized elective courses in local public schools; certain infrastructure with high fixed cost, such as an airport or highway; and pure public goods whose consumption is non-excludable and non-rival, such as public parks. Given we do not fully address these issues, any extrapolation from per capita spending (on a particular service) to public good provision should be made with these caveats in mind.

4 Empirical Framework

4.1 OLS estimates

We model the effect of low- and high-skilled immigrants on log per capita revenues and expenditures ($\ln y_{it}$) in county i and year t as follows:

$$\ln y_{it} = \delta_i + \delta_t + \beta_L \frac{M_{Lit}}{Pop_{it}} + \beta_H \frac{M_{Hit}}{Pop_{it}} + \beta_x X_{z,1980} * t + \varepsilon_{it}, \tag{9}$$

where M_{Lit}/Pop_{it} and M_{Hit}/Pop_{it} are the population shares of low- and high-skilled immigrants in county i and year t. We capture slowly changing county-specific factors driving the fiscal variables with county fixed effects (δ_i) and account for any national macroeconomic trends with year fixed effects (δ_t). Instead of contemporaneous control variables that are likely to be endogenous, we include interactions of linear time trends with economic and demographic variables at the commuting zone level measured in 1980 ($X_{z,1980} * t$). The vector $X_{z,1980}$ includes the 1980 population shares of adult women (age 25 above), African Americans, individuals who are younger than 25 (youth), married, unemployed, and located in urban areas, as well as the (real) average per capita income (in logs) and the Bartik (delta) indicator as in Bartik (1992).[24] All commuting zone demographic variables ($X_{z,1980}$) are sourced from the 1980 U.S. Census and are summarized in Panel (d) of Table 1.

In a world in which both tax rates and benefits adjust in response to immigration, our theoretical model predicts that $\beta_L \leq 0$ and $\beta_H \geq 0$ for both per capita own revenues and expenditures. This suggests that the arrival of low-skilled immigrants will result in a decline in per capita own revenues and expenditures unless an increase in tax rates fully compensates for the decrease in the per capita tax base, in which case $\beta_L = 0$; exactly the opposite is predicted for high-skilled immigrants. Note that the estimated elasticities, β_L and β_H, will likely differ in magnitude for per capita own revenues and expenditures, as the latter depends on *total* revenues, which is determined both by locally generated (own) revenues and intergovernmental transfers (from the federal and state governments).

In Table 2, we present estimates from variants of specification (9) with (log) per

[24] Specifically, $Bartik^{EMPL}_{zt} = \ln(empl_{z1980}) + \sum_j (share^{EMPL}_{zj,1980} \, \Delta \ln(empl)_{jt})$, where $\ln(empl_{z1980})$ is the log of total employment in commuting zone z in 1980. The second term is the weighted average of industry-specific changes in (log) employment in year t, with commuting zone employment shares of each industry in 1980 ($share^{EMPL}_{zj,1980}$) used as weights.

capita revenues from own sources and (log) per capita general expenditures as dependent variables in Panels (a) and (b), respectively. In the first two columns of each panel the main explanatory variable is the population share of immigrants (M_{it}/Pop_{it}) included in specifications with and without commuting zone controls. The last two columns allow the impact of immigration to differ across immigrants of different skill levels as in equation (9). In all specifications, observations are weighted by population, and standard errors are clustered at the county level to account for the potential correlation of errors over time.

A few clear patterns emerge. There is a negative association between the share of immigrants and locally generated per capita revenues. The association between per capita general expenditures that are used to fund local public goods and immigration is similarly negative. The estimated coefficients, while significant, are small and hide important heterogeneity, as indicated in the next two columns. There is a robust *negative* association between the share of low-skilled immigrants and both locally generated (per capita) revenues and (per capita) general expenditures. This association is *positive* between the share of high-skilled immigrants and both per capita own revenues and general expenditures.[25] The estimates reported in Table 2 provide *prima facie* evidence for a strong association between the shares of immigrants and the local budget. We next turn to establishing whether the basic correlations reported in this section point to a causal relationship or are driven by factors that may simultaneously impact both the share of immigrants and public finances in a locality.

4.2 Identification

There are several threats to identifying a causal link between immigration and local revenues and expenditures based on the OLS estimates. One threat is that some counties have (persistent) economic, cultural and institutional features that attract immigrants and also affect their local budget. Inclusion of county fixed effects (δ_i) address these concerns to the extent that these characteristics do not change much over time. However, it is also possible that new immigrants sort themselves into specific localities as a function of *changes* in economic and demographic factors that also affect the local budget. This would be the case if, for example, immigrants select into growing counties that also have the potential for increased quality and quantity of locally provided public goods. Accounting for these changes with the interactions of linear time trends with 1980 economic and demographic variables ($X_{z,1980} * t$), as we do in equation (9), would reduce the bias but is unlikely to fully resolve it. Importantly, there is the possibility of reverse causality between fiscal variables and immigration, which would arise if, for example, an increase in the generosity or quality of per capita benefits or a decline in tax rates in a county attracts immigrants. Using lagged immigration rates would help address this issue if there was no persistence over time in local public finances, which again is not likely to be the case. Hence, estimation of a causal relationship between public finances and immigration

[25] See Figures B1a–B1c for a graphical depiction of the associations summarized in Table 2, where we plot changes in public finance variables against changes in immigration (total, low-skilled, and high-skilled) over the sample period (between 1990 and 2010).

requires an IV strategy with plausibly exogenous variation in immigration across localities.

Our instruments build on the widely used shift-share methodology (Altonji and Card, 1991; Card, 2001), which we modify to account for two distinct populations of immigrants by skill level, as in Mayda et al. (2022). We identify exogenous variation in low- and high-skilled immigrant shares in a county by leveraging variation at the *national* level in the distribution of immigrants by skill level and by country of origin, as well as the variation in the pre-sample distribution of immigrants by country of origin across counties.[26] Specifically, let us define the term $sh_{c,i,80}$ as the number of foreign-born from country c, age 25 or above, living in county i in 1980, as a share of their total population in the U.S. in 1980:[27]

$$sh_{c,i,80} = \frac{M_{c,i,80}}{\sum_i M_{c,i,80}}. \tag{10}$$

The predicted number of high-skilled immigrants in county i and year t ($\widehat{M}_{Hit}$) is then the aggregate number of high-skilled immigrants from country c, age 25 or above, in year t (M_{Hct}) distributed across counties using their 1980 shares ($sh_{c,i,80}$). The predicted number of low-skilled immigrants is constructed in an analogous way:

$$\widehat{M}_{Hit} = \sum_c sh_{c,i,80} M_{Hct} \quad \text{and} \quad \widehat{M}_{Lit} = \sum_c sh_{c,i,80} M_{Lct}. \tag{11}$$

The instrument for the share of high-skilled immigrants in county i is the predicted number of high-skilled immigrants divided by the predicted total population ($\widehat{M}_{Hit}/\widehat{Pop}_{it}$). We define the predicted population of county i in year t as the sum of the number of natives in 1980 and the predicted number of immigrants of all ages in year t and in county i ($\widehat{Pop}_{it} = (N^{all}_{i,80} + \widehat{M}^{all}_{it})$, where the predicted number of immigrants, $\widehat{M}^{all}_{it}$, is constructed in a similar fashion as in equation (11) with immigrants of all ages from country c at the national level distributed using their share in county i in 1980. The instrument for the share of low-skilled immigrants ($\widehat{M}_{Lit}/\widehat{Pop}_{it}$) is constructed analogously. The instrument for the overall immigrant share is then simply $(\widehat{M}_{Lit} + \widehat{M}_{Hit})/\widehat{Pop}_{it}$.

As long as the educational composition of immigrants differs sufficiently by country of origin, counties with a similar total share of immigrants in 1980, but attracting immigrants from different countries of origin, will experience differential variation in predicted high- and low-skilled immigrants. Identification thereby relies on sufficient variation in skill intensity across immigrants from different countries of origin.[28]

[26] We use data from the U.S. Census on national migration flows by country of origin and skill (1990, 2000 and 2010) and on county-level shares of immigrants by country of origin (1980).

[27] In order to ensure a sufficient sample size, we consider 15 countries (or country groups) of origin: Mexico, Canada, Rest of the Americas (countries other than the U.S., Mexico and Canada), Western Europe, Eastern Europe, China, Japan, Korea, Philippines, India, Vietnam, Rest of Asia, Africa, Oceania, Others. See Figure B2 in the appendix for the share of immigrants over 25, by country of origin in 1980.

[28] Figure B3 shows the change in the share of immigrants over 25 by skill level and country of origin between 1980 and 2010.

4.2.1 Validity of the Instruments

The shift-share instrument has been widely used in immigration economics.[29] The instrument generally has reasonable power because networks of existing immigrants tend to attract new immigrants from the same country, and its exclusion restriction is plausible. The latter is based on the assumption that the distribution of immigrants across counties by country of origin 10 years prior to the beginning of the period of analysis (in 1980, in our case) is not correlated with local economic and demographic *changes* during the period of analysis (after 1990, in our case), other than via their impact on current immigration. While we cannot investigate directly the exclusion restriction, we perform a series of tests that provide supporting evidence for it.

To address the concern that the instrument itself might be affected by reverse causality, we regress the change in the instrument-predicted immigrant shares over the sample period (1990–2010) on pre-sample changes (1980–1990) in the fiscal variables. The estimates are reported in Table 3 separately for the change in predicted shares of total, low-skilled and high-skilled immigrants as the dependent variables. All estimated coefficients for log change in per capita own revenues and general expenditures are small and insignificant, suggesting that reverse causality is not an issue once we instrument for the immigrant shares.[30] In Table 4 we report estimates from a slightly different exercise (Autor et al., 2013) and show that the changes in our main outcome variables in the past (between 1980 and 1990) are not predicted by changes in immigrant shares in the future (in 1990–2010 and 1990–2000 in odd and even numbered columns, respectively) after we instrument. These regressions can be thought of both as a falsification and a pre-treatment exercise, suggesting that changes in predicted immigrant shares in 1990–2010 (or 1990–2000) are orthogonal to changes in the fiscal variables in the pre-treatment period (1980–1990).

In Figures 3a–c we provide visual evidence for the validity of the instruments. We plot pre-sample changes in log per capita own revenues and general expenditures (1980–1990) against the instrument-predicted changes over 1990–2010 in the overall immigrant share (Figure 3a), the low-skilled immigrant share (Figure 3b) and the high-skilled immigrant share (Figure 3c). The estimated lines are flat and the corresponding regression coefficients are close to zero and not statistically significant, which suggests no association between pre-sample trends in fiscal variables and predicted immigrant flows during the period of analysis.[31]

Emerging literature has highlighted some of the weaknesses of the shift-share instrument approach and recommended a new set of stringent tests. One main concern is that the initial shares of the country-of-origin groups are endogenous. To mitigate this concern, we first measure how relevant each country-of-origin's share is in generating the identifying

[29] See a review of its use and refinements in Lewis and Peri (2015).

[30] One exception is the estimated coefficient of (past) own revenues for (future) high-skilled immigrants in Column (5), which we interpret as a well identified (significant at 10 percent) zero, given the estimated magnitude of the coefficient.

[31] These graphs contrast with those of the negative (positive) association between the fiscal variables *in the period of analysis* and the predicted changes in low-skilled (high-skilled) immigrant shares, depicted in Figure B1b (Figure B1c).

variation in the two instruments by calculating the Rotemberg weights, as in Goldsmith-Pinkham et al. (2020). Figure B4 shows that Mexican immigrants have the highest weight for low-skilled immigrants, while immigrants from the Rest of the Americas (countries other than the U.S., Mexico and Canada) have the highest weight for high-skilled immigrant flows. Then, we test for a correlation between the initial shares of each immigrant group and the pre-sample changes in the fiscal variables of interest. The estimates in Table A2 show no significant correlation between the initial shares and the changes over 1980–1990 in local per capita revenues from own sources and general expenditures for any country-of-origin group, including the groups with the highest importance (i.e., Rotemberg weights).[32] These results alleviate the concern that immigrants from any particular country of origin cause a violation of the exclusion restriction.

Finally, Table 5 reports the coefficients from the first-stage regression for the share of total immigrants (columns (1) and (2)), the share of low-skilled immigrants (columns (3) and (4)) and the share of high-skilled immigrants (columns (5) and (6)), estimated with and without commuting zone level controls. The F-statistics of the first stage are large, and the estimated coefficients are precisely estimated with the expected signs. The predicted shares of immigrants for both skill levels as well as for overall immigration are positively correlated with the corresponding immigrant shares. Taken together, we consider these results as supportive evidence that our instruments predict well the endogenous immigration shares and satisfy the exclusion restriction. We provide further robustness checks in Section 4.3.1.

4.3 2SLS estimates

This section presents the main findings of the paper on the causal association between the share of immigrants and local public finances. Table 6 reports estimates from the 2SLS specification based on exogenous variation in the share of immigrants, overall (in columns (1) and (2)) and by skill category (in columns (3) and (4)). In Panels (a) and (b) the dependent variables are the (log per capita) revenues from own sources and general expenditures, respectively. Specifications reported in columns (1) and (3) include only county and year fixed effects; columns (2) and (4) also include exogenous controls at the commuting zone level, as in equation (9).

