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Immigration and US Shelter Prices: The Role of Geographical and Immigrant Heterogeneity

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Abstract

The arrival of immigrants increases demand for housing and puts upward pressure on shelter prices. Using instrumental variables based on the ancestry composition of residents in US counties, we estimate the causal impact of immigration on local shelter prices. We show that the impact of immigrants is heterogeneous across locations. The increase in shelter prices is greater in counties where immigrants have higher levels of education and in counties that issue fewer building permits. We also find that the house prices respond more to immigration than rent prices do. The larger issuance of building permits for multi-unit homes than for single-unit homes can reconcile the different price reactions. Based on empirical estimates, we find that the predicted contribution of immigration to US shelter price growth is small, around 2%, because the arrival of immigrants accounts for a small share in local population changes. When we apply our estimates to population movements across counties within the United States, our model can predict 50% to 60% of observed shelter price growth over the past 30 years.

Topics: Housing; Inflation and prices; International topics; Regional economic developments
JEL codes: J61, R23, R31

Résumé

L'immigration fait monter la demande de logements et exerce une pression haussière sur les frais de logement. À l'aide de variables instrumentales créées à partir de l'ascendance des habitants des comtés américains, nous estimons les effets spécifiques de l'immigration sur les frais de logement à l'échelle locale des comtés. Nous montrons que l'immigration a des effets variés dans les comtés. La progression des frais de logement est plus forte dans les comtés où les immigrants ont des niveaux de scolarité plus élevés et dans ceux où ont été délivrés un plus petit nombre de permis de construction. Les prix des logements sont plus sensibles à l'immigration que les prix des loyers. La délivrance en plus grand nombre de permis de construction pour des logements collectifs plutôt que pour des maisons individuelles permet d'expliquer cette différence dans l'élasticité des prix. D'après les estimations empiriques, l'immigration contribue modérément à la croissance des frais de logement aux États-Unis : cet apport projeté d'environ 2 % s'explique par le fait que l'immigration joue un rôle mineur dans les mouvements démographiques à l'échelle locale. En revanche, nos estimations permettent de prédire que les flux de population entre les comtés américains sont responsables, à hauteur de 50-60 %, de la croissance des frais de logement observée au cours des 30 dernières années.

Sujets : Logement; Inflation et prix; Questions internationales; Évolution économique régionale
Codes JEL : J61, R23, R31

1 Introduction

In recent years, many advanced economies have seen a notable uptick in the arrival of new immigrants. This has created widespread discussion on the potential economic consequences of immigration. The impact on shelter prices (i.e., rent and house prices) has been among the most discussed of these consequences, especially in the context of the recent increases in housing prices seen in these countries.[1] Given that shelter prices represent a large fraction of total inflation, understanding the impact of immigration on shelter prices is critical to understanding its impact on inflation and on the wider economy. In this paper, we analyze the impact of immigration on housing and rent prices at the local level in the United States.

There are various channels through which immigration can affect shelter prices. New immigrants arriving in the US need housing and thereby increase demand, which puts upward pressure on shelter prices. The magnitude of this demand shock will depend on the income of immigrants and the underlying supply conditions of the local housing market. Richer immigrants are more likely to buy a home rather than rent an apartment, and they can afford more expensive homes compared to lower-income immigrants. If immigrants arrive in a housing market where supply can expand, the impact on shelter prices will be muted relative to a housing market where it is more difficult to add homes. Taken together, these channels suggest that the impact of immigrants on shelter prices can differ for houses compared to rental units, depends on local housing market characteristics, and may vary across the shelter price distribution.

In this paper, we document a causal association between new immigration and shelter prices at the US county level. We start by outlining a simple framework emphasizing the various channels through which immigrants affect shelter prices. We then empirically assess the importance of these shocks using detailed county-level data from the US for the period 1985–2019. An important challenge in the analysis of the link between immigration and shelter prices is endogeneity driven by the sorting of immigrants into specific localities, which depends on the underlying house prices in the location. We address this issue by employing a shift-share instrument based on the ancestry composition of residents in each US county (Burchardi et al., 2019). We leverage the composition of residents' ancestry as well as the timing and size of the national inflow of immigrants from a country of origin matched to ancestry. Given that the ancestry composition itself may be endogenous, we predict ancestry for each year and county using the (residualized) interaction of historical (country of origin-specific) push factors and (US county-specific) pull factors from 1880 until that year.