The estimated impact of overall immigration on own revenues and general expenditures is negative in column (1). Once we include the commuting zone level controls in column (2), the estimated coefficient becomes insignificant for both revenues and expenditures. However, the estimates for overall migration hide important heterogeneity across immigrants with different skill levels: While an increase in the share of high-skilled immigrants improves public finances in terms of both own revenues and spending, low-skilled immigrants have the opposite effect. Between 1990 and 2010, the share of low-skilled immigrants increased on average by 3 percentage points, which results in a *reduction* in per capita own revenues

[32] One exception is the estimated coefficient for own revenues for the Rest of the Americas category, which is marginally significant (at 10 percent) but very small in magnitude (0.006), which we interpret as a well identified zero.

by 8.4 percent (about $129) and in per capita general expenditures by 5.6 percent (about $125). During this period, the share of high-skilled immigrants increased by 1.8 percentage points, which results in an *increase* in per capita own revenues by 6 percent (about $92) and in per capita general expenditures by 5.3 percent (about $119).[33] Based on these estimates, the impact of the average increase in the share of overall immigrants between 1990 and 2010 is a decrease in per capita own revenues per year of about $37 (2.4 percent) and a decrease in per capita general expenditures per year of only about $6 (less than 0.5 percent).[34]

Our results suggest that in the *average* county, which experienced the same change in low- and high-skilled immigrant shares as the U.S. as a whole in 1990–2010, the adverse impact of low-skilled immigrants on the provision of public goods was mostly offset by the positive impact of high-skilled immigrants: The net effect is 0.3 percent per year, relative to a county in which there was no immigration during this period. However, the average effect masks substantial geographical heterogeneity, as counties across the U.S. differ in terms of the composition of immigrants that arrived during this period, as depicted in Figures 1 and 2. Based on the changes observed in high- and low-skilled immigrant shares at the *county level*, Figures 4 and 5 show variation in the predicted local impact of immigration on per capita revenues and expenditures across counties. For example, Monterey, CA, experienced an increase in the share of low-skilled immigrants by 3.4 percentage points and a larger increase in the share of high-skilled immigrants, 7.7 percentage points. Our estimates suggest that the fiscal impact of immigration in this county was positive and large, at about 14 percent for both revenues and expenditures. This is in contrast to a county like Presidio, TX, which experienced a significant increase in the share of low-skilled immigrants (9.7 percentage points) and a small increase in the share of high-skilled immigrants (0.9 percentage points). As a consequence, revenues and expenditures *decreased* by 24 and 15 percent, respectively. These two counties are at the extremes of the distribution of fiscal effects across counties. Figure B5 gives the kernel density of the county-level estimates, which shows large peaks around zero for both per-capita revenues from own sources and per-capita general expenditures.

The change in provision of public goods we observe in the data is an equilibrium outcome that reflects changes in both per capita revenues and benefits, as predicted by the *benefit adjustment scenario*, as well as any adjustments to (income, property and

[33] Given the imprecisely estimated coefficients in column (2), in what follows, we focus our attention on the precisely estimated impact of low- and high-skilled immigrants and use these estimates to infer the impact of overall immigration (π=π_L+π_H) on per capita revenues and expenditures, as in $\hat{\beta}_{overall}$=$\hat{\beta}_L d\pi_L + \hat{\beta}_H d\pi_H$.

[34] The interpretation of the fiscal effects based on our estimation is different from what is calculated in accounting exercises such as in NASEM (2016). In our analysis, the beneficiaries of locally provided public goods are both natives and immigrants while, in accounting exercises, public expenditures are restricted to those targeting immigrants directly. In terms of the magnitude of the effects on the provision of public goods, an interesting comparison is the impact of the China trade shock on the same set of fiscal variables. Feler and Senses (2017) document a decrease in per capita public spending of 2.9 percent associated with an average increase in imports per worker from China by $3,290 between 1990 and 2007. This impact is a little more than half of what we find for an increase in the share of low-skilled immigrants.

consumption) tax rates consistent with the *tax adjustment scenario* in Section 2. Our finding that per capita revenues and expenditures decrease with the share of low-skilled immigrants and increase with the share of high-skilled immigrants is broadly consistent with the *benefit adjustment scenario*, under which local governments address the decline (increase) in the tax base by letting per capita revenues go down (up), with a resulting decline (increase) in per capita spending. While it is also possible that local governments adjust tax rates, the change in per capita revenues and expenditures indicate that tax rates do not *fully* adjust to compensate for the change in the tax base.[35]

4.3.1 Robustness

Before examining the underlying channels and mechanism, we provide additional support for the validity of the identification strategy and robustness of our estimates to alternative specifications. In Table 7, we show that our results are robust to accounting for pre-existing trends in local public revenues and spending, which could be correlated with (future) migration flows. We modify the benchmark specification by estimating it in long-differences (between 1990 and 2010) and by including, as controls, the changes in the dependent variables in the pre-sample period (between 1980 and 1990). In line with the estimates in Table 6, overall immigration has a small and insignificant impact; the low-skilled immigrant share reduces per capita revenues and expenditures, and the high-skilled immigrant share increases them.

Identification of a causal effect can be achieved even if the initial shares are not exogenous, as long as the aggregate shocks are (Borusyak et al., 2022). In our case, the aggregate shocks are the migration inflows from the 15 different groups of countries of origin, over the three time periods. The estimates in Table A3 in the Appendix suggest that our results are robust to using a specification at the *country-of-origin* level (i.e., "shock-level") that includes country-of-origin and year fixed effects.[36]

In Table 8, we carry out a series of additional robustness checks with own revenues (Panel (a)) and general expenditures (Panel (b)) as dependent variables. Our main results are replicated in column (1) for reference. We check the sensitivity of our estimates to fixing the *total* population in the denominator of the instruments at its 1980 value in column (2); using time-varying population weights in column (3); clustering standard errors at the state level in column (4); and including state-specific time trends in column (5). Our findings are robust, both in terms of signs and significance levels, as well as the magnitudes of the estimated effects. We also run a specification of *changes* in log per capita revenues and expenditures on the inflows of immigrants, along the lines of Card

[35]Due to data constraints, we cannot explicitly test for the extent to which localities adjust tax rates in response to immigration, but we provide some indicative evidence of changes in "effective" property tax rates, in the next section.

[36]To convert the data from the county-level to the shock-level, we weight fiscal variables and commuting zone level controls by the 1980 county-specific immigration shares of a given country-of-origin and sum across all counties for every year. So, for example, "Mexican per-capita general expenditures" are the weighted average of county-level per capita general expenditures, with the share of Mexican immigrants by county in 1980 as weights.

(2001). The results are robust (see Table A4). Moreover, the estimates are not driven by specific states, as shown in Figure B6a.[37]

An important robustness check consists of investigating how native inflows and outflows affect our results. There may be a correlation between immigrant inflow to a given location and native inflows and outflows, for example, due to economic conditions that affect the location decisions of both groups of workers. This correlation biases our estimates. For example, if counties that receive low-skilled immigrants also experience an increase in the number of low-skilled natives, we are likely to overestimate the negative impact of low-skilled immigrants. This is because our theoretical framework predicts that low-skilled natives, too, should decrease revenues and expenditures. To the extent that our instruments are valid, IV estimation addresses this concern. In particular, the instruments exploit variation in the size of immigrant networks of co-nationals, which should not be correlated with natives' location choice. We also show that our results are robust when we control for the share of low-skilled natives, although the latter variable is admittedly endogenous (see Table A5).

5 Unpacking the Channels

An inflow of immigrants will impact the local budget through their effect on the tax base and tax rates. Under the institutional requirement of a balanced budget for most localities in the U.S., any resulting change in local per capita revenues will be reflected in a change in per capita expenditures unless the intergovernmental transfers fully insure against changes in own revenues. Changes in per capita expenditures will impact the quantity and quality of local public services supplied by the government. Immigration could also impact public goods provision because of the changing demand for various services, as well as the cost of providing them. In this section, we focus on these mechanisms.

5.1 Revenue Items

We start with the revenue side of the fiscal equation and separately examine the association between immigration and various components of locally sourced revenues in Tables 9a and 9b, and extend our analysis to total revenue and intergovernmental transfers in Table 9c. Given the robust heterogeneous impact of low- and high-skilled immigrants we document in previous sections, we focus the rest of our analysis on specifications that include the immigrant shares by skill type.

Our benchmark results in Table 6 focus on per capita revenues *from own sources*. These revenues are derived from various types of taxes and charges, which we separately relate to immigration in the specifications reported in Table 9a. Locally generated revenues are made up of general revenues (column (2)) and revenues from utilities, insurance and

[37]When we omit California (Florida, New Jersey and Pennsylvania), point estimates for the impact of low-skilled (high-skilled) migrants on per capita expenditures change the most, but they are not significantly different from the others.

liquor stores (column (8)). General revenues are our main focus as they are specifically used to fund locally provided public goods. More than half of general (own) revenues derive from locally levied taxes (column (3)), which are sourced from property taxes (column (4)), sales, income and license taxes (column (5)) and other taxes (column (6)). Charges and administrative revenue (column (7)) constitute the remainder of general revenues. The estimates reported in Table 9a broadly paint the same picture as before. An increase in low-skilled immigrants results in a reduction of all sources of general (per capita) revenue, while the arrival of high-skilled immigrants results in an increase. For example, an increase in low-skilled immigrants by one percent of the local population reduces per capita tax revenues by 2.2 percent, while the same increase in high-skilled immigrants results in an increase of 2.5 percent. In terms of the magnitude and precision of the estimates, we find that the positive impact of high-skilled immigrants is more pronounced for per capita property taxes, other taxes, and charges and administrative revenues; the negative effect of low-skilled immigrants mainly derives from their impact on per capita sales, income and license taxes, and other taxes.

Tax revenues are jointly determined by tax rates and the tax base, both of which could change in response to immigration. An inflow of immigrants will impact the per capita tax base if they cause a change in average income in a county. This would mechanically be the case if the income of immigrants is different than that of the natives. In addition, immigration can impact average income through labor-market effects. The standard labor economics model predicts that immigrants should improve the wage and employment outcomes of complementary types of workers and worsen outcomes for workers with similar types of skills (Borjas, 1999, 2014). Other models point out that the economy may absorb an inflow of immigrants through alternative adjustment mechanisms, such as changes in the output mix in an open economy (Burstein et al., 2020) or through specialization in different tasks (Peri and Sparber, 2009), in which case wages and employment rates of similarly skilled workers do not necessarily decrease (and may even improve). In column (1) of Table 9b, we use per capita personal income in a county as one proxy for the local tax base. We find that an inflow of high-skilled immigrants increases the average local income, while the opposite is true for low-skilled immigrants. These findings are in line with the result that income and sales taxes decrease (increase) when low-skilled (high-skilled) immigrants arrive to a county, as documented in column (5) of Table 9a.

An increase in immigrants could result in a change in housing values because of their effect on the local demand for housing both directly and indirectly via the impact on migration decisions of natives. Immigrants may also change the local supply of housing through their effect on the level and type of new construction. Unless local governments adjust property tax rates to fully offset any resulting change in housing values, the revenue from local property taxes, which constitute, on average, 43 percent of local tax revenues, will be impacted. The empirical evidence of the effect of immigration on house prices in the U.S. is mixed (Saiz, 2007; Saiz and Wachter, 2011).[38] Importantly, existing literature

[38]In general, the unit of analysis seems to be an important factor, with a positive (negative) estimated impact at more aggregate (local) levels. See, for example, Sá (2015) for the U.K. and Accetturo et al. (2014) for Italy.

does not explore the possibility that any such impact might be heterogeneous depending on the type of immigrants that the locality receives.

In columns (2)–(4) of Table 9b, we explore the effects of the two types of immigrants on the house price index, median house value and median rent.[39] We find that low-skilled immigrants are associated with a relative decline in house prices and rents, while high-skilled immigrants give rise to a relative increase. These findings are consistent with high-(low-) skilled immigrants increasing (decreasing) relative demand for houses with higher than average prices in a given locality. This could be because high-skilled immigrants are more likely to demand single-family homes in high performing school districts or in low-crime areas, relative to high density apartment buildings or rental properties. The decline in housing prices when low-skilled immigrants arrive could be the result of a change in the preferences of natives away from counties that disproportionately attract low-skilled immigrants, due to discrimination and perceived (or actual) consequences of immigrants living in a locality (Boustan et al., 2013). Also consistent is a supply-side explanation, based on an increase in new construction in areas that receive low-skilled immigrants, perhaps due to a decrease in labor costs in construction. Independent of the particular channels through which immigrants impact house prices, our findings suggest that the property tax base is indeed affected by immigration in a way that is consistent with our estimates of the impact on property tax revenues, as reported in column (4) of Table 9a.[40]

Tax revenues are also determined by tax rates, which may change in response to immigration. For example, local governments could respond to the arrival of low-skilled immigrants by increasing tax rates in order to meet the balanced budget requirement. Alternately, the arrival of low-skilled immigrants could alter preferences for redistribution and lead to a *reduction* in tax rates in order to shrink the size of the welfare state. Due to the lack of relevant data, we cannot explicitly test this mechanism in a comprehensive manner, but in column (5) of Table 9b we provide some suggestive evidence of property tax rates. We construct a measure of median effective property tax rates by dividing median reported property taxes by median house values.[41] We find that an increase in the share of low-skilled immigrants increased the median property tax rates levied in a county; high-skilled immigrants resulted in a decrease, although it is not statistically significant. This finding is broadly consistent with the predictions of the *tax adjustment scenario* in Section 2.[42] The adjustment of tax rates does not fully offset the change in the tax base,

[39]The house price index is from the Federal Housing Finance Agency and measures changes in single-family home values based on data from 400 American cities in 50 states, which we aggregate to the county level using transaction-sales-based weights. The median house value and the median rent are provided by the U.S. Census and reflect self-reported values by respondents in each county.

[40]A change in property values also has a secondary effect on local revenues through its impact on consumption. Since housing is the most important component of wealth for many households, a relative decline in home values tends to suppress homeowners' perceived wealth and their consumption of goods and services, which may further reduce local sales tax revenues (Lutz et al., 2011). Also related are studies that explore the relationship between housing prices and local budgets in the context of the Great Recession (Lutz et al., 2011; Chernick et al., 2011; Alm et al., 2014; Cromwell and Ihlanfeldt, 2015).

[41]The availability of the 1990 data made it possible for us to construct the median effective property tax rate at the commuting zone level for that year.

[42]These results are consistent with Lutz (2008), who reports that policy makers offset about 60 percent of

however, since U.S. counties experience changes in per capita revenues and expenditures in response to low- and high-skilled immigration, as shown in Table 6.

So far, our findings suggest that an increase in low-skilled immigrants decreases local average income and house prices and results in a decline in per capita revenues from income, sales and property taxes, despite a slight increase in effective property tax rates. Given the binding budget constraint that most local governments face, the outcome should be a decline in (quality or quantity of) public goods provision unless intergovernmental transfers increase to make up for the decrease in per capita revenues generated locally. Since the transfers from state and federal governments are, in general, a function of the locality's population and poverty rates measured during census years (Suárez Serrato and Wingender, 2016), some degree of insurance against a decline in revenues due to immigration is to be expected. How much of the loss in per capita revenues these transfers insure against, in practice, is an empirical question. To explore this channel, we estimate the impact of immigrants on "total revenues," constructed as the sum of "revenues from own sources" and "total intergovernmental transfers" (in columns (1)–(3) of Table 9c). The coefficients in column (1) suggest that our results are somewhat less pronounced for total revenues: the coefficient on high-skilled immigrants is smaller in magnitude and not significant, while the coefficient on low-skilled immigrants remains unchanged. We document some degree of insurance by the federal government in column (4): Transfers from the federal government *increase* with the arrival of low-skilled immigrants but decrease (although not significantly) when high-skilled immigrants arrive. This is not the case when we consider transfers from state and local governments, which decrease with both types of immigrants (column (5)). The latter effect dominates in the case of low-skilled immigrants, as reflected in a decline in overall transfers (column (3)).

A possible explanation for lower state and local transfers with an inflow of low-skilled immigrant is that immigrant inflows are likely to be positively correlated within a state. If a county that receives low-skilled immigrants is located in a state that also experiences a decline in state revenues due to low-skilled immigration, the ability of the state and other local governments to provide insurance will be restricted. The decrease in transfers at a time when own revenues are also declining will then exacerbate any impact of the county level shock. We test for this hypothesis by controlling for low- and high-skilled immigrant shares in the rest of the state, in column (6). Our estimates suggest that a higher share of low-skilled immigrants in the rest of the state is associated with a decline in per capita transfers from the state and other local governments to the impacted county. Importantly, after we control for immigrant shares in the rest of the state, the impact of low-skilled immigrants on state and local transfers is no longer negative. Taken together, we find no evidence of substantial revenue smoothing by state governments in response to county-level immigration shocks. If anything, the decline in transfers trails the decline in per capita own revenues in counties that receive low-skilled immigrants.[43] These findings suggest

house price changes by adjusting the effective tax rate. As house prices decline, policymakers increase the effective tax rate, often by delaying downward adjustments in property assessments.

[43]As a consistency check, we rule out an association between (residual) state-level immigration shares and *own* revenues and federal transfers. Specifically, as expected, we find that per capita own revenues

that the federal government may be better suited than state and local governments to insure counties against negative fiscal shocks resulting from immigration. This could be achieved to some extent through a redistribution of federal transfers from counties that benefit from immigration to counties where it has a negative impact. Also possible is an adjustment of the overall level of federal transfers, given the documented positive fiscal effects of immigration at the federal level (NASEM, 2016).[44]

5.2 Expenditure Items

We next explore the expenditure side of the fiscal equation in order to identify how various spending items adjust differentially with an inflow of low-skilled and high-skilled immigrants. The effect of immigration on various expenditure categories reflects a combination of supply and demand channels. Given the balanced budget requirement, any change in per capita total revenues due to immigration will result in a corresponding change in per capita total expenditures. This will affect, on the supply side, the ability of local jurisdictions to fund different goods and services, with implications for their quantity and quality. Moreover, immigrants may directly impact the price of certain services, such as child and elder care (Cortes, 2008; Cortes and Tessada, 2011) and alter the costs for public providers. If, for example, economies of scale are prevalent in service provision or if some of the immigrants work as teachers, nurses, bus drivers or custodians in public schools, the per capita cost of public education may decrease with an inflow of immigrants. Importantly, local services differ in their reliance on state and federal transfers that are based on formulas factoring in head counts (overall population, enrollments) and per capita income. As a result, in response to immigration, expenditures may vary more for services that are mostly locally funded compared to services that rely more on intergovernmental transfers.

An inflow of low- and high-skilled immigrants might also change the demand for certain types of services. For example, to the extent immigration affects (or is *perceived* to affect) crime rates at the local level, the demand for public safety expenditures may be impacted. If low-skilled immigrants are on average poorer, the demand for public welfare expenditures may increase. An increase in low-skilled immigrants could increase demand for public education spending if low-skilled immigrants have more school-age children compared to natives, or for public transportation, to the extent car ownership rates are lower for low-skilled immigrants. It is also possible that native preferences for different types of spending will change because of immigration. For example, natives may vote against funding public services that are disproportionately used by immigrants.

We provide indicative evidence for some of these mechanisms by exploring the differential impact of immigration on different expenditure categories, in Table 10a. About 90 percent of total expenditures (column (1)) are general expenditures on locally provided

and federal transfers are not impacted by the (residual) state-level immigration shares; the sign and magnitude of the estimated coefficients on the county-level immigration variables remain unchanged. These estimates are available upon request.

[44] Edelberg and Watson (2022) explore mechanisms to transfer some of the federal gains from immigration towards adversely affected localities.

public services (column (2) of Table 10a), with the remainder 10 percent for liquor stores, utilities and the insurance trust sector (column (10)). We find that per capita general expenditures decrease with the arrival of low-skilled immigrants and increase with high-skilled immigrants, with the magnitude of the estimates in column (2) providing a benchmark to assess any change in the composition of general expenditures as a consequence of immigration.

High-skilled immigration leads to increased spending on infrastructure (column (3)), which may be driven by greater demand for "transportation and building infrastructure" by high-skilled, high-income immigrants, as well as by the greater per capita revenues they bring in. The expenditures on "public amenities" (libraries, parks and recreation, natural resources, health and hospitals, public welfare, housing and community development) also trail changes in public revenues; they decrease with the arrival of low-skilled immigrants and increase with the arrival of high-skilled immigrants. The estimated impact is large with a decline of 4.8 percent and an increase of 3.9 percent in response to a one percentage point increase in the share of low- and high-skilled immigrants, respectively (column (4)).

Estimates reported in column (5) of Table 10a suggest that per capita spending on "law and order" (constructed as the sum of expenditures on police, fire, corrections, judiciary and protective inspection) does not increase with the arrival of either low- or high-skilled immigrants. This finding is noteworthy as public safety is the only spending item with a significant negative association with high-skilled immigration; the estimated impact on most other spending categories trails the positive impact on per capita revenues. Spending on public safety is shaped by revenue streams as well as demand by the voting public, which is partly determined by the observed or perceived impact of immigration on crime rates. To shed light on this point, in the first two columns of Table 10b, we investigate the impact of low-skilled and high-skilled immigration on county-level violent and property crime rates. The results suggest that the fear that immigrants increase crime is unfounded: High-skilled immigration is associated with lower levels of both violent and property crime rates; the association between low-skilled immigrants and either type of crime is also negative, although imprecisely estimated.[45] These findings are in line with the changes we observe in public safety spending in Table 10a, with the decrease in crime rates reflected in lower demand for spending on law and order.

Education is the largest spending category, making up a little over half of general spending. While the impact of low- and high-skilled immigrants on per capita spending in education is negative and positive, respectively, the estimated coefficients are small in magnitude and are not statistically significant (see column (6) of Table 10a). These results are qualitatively unchanged when we focus on *per pupil* expenditures on education and are mirrored in the small and insignificant impact that both types of immigrants have on student to teacher ratios, as reported in columns (3) and (4) of Table 10b. Taken together, we interpret these results as evidence that immigration does not have a significant impact

[45]The literature on immigration and crime focuses on the impact of overall immigration, abstracting away from heterogeneity across low- and high-skilled immigrants. The evidence in the U.S. points to no significant impact of overall immigration on crime rates, with a possible exception of property crimes (Butcher and Piehl, 1998; Reid et al., 2005; Wadsworth, 2010; Spenkuch, 2014).

on the quantity or quality of public education provided by local governments. One possible explanation for this finding is the role of intergovernmental transfers. The share of such transfers in education spending is high, around 70 percent on average, with the magnitude based directly on formulas incorporating both the number of enrolled students and their household incomes. If an inflow of immigrants increases the number of children enrolled in local public schools, the county will receive proportionally more money, therefore spending should not necessarily be affected by a per pupil basis, despite a decline in local revenues. We find no evidence of an increase in total intergovernmental transfers specifically dedicated to education in response to a decline in own revenues. Mirroring our findings for total transfers in Table 9c, while federal transfers targeting education do in fact increase with low-skilled immigrants, this effect is outweighed by the decline in transfers from the state and local governments, mainly in counties located in states with high levels of low-skilled immigrants. Table A6 reports these estimates separately in per capita and per pupil terms.[46] Our finding of no impact of low-skilled immigration on per capita (or per pupil) spending on education or on student to teacher ratios, despite a decline in own revenues and in intergovernmental transfers dedicated to education, is consistent with a possible reallocation of resources across expenditure items for education.

6 Second-Generation Immigrants

Up to this point we have focused on the local fiscal effects of first-generation immigrants, i.e., individuals who are foreign-born. In this section, we extend the analysis and incorporate second-generation immigrants, defined as native-born individuals with at least one foreign-born parent. The existence of a local immigrant community likely attracts both first- and second-generation immigrants to that location. If this is the case, the omission of second-generation immigrants in specification (9) could result in biased estimates of the impact of foreign-born individuals.[47] The direction of the bias would then depend on the fiscal impact of second-generation immigrants, which may be different than that of first-generation ones, due, for example, to differences in income levels and in utilization of locally provided public services. Abramitzky and Boustan (2022) show significant intergenerational upward mobility of immigrants, with the second generation doing better than the first, both today and in the past. Consistent with this finding, NASEM (2016) documents that the direct tax payments of first-generation immigrants tend to be lower than those of natives, while second-generation immigrants contribute a significantly larger amount. Similarly, first-generation immigrants receive higher direct transfers than natives, while second-generation immigrants receive smaller transfers than natives. These findings

[46] Feler and Senses (2017) estimate a relative decline in both per capita education spending and teacher to student ratios in localities heavily exposed to an increase in imports from China, with no evidence of adjustments in federal transfers. The difference in federal response to different types of shocks, trade vs. immigration shocks, is perhaps not surprising given that enrollments enter the transfer formulas directly.

[47] This point is related to the identification concerns discussed in Jaeger et al. (2018), as the impact of second-generation immigrants can be viewed as part of the long-run effect of first-generation ones. In that sense, it is relevant not only for our analysis of the fiscal impact of immigration but also for any estimated impact of immigration based on reduced-form analysis.

suggest that second-generation immigrants have a more positive impact on revenues and a less positive impact on expenditures than first-generation immigrants.

Since data on country of birth of a respondent's parents are not available in the Census and ACS during our sample period, we use a *proxy* measure of second-generation immigrants based on whether a language other than English is spoken at home.[48] We construct the share of second-generation immigrants in a commuting zone as the share of individuals born in the U.S. who speak a language other than English at home. This could result in an underestimation of the actual number of second-generation immigrants, as it excludes those from English-speaking countries (e.g., Canada, the U.K., South Africa), and those who did not learn the language of their parents. It is also possible that this measure overestimates the number of second-generation immigrants, due to individuals in multi-generational households who speak a language other than English at home with their immigrant grandparents (third-generation immigrants). Analogous to our analysis of first-generation immigrants, we instrument for the measure of second-generation immigrants using a shift-share variable. This is to address endogeneity, as well as the measurement error in the language-based measure. In doing so, we take advantage of the fact that the Current Population Survey (CPS) reports the country of birth of the respondent's father and mother, which allows us to construct an estimate of the actual *national* number of second-generation immigrants by country of origin.[49] We then apportion the aggregate number of second-generation immigrants to counties using the (1970 and 1980) county-level shares of first-generation immigrants by country-of-origin and sum across all countries of origin.[50] We report the first-stage regressions in Table A7. We use 1970 county-level shares in columns (1)–(3), based on the assumption that the adult second-generation immigrants observed in 1990–2010 are the children of (first-generation) immigrants who arrived at least a few decades earlier. Given the low F-values, we also report estimates based on the instrument using 1980 shares as weights in columns (4)–(6), for robustness.