Our empirical findings show a very robust impact on rents and housing prices. Ac-

[1] See for example, "Housing Affordability Remains Stretched Amid Higher Interest Rate Environment," IMF Blog, January 11, 2024.

cording to our baseline regression, immigration inflows equal to 1 percent of a county's population were associated with increases in median housing prices and rents by 3.8 percent and 2.2 percent, respectively. These estimates are an order of magnitude bigger than the previous estimates from the immigration literature (Saiz, 2007). The main reason for this difference is that we allow the impact of immigrants to vary by their education attainment (a pre-determined proxy for their income) and by local housing supply conditions (number of building permits issued 5 years prior to the arrival of immigrants) in their destination counties. Without these interaction terms, our estimates are not significantly different from Saiz (2007). Allowing for this type of heterogeneity has substantial implications for spatial differences in housing prices across US counties. In the county with the most restrictive issuance of building permits receiving immigrants with the highest level of education, an immigrant inflow of 1 percent of the county's population would increase shelter prices by 6 to 8 percent. On the flip side, in the county with the least restrictive issuance of building permits and the lowest level of education of immigrants, an immigrant inflow of 1 percent of the county's population would reduce shelter prices by 0 to 2 percent relative to a county that did not experience an immigrant inflow.

Armed with the estimated effects of immigrants on shelter prices and observed immigration flows, we calculate the model implied contribution of immigration to observed changes in US shelter prices. The overall impact of immigration on the rise in shelter prices is minimal, contributing less than 2 percent to the increase. This is primarily because immigration only accounts for a small fraction of local population changes. The most important contributors to local population changes are movements of people across counties within the US. Under the assumption that our coefficient estimates can be applied to these intra-country movements, within-US population shifts and changes in counties' educational composition can explain 59 percent of the observed change in median housing prices and 47 percent of the observed median rent price changes. In this regard, our paper suggests that the influx of immigrants from other countries serves as a useful tool to identify causal effects of population movements on shelter prices. When applying these estimates to both national and international population movements, they predict observed changes in US shelter prices and provide insights into how movements of natives and immigrants in combination with local supply conditions affect the local housing market.

These findings are in line with the recent literature on immigration and house price growth. Most papers find a robust positive relationship between immigration and shelter prices in the United States (Ottaviano and Peri, 2006; Saiz, 2007; Mussa et al., 2017). Our main contribution to this literature is to account for the skill composition of incoming immigrants and the heterogeneity of housing supply conditions in the destination counties. These changes increase the point estimate of the immigration-shelter price impact and improve our ability to predict realized changes in housing prices.

The remainder of the paper is structured as follows. We will first describe our empirical strategy including how we identify exogenous variation in immigration, how we measure

immigrant heterogeneity and the details of our baseline regression equation. We will then describe the data and the construction of variables used in our analysis. We will present our baseline results for median housing and rent prices and our results for other quintiles of housing and rent prices. Finally, we will present an extension of our baseline exercise where we also consider the impact on shelter prices of county-level changes in the within-US population.

2 Framework and existing literature

This section discusses the framework and channels through which immigrants affect shelter prices. We consider the international arrival of immigrants as a population shock that increases local housing demand in US counties. For the moment, we suppose that the effects of new immigrants on local housing is comparable to a population increase caused by people moving in from other counties within the US. The advantage of focusing on immigrants is that we can, arguably, generate exogenous variation and identify causal effects of increases in housing demand on local shelter prices. To make the demand shock comparable across locations in the US, we scale the inflow of new immigrants by the size of the local population before immigrants arrive. We expect that an increase in the share of new immigrants relative to the initial population increases demand for housing and positively affects shelter prices.

An important consideration is that the demand effect of the arrival of new residents may vary with the level of income or wealth of the new residents. If new residents are richer, they are more likely to buy a home rather than rent an apartment, and they can afford more expensive homes relative to lower-income people. While the income level of immigrants is observable in the data we use, it is likely to be partially determined by the location choice of immigrants and, therefore, using income directly would introduce endogeneity. For this reason, we use the educational attainment of immigrants as a proxy for their income level. We also focus on immigrants aged 25 and over as they have most likely completed their education. As educational attainment is positively correlated with income and pre-determined before the immigrants' arrival in the US, we should, everything else being equal, observe that shelter prices increase more in locations where new residents are more educated.