Table 11 reports estimates from specifications that include the share of second-generation immigrants in a locality. Specifically, we extend equation (9) first by directly including the language-based proxy in column (1), then by instrumenting it in columns (2) and (3), and by directly using each instrument as a proxy for second-generation immigrants in columns (4) and (5). The shares of low- and high-skilled first-generation immigrants are constructed and instrumented as before, in all specifications. Columns (6)–(10) report estimates from analogous specifications with per capita general expenditures as the de-

[48] Individuals who speak more than one non-English language at home are asked to report the language they speak most often or the language they learned first.

[49] CPS is representative of the national level but not of the local (state, commuting zone or county) level. Since 1994 is the first year for which the CPS provides information on the country of birth of the parents, we pool 1994 and 1995 and construct an average to proxy for the number of second-generation immigrants in 1990 from each country-of-origin group. For the remaining years, 2000 and 2010, we take the average of the pooled 2000 to 2002 and 2010 to 2012 samples, respectively. This is to avoid large year-to-year fluctuations, which are more pronounced for some country-of-origin groups because of low sampling rates. If a person's parents were born in different countries, we construct the instrument by distributing the person equally to the immigration stock of each.

[50] Both the language-based measure and the predicted measure of second-generation immigrants are positively correlated with our measure of first-generation immigrants, with correlation coefficients of 0.34 and 0.55, respectively.

pendent variable. The estimates in Table 11 suggest that the main results of this paper are robust to controlling for the share of second-generation immigrants: The impact of low-skilled immigrants on the provision of local public goods is negative, while the impact of high-skilled immigrants is positive. There is a slight change in the magnitude of some of the effects, consistent with the possibility of omitted variable bias in previous estimates.[51] We also find that while second-generation immigrants have a positive and significant impact on per-capita (own) revenues, their impact is insignificant and small in magnitude on per-capita (general) expenditures. These findings are consistent with the results based on the accounting analysis in NASEM (2016). They also suggest that the increase in revenues brought about by second-generation immigrants partially offsets the decrease in revenues triggered by first-generation immigrants, with the consequence that per capita expenditures need not decrease much with an inflow of the latter.

7 Conclusions

Immigration continues to be a salient political issue. What is crucial in the debate is what role immigrants play in the destination countries. Immigrants affect the host economies through several different channels. They impact the labor market opportunities of natives; they affect the destination country's welfare state; they change the prices of goods and services; they shape production patterns as well as trade and FDI flows to and from origin countries. In addition, immigrants also have a non-economic impact, for example on culture, potentially security and crime, and politics. While many papers have analyzed immigration along these various dimensions, the impact on local public finances has not received much attention as of yet. We attempt to fill this gap in this paper.

The results of our paper shed light on the role that immigrants play from a public finance point of view at the *local* level. We document substantial heterogeneity in the effect of immigration, depending on the type of immigrants, location within the U.S. and across generations. The skill level of immigrants is a key variable, as the effect on local public revenues and expenditures is opposite for low- and high-skilled immigrants. This is not surprising, given that immigrants' education level affects their income, which in turn impacts the local per capita tax base and corresponding public revenues (income, sales and property taxes). We document substantial variation in the shares of low-skilled and high-skilled immigrants across counties in the U.S., which implies that the impact of immigration differs greatly over counties, with some counties experiencing a negative fiscal impact and others experiencing a positive one. We find that, while transfers from

[51] Specifically, we compare the estimated impact in columns (5) and (10) in Table 11 with our baseline estimates in Table 6, in response to the increase in the observed shares of immigrants in 1990–2010. The impact on per capita own revenues is more negative for low-skilled immigrants (-12.3 versus -8.4 percent) and less positive for high-skilled immigrants (3.5 versus 6 percent). At the same time, the impact on per capita expenditures is similar: -6 (vs. -5.6) and 5 (vs. 5.3) percent for low- and high-skilled immigrants, respectively. The impact of the increase in the overall share of immigrants between 1990 and 2010 is a decrease in per capita general expenditures per year of 1 percent ($23), which is in the same ballpark as the estimates in Table 6. We note that these estimates should be interpreted with the caveat that second-generation immigrants are measured with noise.

the federal government partially smooth out the impact on per capita revenues, transfers from state governments exacerbate it, since immigration shocks are correlated within a state. Second-generation immigrants have a positive and significant impact on per capita (own) revenues; their impact is insignificant and small in magnitude on per capita (general) expenditures. Our main findings on the fiscal effect of immigrants with different skill levels are robust to accounting for second-generation immigrants.

Our analysis has identified economic shocks, such as changes in the per capita tax base and corresponding tax revenues, as a channel for the fiscal impact of immigration. While we have not focused on political economy issues, we recognize their importance. For example, our model predicts that when low-skilled immigrants arrive, per capita revenues decrease, in which case the balanced budget requirement forces the local government to either increase tax rates or decrease per capita benefits or both. Voters' sentiments may shape policymakers' choice between the two types of adjustment (tax rates vs. per capita benefits). Moreover, as mentioned earlier, immigration is likely to impact the desired size of the welfare state ("preferences for redistribution"). Public opinion may also affect the decision on how to allocate funds across various public goods: A local government may choose to allocate fewer resources to services that are intensively utilized by immigrants if the anti-immigrant sentiment in that locality is high. Future work should investigate how automatic adjustments to changes in the tax base to balance the budget, which is the main focus of this paper, interact with political economy considerations.

Another important area of future research is the fiscal impact of immigration at the state and federal levels of American governments, which we expect to differ from that at the local level. This is because the institutional constraints are different at the state and federal levels compared to counties. For example, there are laws that require the same level of per capita spending across school districts in a given state; at the federal level, there is no balanced budget requirement. The approach implemented in this paper can be used to explore these important questions in order to provide a fuller picture of the overall fiscal impact of immigration and to inform evidence-based policy recommendations.

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9 Tables

Table 1: Summary Statistics

	1990		2010	
	mean	sd	mean	sd
(a) Immigrants				
Share of immigrants	0.057	0.065	0.106	0.092
Share of low-skilled immigrants	0.046	0.054	0.076	0.067
Share of high-skilled immigrants	0.012	0.012	0.030	0.028
(b) Per capita revenue				
Total revenue	2516.7	1342.6	3685.6	2217.4
Total revenue from own sources	1543.7	1156.4	2283.1	1879.9
General revenue from own sources	1313.8	939.8	1962.8	1610.6
Total Tax revenue	776.9	570.7	1196.4	1214.0
Property tax	649.0	513.7	963.6	1136.4
Sales, income and license taxes	101.7	167.3	193.2	271.8
Other taxes	26.2	37.5	39.5	79.3
Charges and administrative revenue	536.9	594.6	766.4	785.0
Utilities, insurance trust and liquor stores	229.8	546.8	320.3	773.2
Inter-governmental transfers	973.1	444.3	1402.5	754.5
Federal	58.2	92.6	131.7	227.9
State	857.9	398.3	1179.5	602.4
Local	57.0	73.3	91.3	136.7
(c) Per capita expenditure				
Total expenditure	2503.8	1298.7	3643.3	2212.9
General expenditure	2256.8	1067.1	3292.3	1842.1
Education	1122.3	392.8	1528.2	923.9
Law and Order	178.7	158.2	316.9	233.3
Sanitation	83.8	83.1	138.2	118.4
Infrastructure	204.9	176.6	285.5	343.3
Public amenities	379.6	406.3	630.2	827.0
Administrative	186.9	363.7	219.2	280.4
Other	100.5	121.0	174.1	234.4
Utilities, insurance trust and liquor stores	247.0	598.3	351.0	882.7

(d) Demographics

	1980	
	mean	sd
Share of urban	0.686	0.350
Share of youth	0.416	0.031
Per-capita real income (in logs)	9.944	0.145
Share of African American	0.116	0.099
Share of adult women	0.310	0.019
Share of married	0.449	0.029
Share of unemployed	0.030	0.008
Bartik instrument	12.788	1.671

Notes: Population-weighted means and standard deviations are reported for 3,079 counties. Commuting zone demographic variables are from the 1980 U.S. Census.

Table 2: The Effect of Immigration on Own Revenue and General Expenditures, OLS

(a) Per capita revenue from own sources (in logs)

Dependent variable	Log of per capita revenue from own sources			
	(1)	(2)	(3)	(4)
Share of immigrants	-0.677***	-0.768**		
	[0.225]	[0.318]		
Share of low-skilled immigrants			-1.693***	-1.915***
			[0.455]	[0.466]
Share of high-skilled immigrants			1.047	1.894**
			[0.644]	[0.794]
Commuting zone controls	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237
R^2	0.53	0.54	0.53	0.54

(b) Per capita general expenditures (in logs)

Dependent variable	Log of per capita general expenditures			
	(1)	(2)	(3)	(4)
Share of immigrants	-0.531***	-0.471**		
	[0.185]	[0.219]		
Share of low-skilled immigrants			-1.377***	-1.178***
			[0.313]	[0.280]
Share of high-skilled immigrants			0.905**	1.166**
			[0.432]	[0.534]
Commuting zone controls	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237
R^2	0.69	0.70	0.69	0.70

Notes: The dependent variables are the log of per capita own revenue and log of per capita general expenditures in Panels (a) and (b), respectively. Commuting zone controls are interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Each specification includes county and panel fixed effects. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 3: Reverse Causality Analysis
Changes in Predicted Immigrant Shares (1990–2010) and Changes in Own Revenue and General Expenditure (1980–1990), OLS

Dependent variable	Change predicted share of immigrants (1990–2010)					
	Total		Low-skilled		High-skilled	
	(1)	(2)	(3)	(4)	(5)	(6)
Log change per-capita own revenues (1990-1980)	-0.001		-0.006		0.002*	
	[0.006]		[0.004]		[0.001]	
Log change per-capita general expenditure (1990-1980)		0.007		0.010		-0.002
		[0.012]		[0.007]		[0.002]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3079	3079	3079	3079	3079	3079
R^2	0.46	0.46	0.64	0.64	0.76	0.76

Notes: The dependent variable in each specification is the change in the predicted share of total immigrants, low-skilled immigrants, and high-skilled immigrants, calculated over 1990–2010, in columns (1)–(2), (3)–(4) and (5)–(6), respectively. Each OLS specification includes county and panel fixed effects, as well as commuting zone controls constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Specifications (3) and (4) ((5) and (6)) also include the change in the predicted share of high- (low-) skilled immigrants as a control. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 4: Falsification Tests
Changes in Own Revenue and General Expenditure (1980–1990) and Changes in Predicted Immigrant Shares (1990–2000 and 1990–2010), 2SLS

Dependent variable	Log change in per capita own revenue (1980–90)				Log change in per capita general expenditure (1980–90)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in share of immigrants (2010-1990)	-0.173				0.397			
	[0.565]				[0.644]			
Change in share of immigrants (2000-1990)		-0.074				0.292		
		[0.429]				[0.485]		
Change in share of low-skilled immigrants (2010-1990)			-1.248				1.098	
			[0.817]				[0.752]	
Change in share of high-skilled immigrants (2010-1990)			1.501				-0.791	
			[1.068]				[0.946]	
Change in share of low-skilled immigrants (2000-1990)				-1.336				1.177
				[0.909]				[0.833]
Change in share of high-skilled immigrants (2000-1990)				3.064				-1.774
				[1.948]				[1.813]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3079	3079	3079	3079	3079	3079	3079	3079
IV F-stat	107.25	42.92	16.57	55.21	107.25	42.92	16.57	55.21

Notes: The dependent variable is the log change over 1980–1990 in total per capita own revenue in columns (1)–(4) and in per capita general expenditures in columns (5)–(8). Each 2SLS specification includes county and panel fixed effects, as well as commuting zone controls constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 5: First-Stage Specifications

Dependent variable	Share of immigrants		Share of low-skilled imm.		Share of high-skilled imm.	
	(1)	(2)	(3)	(4)	(5)	(6)
Predicted share of immigrants	0.435***	0.311***				
	[0.053]	[0.045]				
Predicted share of low-skilled imm.			0.261***	0.295***	-0.002	0.009
			[0.051]	[0.042]	[0.021]	[0.025]
Predicted share of high-skilled imm.			0.169	-0.320**	0.869***	0.660***
			[0.138]	[0.152]	[0.078]	[0.098]
Commuting zone controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237	9237	9237
R^2	0.76	0.83	0.68	0.76	0.84	0.87

Notes: The dependent variables are the population shares of total immigrants, low-skilled immigrants, and high-skilled immigrants in columns (1)–(2), (3)–(4) and (5)–(6), respectively. Each specification includes county and panel fixed effects and is estimated with and without commuting zone controls. Commuting zone controls are constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 6: The Effect of Immigration on Own Revenue and General Expenditures, 2SLS

(a) Per capita own revenue (in logs)

	(1)	(2)	(3)	(4)
Share of immigrants	-0.515**	-0.324		
	[0.253]	[0.431]		
Share of low-skilled immigrants			-1.846**	-2.786***
			[0.837]	[0.823]
Share of high-skilled immigrants			1.124	3.316***
			[0.887]	[1.094]
Commuting zone controls	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237
IV F-stat	67.02	47.24	17.97	26.27

(b) Per capita general expenditures (in logs)

	(1)	(2)	(3)	(4)
Share of immigrants	-0.503**	0.076		
	[0.231]	[0.356]		
Share of low-skilled immigrants			-2.479***	-1.850***
			[0.667]	[0.636]
Share of high-skilled immigrants			1.933***	2.922***
			[0.749]	[0.956]
Commuting zone controls	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237
IV F-stat	67.02	47.24	17.97	26.27

Notes: The dependent variables are the log of per capita own revenue and general expenditures in Panels (a) and (b), respectively. Each specification includes county and panel fixed effects and is estimated with and without commuting zone controls. Commuting zone controls are constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 7: Changes in Immigrant Share and in Own Revenue and General Expenditures over 1990–2010, 2SLS

Dependent variable	Change in own revenue (1990–2010)				Change in general expenditure (1990–2010)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in share of immigrants (2010-1990)	0.123	0.105			0.338	0.441		
	[0.516]	[0.502]			[0.410]	[0.421]		
Change in share of low-skilled immigrants (2010-1990)			-1.857*	-2.163**			-1.671**	-1.296
			[1.023]	[1.008]			[0.763]	[0.802]
Change in share of high-skilled immigrants (2010-1990)			2.780***	3.149***			3.035***	2.766**
			[1.043]	[1.117]			[1.041]	[1.131]
Lag change per-capita own revenues (1990-1980)		-0.244***		-0.245***				
		[0.045]		[0.044]				
Lag change per-capita general expenditures (1990-1980)						-0.354***		-0.341***
						[0.036]		[0.038]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3079	3079	3079	3079	3079	3079	3079	3079
IV F-stat	42.92	44.49	16.57	17.23	42.92	43.31	16.57	16.29

Notes: The dependent variables are (log) changes in per capita own revenues and general expenditures between 2010 and 1990, in columns (1)–(4) and (5)–(8), respectively. Each specification includes county and panel fixed effects, as well as commuting zone controls. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 8: Robustness: Per Capita Revenues, Per Capita Expenditures and Immigrant Share 2SLS Estimates, U.S. Counties, 1990–2010

(a) Per capita revenues from own sources (logs)

Dependent variable	Benchmark	Population fix to 1980	Weighted current pop	SE cluster state-level	State-time trends
	(1)	(2)	(3)	(4)	(5)
Share of low-skilled imm.	-2.786***	-2.491***	-2.782***	-2.786***	-2.705***
	[0.823]	[0.795]	[0.820]	[0.874]	[0.828]
Share of high-skilled imm.	3.316***	3.040***	3.622***	3.316**	3.225***
	[1.094]	[1.060]	[1.108]	[1.479]	[1.124]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237	9237
IV F-stat	26.27	25.41	25.75	24.98	24.23

(b) Per capita general expenditures (logs)

Dependent variable	Benchmark	Population fix to 1980	Weighted current pop	SE cluster state-level	State-time trends
	(1)	(2)	(3)	(4)	(5)
Share of low-skilled imm.	-1.850***	-1.660***	-1.929***	-1.850**	-1.752***
	[0.636]	[0.632]	[0.643]	[0.719]	[0.622]
Share of high-skilled imm.	2.922***	2.245**	3.017***	2.922**	2.861***
	[0.956]	[0.952]	[0.953]	[1.424]	[0.971]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237	9237
IV F-stat	26.27	25.41	25.75	24.98	24.23

Notes: The dependent variable in Panel (a) is the log of total per capita own revenue, and in Panel (b) it is the log of per capita general expenditures in a county and year. Column (1) is the benchmark specification from Table 6. Column (2) fixes the denominator of the shares to the population in 1980. Column (3) uses the current population as regression weights. In column (4) the standard errors are clustered at the state level. Column (5) includes state-specific time trends as control variables. The explanatory variables are equal to immigrants by skill level as a share of the population aged 25 and above. The method of estimation is ordinary least squares. The controls at the commuting zone level are the 1980 values interacted with linear time trends of the share of men, married, African Americans, and urban citizens, the log of the average income, the share of unemployed and people below age 25 and the Bartik employment shifter described in the text. Each regression is weighted by the average population of the county over the sample period. Standard errors in parentheses are clustered by the county level. ***, **, * indicate the statistically significant difference from zero at the 1, 5 and 10 percent levels, respectively.

Table 9a: The Effect of Immigration on Local Revenue, 2SLS

Dependent variable	Own revenue	General revenue	Tax revenue	Property tax revenue	Sales, income, license taxes	Other taxes	Total charges, admin. revenue	Utilities, insurance, liquor stores
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of low-skilled immigrants	-2.786***	-1.841*	-2.173***	-1.411	-17.435***	-6.908**	-0.946	-5.224
	[0.823]	[1.079]	[0.819]	[0.913]	[4.316]	[3.241]	[2.704]	[3.373]
Share of high-skilled immigrants	3.316***	4.204***	2.486**	2.577**	2.310	10.969***	8.082***	-3.996
	[1.094]	[1.219]	[0.992]	[1.264]	[8.976]	[2.956]	[2.291]	[3.690]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237	8525	9214	9237	9108
IV F-stat	26.27	26.27	26.27	26.27	26.32	26.27	26.27	26.20

Notes: General own revenue (column (2)) is the sum of tax revenue (column (3)) and total charges and administrative revenue (column (7)). Total taxes are the sum of property taxes (column (4)), sales, income, and license taxes (column (5)) and other taxes (column (6)). All dependent variables are in per capita terms and in logs. Each specification includes county and panel fixed effects, as well as commuting zone controls constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 9b: The Effect of Immigration on the Tax Base and Effective Property Tax Rate, 2SLS

Dependent variable	Per capita personal income	House price index	Median house value	Median rent	Effective property tax rate
	(1)	(2)	(3)	(4)	(5)
Share of low-skilled immigrants	-1.947***	-5.969***	-6.660***	-1.562**	0.095***
	[0.518]	[1.245]	[1.819]	[0.765]	[0.027]
Share of high-skilled immigrants	2.491***	10.010***	4.302	4.644***	-0.097
	[0.778]	[2.213]	[2.672]	[1.402]	[0.064]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	9231	6129	9239	9240	9241
IV F-stat	25.68	23.61	26.20	26.20	26.41

Notes: The dependent variables are the (log) of per capita personal income in column (1), the Freddie Mac house price index in column (2), the median house value in column (3), and the median house rent in column (4). In column (5) the dependent variable is the median effective property tax rate, calculated as the median reported property tax paid divided by the median reported house value in a county and year. Each specification includes county and panel fixed effects, as well as commuting zone controls constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 9c: The Effect of Immigration on Intergovernmental Transfers, 2SLS

Dependent variable	Total revenue	Revenue from own sources	Intergov. transfers	Transfer federal gov.	Transfer state and local gov.	Transfer state and local gov.
	(1)	(2)	(3)	(4)	(5)	(6)
Share of low-skilled imm.	-2.753***	-2.786***	-3.148**	6.971**	-3.387**	0.728
	[0.839]	[0.823]	[1.448]	[3.060]	[1.559]	[2.140]
Share of high-skilled imm.	1.526	3.316***	-1.004	-5.328	-2.549	-1.578
	[1.013]	[1.094]	[1.824]	[4.685]	[2.156]	[1.936]
Residual state-level share of low-skilled imm.						-5.598***
						[1.809]
Residual state-level share of high-skilled imm.						0.202
						[1.847]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9237	9237	9236	8951	9236	9236
IV F-stat	26.27	26.27	26.26	25.91	26.26	7.94

Notes: Total revenue (column (1)) is the sum of own revenue (column (2)) and intergovernmental transfers (column (3)). Total intergovernmental transfers (column (3)) are made up of transfers from the federal government (column (4)) and from the state and other local governments (column (5)). All dependent variables are in per capita terms and in logs. Each specification includes county and panel fixed effects, as well as commuting zone controls constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Column (6) also includes the share of immigrants in the rest of the state (excluding the immigrants in the county) in the specification. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 10a: The Effect of Immigration on Local Expenditures

Dependent variable	Total	General	Infra-structure	Public amenities	Law and order	Education	Sanitation	Admin.	Other	Utilities, ins. trust, liquor st.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share of low-skilled imm.	-1.800**	-1.850***	-1.640	-4.802**	-1.265	-0.460	-0.266	0.160	1.790	-1.432
	[0.745]	[0.636]	[1.780]	[2.209]	[0.893]	[1.218]	[2.091]	[2.801]	[2.149]	[3.788]
Share of high-skilled imm.	2.259**	2.922***	4.722*	3.863*	-4.383***	1.287	-1.747	-5.432	7.306**	13.437***
	[0.971]	[0.956]	[2.528]	[2.290]	[1.131]	[1.892]	[3.043]	[3.435]	[3.040]	[4.164]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9237	9237	9235	9231	9236	9226	9184	9131	9237	9205
IV F-stat	26.27	26.27	26.26	26.26	26.26	26.27	26.25	26.20	26.27	26.21

Notes: Total expenditures (column (1)) are general expenditures (column (2)) plus expenditures on liquor stores, utilities, and the insurance trust sector (column (10)). General expenditures consist of expenditures on infrastructure, public amenities, law and order, education, sanitation, administration and other general expenditures, reported in columns (2)–(9). All dependent variables are in per capita terms and in logs. Each specification includes county and panel fixed effects, as well as the commuting zone controls. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table 10b: The Effect of Immigration on Crime Rates and Education Outcomes

Dependent variable	Violent crime	Property crime	Education expend. (per pupil)	Teacher to student ratio
	(1)	(2)	(3)	(4)
Share of low-skilled immigrants	-8.548	-2.101	-1.058	0.018
	[6.593]	[3.599]	[1.046]	[0.037]
Share of high-skilled immigrants	-20.385***	-19.534***	-0.272	-0.011
	[4.580]	[3.644]	[1.343]	[0.061]
Commuting zone controls	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	8300	8593	9219	8848
IV F-stat	21.86	21.94	26.28	25.71

Notes: The dependent variables are the (log) of violent and property crime rates and per-pupil education spending (columns (1)–(3)) and teacher to student ratio (column (4)). Each specification includes county and panel fixed effects, as well as commuting zone controls. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

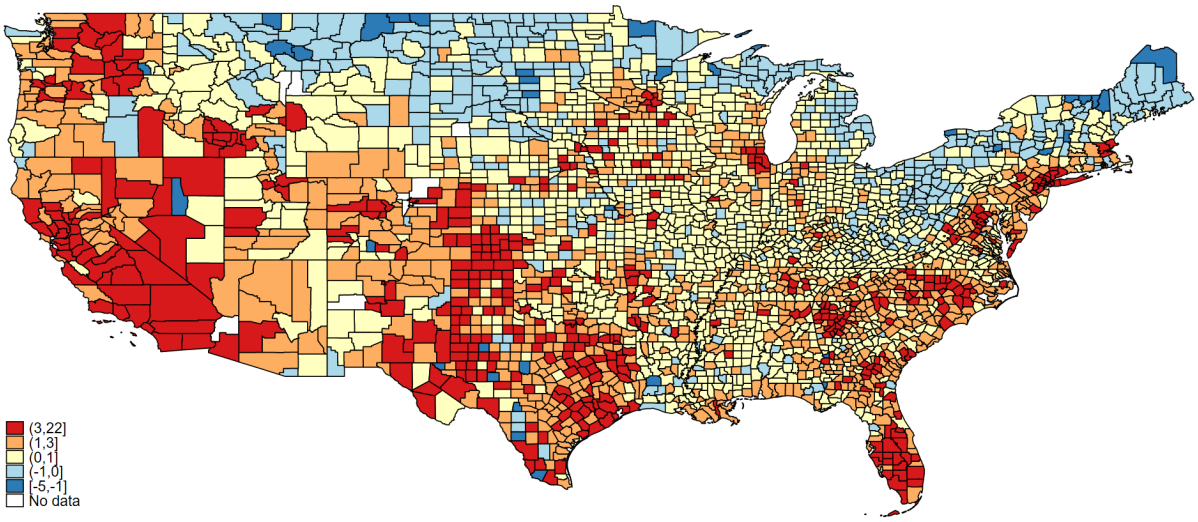
Table 11: Effect of First- and Second-Generation Immigrants on Own Revenue and General Expenditures

	Per capita own revenue (in logs)					Per capita general expenditures (in logs)				
	Language-based proxy			Predicted share of second-generation imm.		Language-based proxy			Predicted share of second-generation imm.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share of low-skilled imm.	-3.181***	-7.753***	-5.652***	-3.954***	-4.090***	-1.791***	-2.697**	-2.174***	-2.049***	-1.997***
	[0.947]	[2.339]	[1.271]	[0.831]	[0.936]	[0.676]	[1.236]	[0.686]	[0.660]	[0.602]
Share of high-skilled imm.	3.119***	0.825	1.879	2.761**	1.920	2.951***	2.497*	2.759**	2.827***	2.764**
	[1.101]	[2.671]	[1.754]	[1.139]	[1.292]	[0.952]	[1.301]	[1.144]	[0.990]	[1.100]
Share of second generation imm.	1.002*	12.622**	7.283***	1.234***	1.505***	-0.150	2.152	0.823	0.210	0.170
	[0.568]	[6.017]	[2.039]	[0.425]	[0.501]	[0.352]	[2.843]	[1.252]	[0.425]	[0.501]
Second generation immigrants										
Instrument	No	Yes	Yes	No	No	No	Yes	Yes	No	No
Predicted shares	-	1970	1980	1970	1980	-	1970	1980	1970	1980
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237	9237	9237	9237	9237	9237	9237
IV F-stat	29.36	1.70	6.60	27.47	31.61	29.36	1.70	6.60	27.47	31.61

Notes: The dependent variables are the log of per capita own revenues in columns (1)–(5) and general expenditures in columns (6)–(10). The OLS specifications in columns (1) and (6) use a language-based measure (speaking a language other than English at home) as a proxy for second-generation immigrants. The 2SLS specifications reported in columns (2) (and (3)) and (7) (and (8)) instrument for this proxy using the predicted share of second-generation immigrants, constructed using the national flow of second-generation immigrants apportioned by the initial share of immigrants in the year 1970 (1980). Estimates reported in columns (4)–(5) and (9)–(10) are from OLS specifications that include the predicted share of second-generation immigrants. Each specification includes county and panel fixed effects, as well as commuting zone controls constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

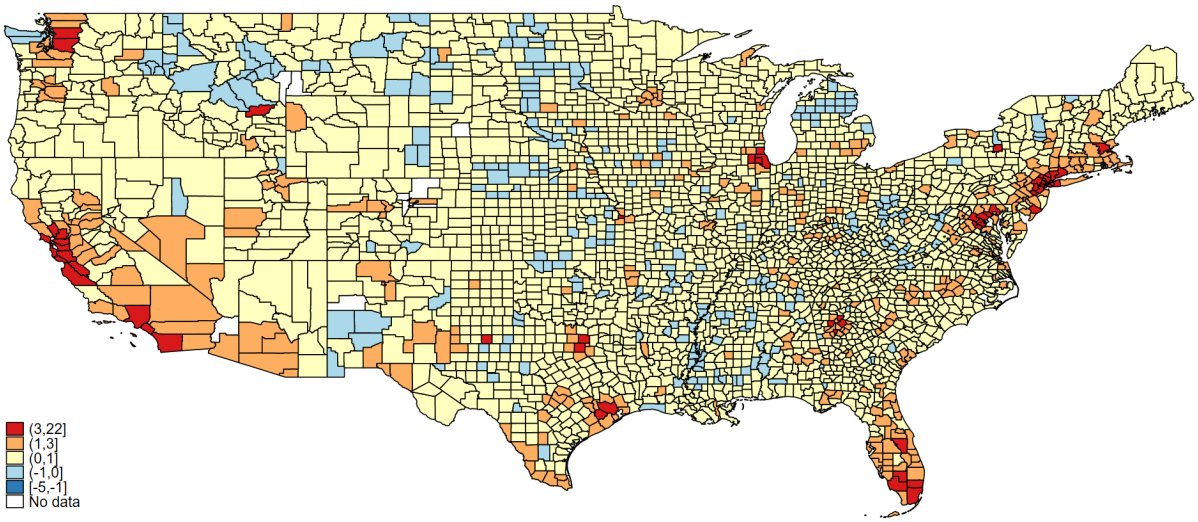
10 Figures

Figure 1: Change in the Share of Low-Skilled Immigrants, by County (1990–2010)



Notes: The changes in the shares of low-skilled immigrants are calculated for each county, for 1990–2010. The shape file for the map is from the U.S. Census Bureau (2016).

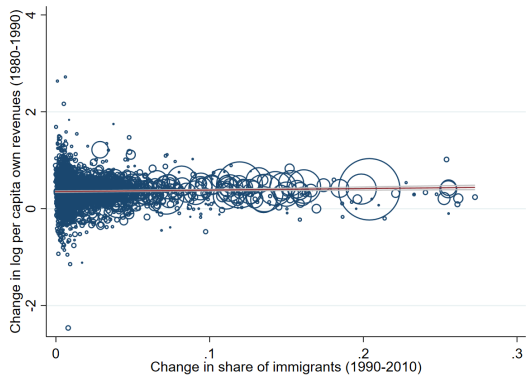
Figure 2: Change in the Share of High-Skilled Immigrants, by County (1990–2010)



Notes: The changes in the shares of high-skilled immigrants are calculated for each county, for 1990–2010. The shape file for the map is from the U.S. Census Bureau (2016).

Figure 3a: Changes in Predicted Immigrant Shares (1990–2010) and Changes in Own Revenue and General Expenditure (1980–90)

(i) Per capita own revenue



(ii) Per capita general expenditures

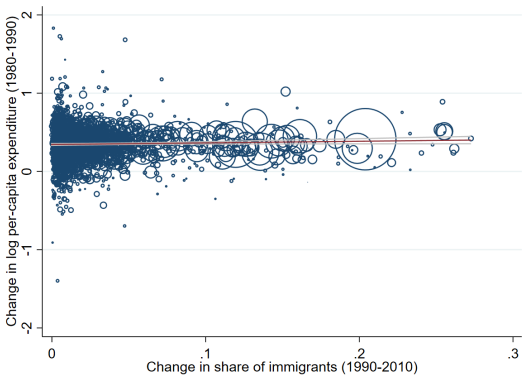
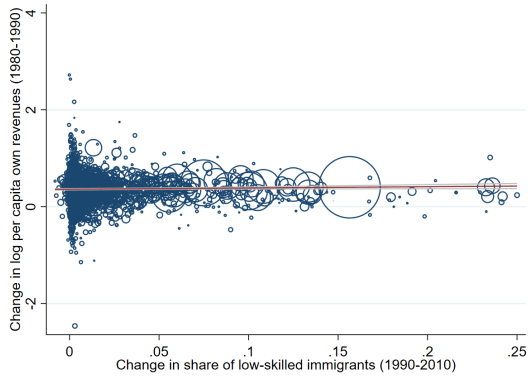


Figure 3b: Changes in Predicted Low-Skilled Immigrant Shares (1990–2010) and Changes in Own Revenue and General Expenditure (1980–90)

(i) Per capita own revenue



(ii) Per capita general expenditures

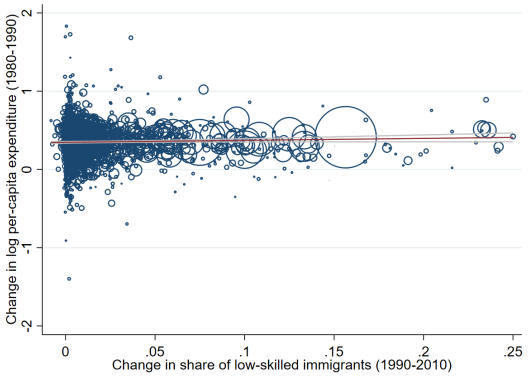
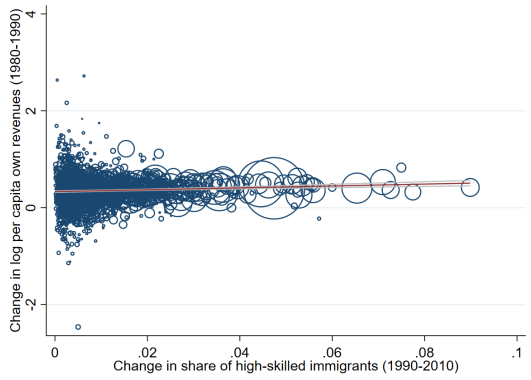
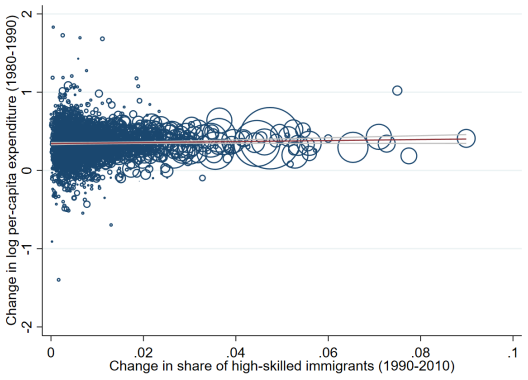


Figure 3c: Changes in Predicted High-Skilled Immigrant Shares (1990–2010) and Changes in Own Revenue and General Expenditure (1980–90)

(i) Per capita own revenue

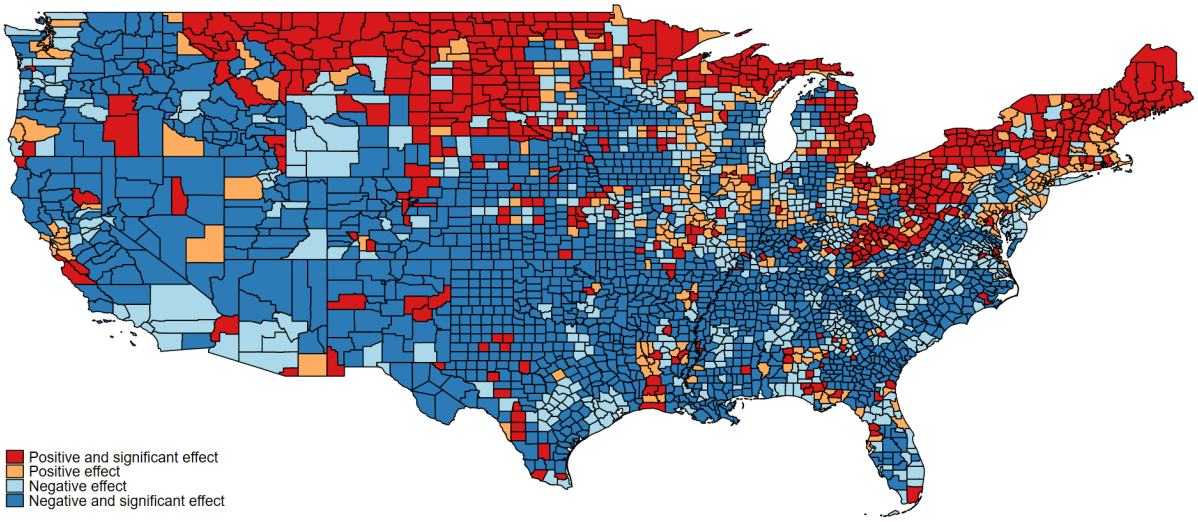


(ii) Per capita general expenditures



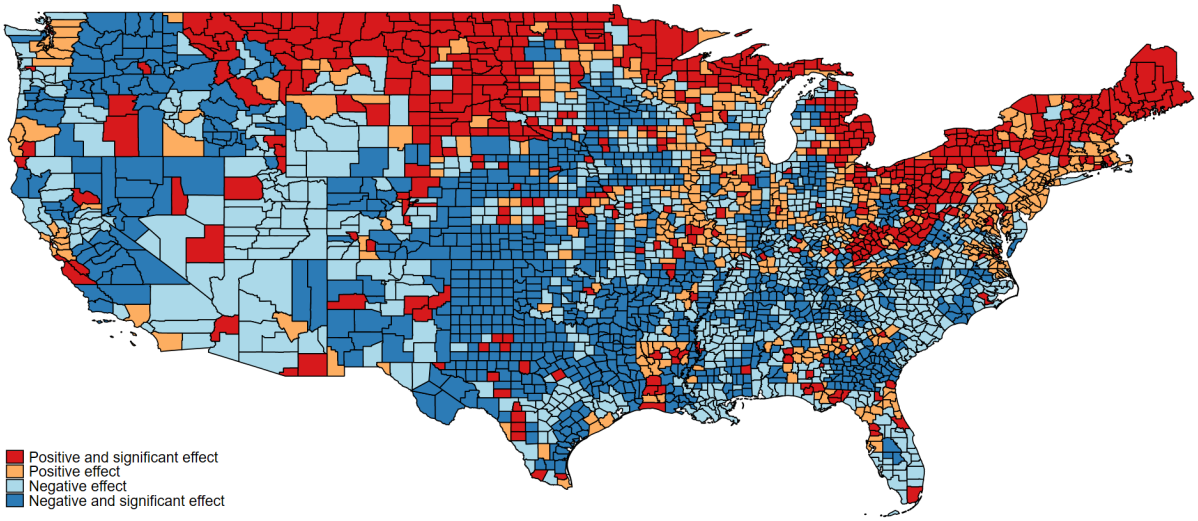
Notes: Figures (i) and (ii) plot log changes in (per capita) own revenue and (per capita) general expenditures for 1980–90, respectively, against the change for 1990–2010 in the share of total immigrants in Figure 3a, in the share of low-skilled immigrants in Figure 3b and in the share of high-skilled immigrants in Figure 3c. Each point represents a county weighted by its overall population, with the red line depicting the fitted values.

Figure 4: The Effect of Immigration on Own Revenue, 1990–2010



Notes: The county-level impact is calculated using the estimated coefficients in column (4) of Panel (a) of Table 6 and the observed changes in the shares of low- and high-skilled immigrants for 1990–2010 in a given county. The shape file for the map is from the U.S. Census Bureau (2016).

Figure 5: The Effect of Immigration on General Expenditures, 1990–2010



Notes: The county-level impact is calculated using the estimated coefficients in column (4) of Panel (b) of Table 6 and the observed changes in the shares of low- and high-skilled immigrants for 1990–2010 in a given county. The shape file for the map is from the U.S. Census Bureau (2016).

11 Appendix Tables

Table A1: Summary Statistics, in Shares

(a) Revenue shares

	1990		2010	
	mean	sd	mean	sd
Rev. from own sources in total rev.	58.4	13.8	59.0	13.8
General rev. in rev. from own sources	86.5	13.0	86.9	12.4
Taxes in general rev. from own sources	61.1	16.2	63.2	16.3
Property taxes in tax rev.	80.3	16.5	77.7	16.3
Sales, income and license taxes in tax rev.	15.7	14.9	18.8	15.6
Other taxes in tax rev.	4.0	4.8	3.5	4.1
Charges and administrative rev. in general rev. from own sources	38.9	16.2	36.8	16.3
Utilities, insurance trust and liquor stores in total rev. from own so	13.5	13.0	13.1	12.4
Inter-governmental transfers in total rev.	41.6	13.8	41.0	13.8
Federal in intergov. transfers	5.6	6.8	8.6	8.3
State in intergov transfers	88.5	9.5	85.2	9.9
Local in intergov transfers	6.0	6.7	6.2	6.1

(b) Expenditure shares

	1990		2010	
	mean	sd	mean	sd
General exp. in total exp.	91.3	9.4	91.6	8.9
Education in general ex	52.6	12.7	49.0	12.9
Law and order in general exp.	7.8	3.7	10.1	4.6
Sanitation in general exp.	3.7	2.9	4.4	3.0
Infrastructure in general exp.	8.9	5.1	8.3	5.5
Public amenities in general exp.	15.1	11.1	16.3	13.1
Administration in general exp.	7.6	5.8	6.7	3.7
Other spending in general exp.	4.2	3.2	5.1	4.0
Utilities, insurance trust, and liquor stores in total exp	8.7	9.4	8.4	8.9

Notes: Population-weighted means and standard deviations are reported for 3,079 counties. Total revenue is revenue from own sources plus inter-governmental transfers. Revenue from own sources is the sum of general revenue from own sources and revenue from utilities, insurance trust and liquor stores. General revenue from own sources is total tax revenue (property, sales, income and license taxes and other taxes) and charges and administrative revenue. Inter-governmental transfers are from the federal, state and other local governments. Total expenditures are equal to general expenditures on education, law and order, sanitation, infrastructure, public amenities, administrative and other spending, plus expenditures on utilities, insurance trust and liquor stores.

Table A2: Exogeneity of the Initial (1980) Shares of Country-of-Origin Groups, OLS (Goldsmith-Pinkham et al., 2020)

(a) Change in (log) per capita own revenue, 1980–1990

	Canada	Other Americas	Mexico	Western Europe	Eastern Europe	China	Japan	Korea	Philippines	Vietnam	India	Other Asia	Africa	Oceania	Rest of world
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Log change revenues from own sources per-capita	-0.002 [0.003]	0.006* [0.004]	0.001 [0.006]	0.001 [0.003]	0.005 [0.005]	0.000 [0.003]	0.000 [0.003]	0.001 [0.005]	0.002 [0.004]	-0.000 [0.003]	0.005 [0.006]	-0.000 [0.004]	0.001 [0.003]	0.000 [0.002]	0.003 [0.003]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044
R^2	0.19	0.24	0.23	0.19	0.13	0.23	0.23	0.22	0.22	0.23	0.13	0.21	0.22	0.24	0.22

(b) Per capita general expenditures, 1980–1990

	Canada	Other Americas	Mexico	Western Europe	Eastern Europe	China	Japan	Korea	Philippines	Vietnam	India	Other Asia	Africa	Oceania	Rest of world
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Log change general expenditure per-capita	-0.001 [0.003]	0.004 [0.003]	0.010 [0.009]	-0.001 [0.002]	-0.001 [0.003]	0.001 [0.004]	0.004 [0.005]	0.004 [0.006]	0.003 [0.004]	0.003 [0.005]	-0.003 [0.003]	0.002 [0.005]	0.000 [0.003]	0.003 [0.004]	0.001 [0.003]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044	3044
R^2	0.19	0.24	0.23	0.19	0.13	0.23	0.23	0.22	0.22	0.23	0.13	0.21	0.22	0.24	0.22

Notes: The dependent variables are the initial (1980) shares of immigrants by each country-of-origin group, regressed on the log change over 1980–90 in per capita own revenue in Panel (a) and on the log change in per capita general expenditures in Panel (b). Each specification includes commuting zone controls constructed as change over 1980–90 in the shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the beginning of the period population of the county. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table A3: The Effect of Immigration on Own Revenue and General Expenditures, Shock-Level Representation, 2SLS (Borusyak et al., 2022)

Dependent variable	Own revenue	Total revenue	General expenditure	Total expenditure
	(1)	(2)	(3)	(4)
Share of low-skilled immigrants	-0.710**	-2.829***	-1.638***	-1.775***
	[0.359]	[0.589]	[0.342]	[0.451]
Share of high-skilled immigrants	2.307**	0.941	1.863*	1.960*
	[0.941]	[1.712]	[1.018]	[1.186]
Commuting zone controls	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	45	45	45	45
IV F-stat	12.44	12.44	12.44	12.44

Notes: The dependent variable in each 2SLS specification is the shock-level transformation of the log of the per capita values given by the specific columns. Each observation is weighted by the average exposure weight of the country of origin. Robust standard errors, clustered by country-of-origin groups, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table A4: First-Difference Specification à la Card (2001): Changes in Immigrant Share and in Own Revenue and General Expenditure, 2SLS

Dependent variable	Change in own revenue				Change in general expenditure			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in share of immigrants	-0.620*	-0.770			-0.266*	0.104		
	[0.357]	[0.709]			[0.149]	[0.215]		
Change in share of low-skilled immigrants			-1.243**	-2.052***			-1.068***	-1.078***
			[0.573]	[0.554]			[0.280]	[0.294]
Change in share of high-skilled immigrants			1.458**	4.628***			1.386***	3.440***
			[0.728]	[1.091]			[0.482]	[0.925]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6158	6158	6158	6158	6158	6158	6158	6158
IV F-stat	33.19	27.77	17.89	11.36	33.19	27.77	17.89	11.36

Notes: The dependent variables are (log) changes in per capita own revenue and general expenditures between 2010 and 1990, in columns (1)–(4) and (5)–(8), respectively. Each specification includes county and panel fixed effects, as well as commuting zone controls. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table A5: The Effect of Immigration on Own Revenue and General Expenditures, Controlling for Low-Skilled Natives, 2SLS

(a) Per capita own revenue (in logs)

	(1)	(2)	(3)	(4)
Share of immigrants	-0.459	-0.244		
	[0.466]	[0.513]		
Share of low-skilled natives	0.080	0.329	-0.114	-0.381
	[0.400]	[0.453]	[0.379]	[0.572]
Share of low-skilled immigrants			-1.818**	-2.915***
			[0.780]	[0.931]
Share of high-skilled immigrants			0.911	3.277***
			[0.880]	[1.099]
Commuting zone controls	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237
IV F-stat	143.34	188.68	42.20	40.89

(b) Per capita general expenditures (in logs)

	(1)	(2)	(3)	(4)
Share of immigrants	-0.505	0.242		
	[0.374]	[0.431]		
Share of low-skilled natives	-0.003	0.684**	-0.275	0.141
	[0.284]	[0.333]	[0.266]	[0.402]
Share of low-skilled immigrants			-2.412***	-1.802**
			[0.625]	[0.728]
Share of high-skilled immigrants			1.417**	2.936***
			[0.690]	[0.970]
Commuting zone controls	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Observations	9237	9237	9237	9237
IV F-stat	143.34	188.68	42.20	40.89

Notes: The dependent variables are the log of per capita own revenue and general expenditures in Panels (a) and (b), respectively. Each specification includes the share of low-skilled natives as well as county and panel fixed effects, and is estimated with and without commuting zone controls. Commuting zone controls are constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table A6: The Effect of Immigration on Intergovernmental Transfers Dedicated to Education, 2SLS

Dependent variable	Intergovernmental Transfers for Education					
	Federal per pupil	State & local per pupil	State & local per pupil	Federal per capita	State & local per capita	State & local per capita
	(1)	(2)	(3)	(4)	(5)	(6)
Share of low-skilled immigrants	22.191**	-6.374***	-3.124	22.830**	-5.771***	-3.151
	[9.288]	[1.651]	[1.959]	[9.385]	[1.737]	[2.305]
Share of high-skilled immigrants	-17.124	-3.017	-3.039	-16.123	-1.470	-1.465
	[14.052]	[3.176]	[2.738]	[13.379]	[3.915]	[3.707]
Residual state-level share of low-skilled immigrants			-5.685***			-4.547**
			[1.836]			[2.050]
Residual state-level share of high-skilled immigrants			4.052*			3.154
			[2.116]			[2.712]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6437	9219	9219	6442	9224	9224
IV F-stat	22.27	26.28	7.95	22.25	26.27	7.94

Notes: The dependent variables are the log of the values given by the specific columns. Educational transfers from the federal government and from the state and other local governments are in columns (1) and (2)–(3) in per capita terms and in columns (4) and (5)–(6) in per pupil terms. Each specification includes county and panel fixed effects, as well as commuting zone controls constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Columns (3) and (6) also include the share of immigrants in the rest of the state (excluding the immigrants in the county). Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table A7: First-Stage Specifications: First- and Second-Generation Immigrants, 2SLS

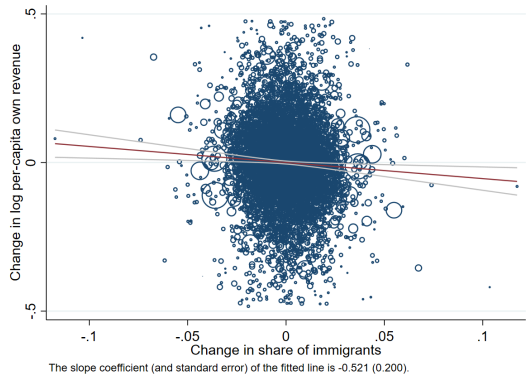
IV specification	Initial share of immigrants in 1970			Initial share of immigrants in 1980		
Dependent variable	Second-gen. imm.	Low-skilled imm.	High-skilled imm.	Second-gen. imm.	Low-skilled imm.	High-skilled imm.
	(1)	(2)	(3)	(4)	(5)	(6)
Predicted share of 2nd generation imm.	0.087**	-0.113***	0.027*	0.181***	-0.232***	0.007
	[0.039]	[0.040]	[0.015]	[0.033]	[0.042]	[0.014]
Predicted share of low-skilled imm.	0.105***	0.308***	0.002	0.081***	0.339***	0.008
	[0.022]	[0.047]	[0.024]	[0.024]	[0.048]	[0.023]
Predicted share of high-skilled imm.	-0.099	-0.161	0.653***	-0.145**	-0.102	0.649***
	[0.068]	[0.155]	[0.078]	[0.073]	[0.159]	[0.078]
Commuting zone controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9249	9249	9249	9249	9249	9249
IV F-stat	1.7	1.7	1.7	6.6	6.6	6.6

Notes: The dependent variables are the share of second-generation immigrants based on speaking a language other than English at home (columns (1) and (4)), the share of low-skilled (first-generation) immigrants (columns (2) and (5)) and the share of high-skilled (first-generation) immigrants (columns (3) and (6)). In columns (1)–(3) and (4)–(6) the instruments for the second-generation immigrants are based on the initial share of immigrants by country of origin in the years 1970 and 1980, respectively. Each specification includes county and panel fixed effects, as well as commuting zone controls constructed as interactions of linear time trends with 1980 values of shares of adult women, African Americans, individuals who are younger than 25, married, unemployed, and located in urban areas, and the real (average) per capita income (in logs) and the Bartik indicator. Observations are weighted by the average population of the county over the sample period. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

12 Appendix Figures

Figure B1a: Change in Total Immigrant Share (1990–2010)

(i) Change in per capita own revenue



(ii) Change in per capita general expenditures

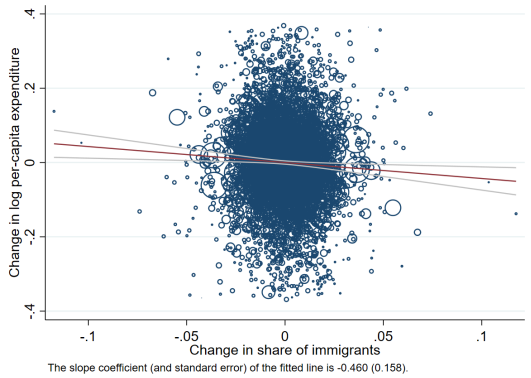
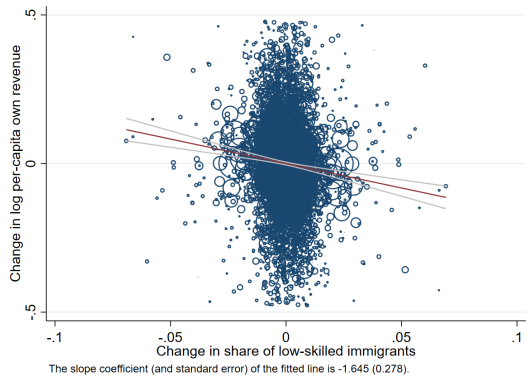


Figure B1b: Change in Low-Skilled Immigrant Share (1990–2010)

(i) Change in per capita own revenue



(ii) Change in per capita general expenditures

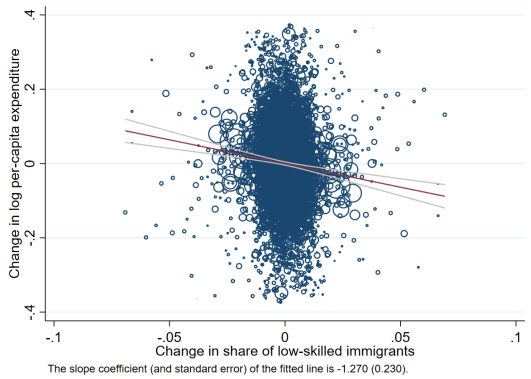
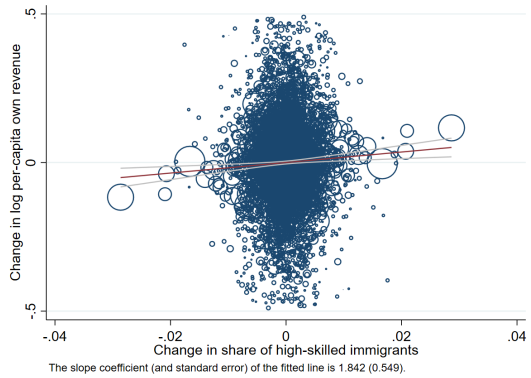
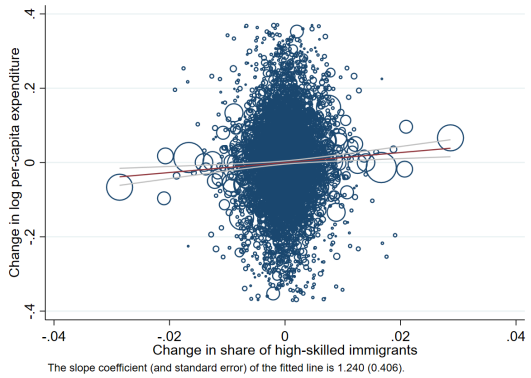


Figure B1c: Change in High-Skilled Immigrant Share (1990–2010)

(i) Change in per capita own revenue

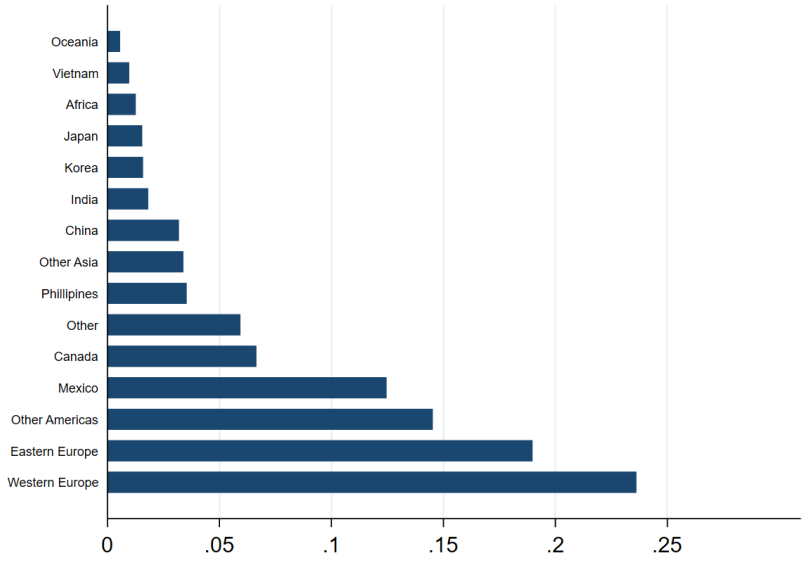


(ii) Change in per capita general expenditures



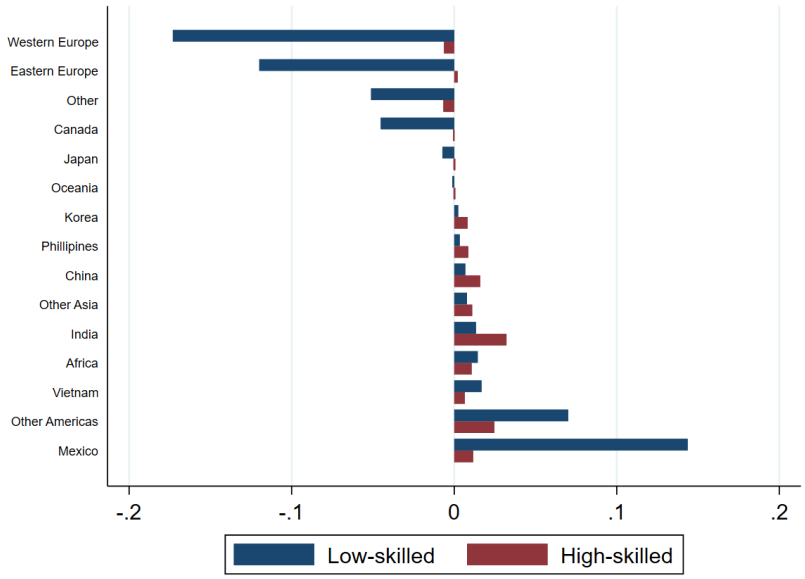
Notes: Panels (i) and (ii) plot log changes in (per capita) own revenue and (per capita) general expenditures, respectively, against the change in the share of total immigrants (Figure B1a), the change in the share of low-skilled immigrants (Figure B1b) and the change in the share of high-skilled immigrants (Figure B1c). All changes are calculated for 1990–2010 over a winsorized (at 1 percent) sample. Each point represents a county weighted by its overall population, with the red line depicting the fitted values.

Figure B2: The Share of Adult Immigrants by Country of Origin, 1980



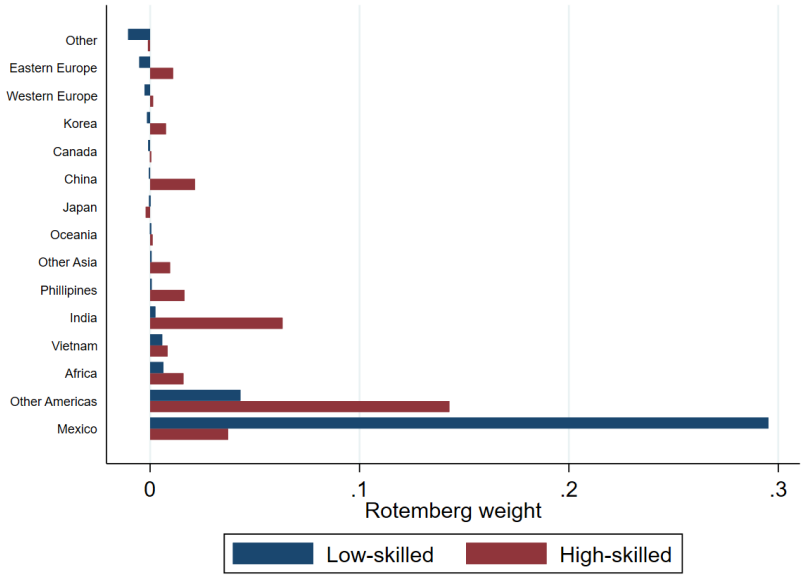
Notes: Each bar represents the share of adult immigrants from each country-of-origin group in the total number of adult immigrants (age 25 and above) in 1980.

Figure B3: The Change in the Share of Immigrants by Country of Origin, 1990–2010



Notes: Blue (red) bars represent the change in the share of low- (high-) skilled immigrants by country-of-origin group, in the overall population in 1990–2010.

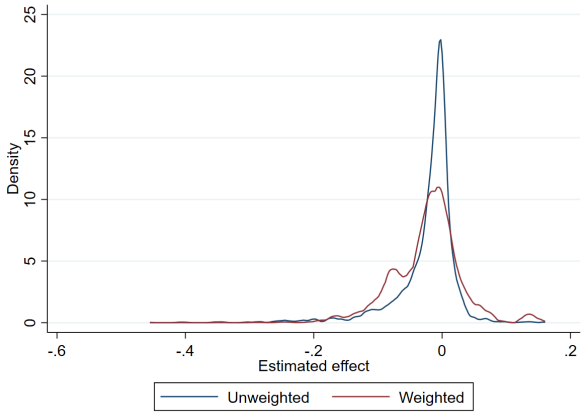
Figure B4: Rotemberg Weights by Country of Origin



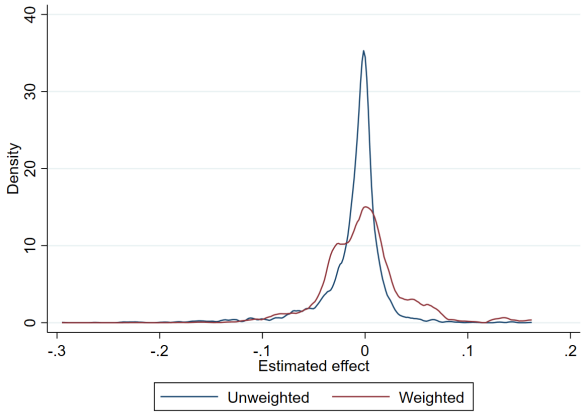
Notes: Each bar represents the Rotemberg weight for low- and high-skilled immigrants by country of origin, as in Goldsmith-Pinkham et al. (2020).

Figure B5: Estimated Fiscal Effects across U.S. Counties

(i) Own revenue



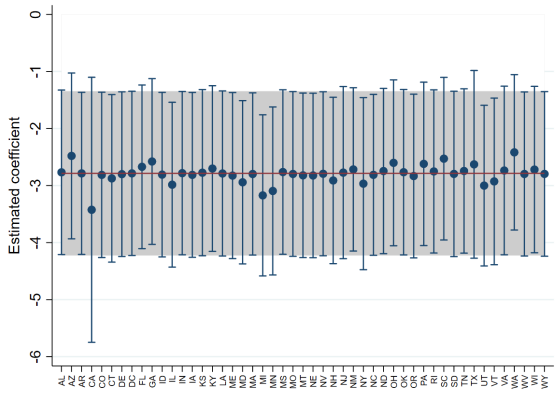
(ii) General expenditures



Notes: The histograms represent the estimated impact of the change in low- and high-skilled immigration over 1990–2010 on own revenue and general expenditure across counties with and without population weights. All calculations are based on estimated coefficients from column (4) in Panels (a) and (b) of Table 6 for own revenues and general expenditures, respectively.

Figure B6a: Leave-One-State-Out: IV Estimates of Per Capita Own Revenue

(i) Low-skilled immigration share



(ii) High-skilled immigration share

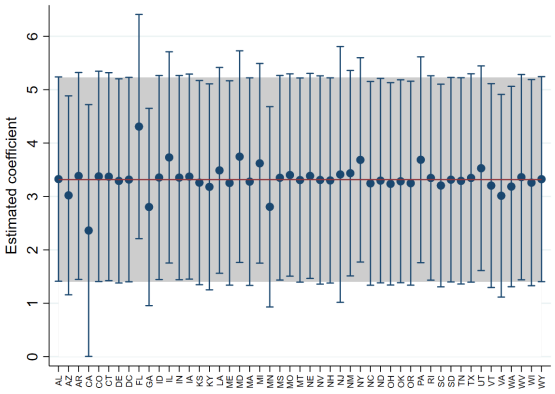
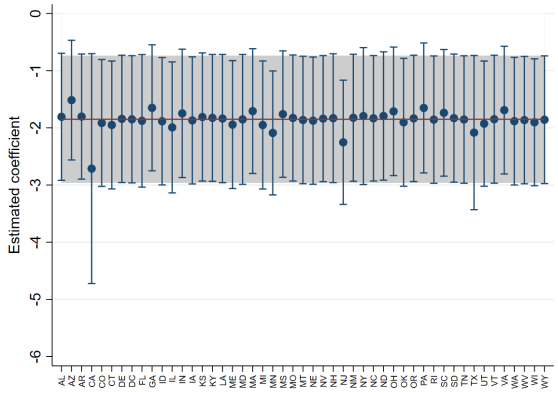
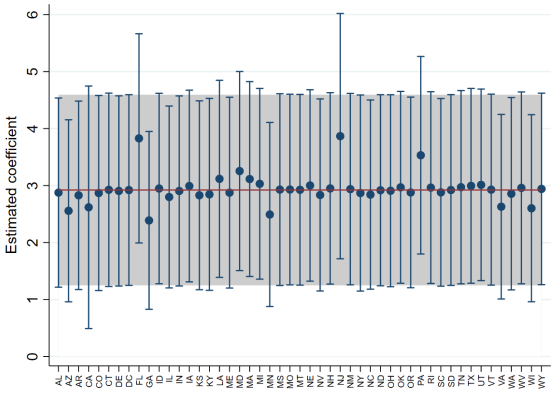


Figure B6b: Leave-One-State-Out: IV Estimates of Per Capita General Expenditures

(i) Low-skilled immigration share



(ii) High-skilled immigration share



Notes: Figures B6a and B6b plot the estimated coefficients when omitting one US state at a time from our baseline regressions in Table 6. Panel (i) shows the point estimates with 95 percent confidence intervals in bars of the share of low-skilled immigrants on the log changes in per capita own revenue (Figure B6a) and in per capita general expenditures (Figure B6b). Panel (ii) shows the estimated coefficients and the 95 percent confidence intervals in bars for the share of high-skilled immigrants on the log changes in per capita own revenues (Figure B6a) and in per capita general expenditures (Figure B6b). For comparisons, the figures include grey-shaded areas that show the 95 percent confidence interval with the baseline estimates of Table 6.