The demand effect of new immigrants will also depend on the supply conditions in the local housing market. If newcomers arrive in a housing market where supply can expand, the impact on shelter prices will be lower relative to a housing market where adding more homes is difficult. To capture the supply conditions in the local housing market, we follow Glaeser and Gyourko (2018) and focus on regulatory differences in housing markets across US counties. As Glaeser and Gyourko (2018) note, there are geographical differences that will make housing more expensive to build in some areas than others (geological composition, see Rosenthal and Strange (2008), steepness of terrain, see Saiz (2010)), as

well as the presence of water, which can limit land supply. While these effects do not vary with time, we suppose that the first order impact of these factors is on the price level, and we will capture these level effects by looking at price changes and some control variables. As for regulatory differences, we use the number of new building permits issued relative to the existing number of housing units prior to immigrants' arrival. In terms of impact, we expect that a higher degree of building regulations results in the issuance of fewer permits and limits housing supply, which results in higher house price growth following a positive demand shock.

The effect of immigrants on shelter prices discussed so far may be different for houses than for rental units. The moving costs related to buying or selling a house or an apartment are much higher than for rental units. Lower moving costs facilitate the adjustments to demand shocks and should dampen the response of population increases on rent prices relative to house prices. In addition, the presence of rent control lowers the response of rent prices to demand shocks (Autor et al., 2014). There is evidence that immigrants have lower homeownership rates than natives, which can be explained by differential location decisions of immigrant and native households (Borjas, 2002). This is not surprising given that in larger cities, immigrants are more likely to find goods from their country of origin (Albert et al., 2024). Similarly, immigrants may settle in different places than natives because of local immigrant-specific amenities and networks (Munshi, 2020). Given these facts, it is important to account for the location decision of immigrants and potential differential responses of house and rent prices to population growth.

Even if we account for all the aforementioned factors and channels, it is not obvious that we should observe a positive correlation between immigration and changes in housing rents and/or prices. One reason could be that current residents move out of counties where immigrants settle because of competition in the local labor market (Borjas, 2003; Ottaviano and Peri, 2012), because of changes in the availability of local public services (Mayda et al., 2023) or because of changes in the value of local amenities if residents have negative attitudes towards immigrants (Boustan, 2007; Saiz and Wachter, 2011; Bian et al., 2023). If immigration inflow spurs net out-migration of natives and this outflow completely offsets the immigrant inflow, then there would be no change in the overall demand for housing and prices may not react. For this reason, we included a separate section that discusses how and whether local population changes affect our results.

3 Data

This section describes and summarizes the data for our empirical analysis below. We use data on the most detailed geographical level and for the longest sample period possible. Our main data source for US shelter prices is the US Census, which we obtain from the National Historical Geographic Information System (NHGIS) available at IPUMS. Our measures for shelter prices are the medians of self-reported house prices and reported contract rents for

owner-occupied units and renter-occupied units, respectively. The county-level measures are available for the years 1980, 1990, 2000, 2010, 2015 and 2019. Given more detailed data for other variables, we linearly interpolate the shelter price data for the years 1985, 1995 and 2005 to get a county-specific panel of 5-year intervals for the period from 1980 to 2019.

Panel (a) of Table 1 shows the following summary statistics: county-population weighted means, standard deviations, and minimum and maximum 5-year shelter prices for the sample period. The average median 5-year growth for house prices was 17.2% and for rent 16.6%. The growth rate of house prices was more pronounced for the upper part of the distribution with 17.6% for the 75th percentile and 14.9% for the 25th. For rent prices, these dynamics were non-linear. Rent prices, on average, rose for the top quartile by 15.0% and by 16.5% for the lower quartile. The variation across counties was very high with standard deviations ranging from 12% for median house prices to 9% for median rents.

Given our interest in the impact of immigrants with different educational attainment, we focus on newly arrived adult immigrants who are likely to have completed their education. To be consistent with Terry et al. (2023), we focus on non-European immigrants only. We define newly arrived adult immigrants as foreign-born people 25 years of age or older, who have immigrated to the US in the past 5 years and report the number of years they attended school. We construct the immigration variables using the reported number of years living in the US from IPUMS for 1980, 1990 and 2000. For 2010, 2015 and 2019, we use the 5-year sample of the American Community Survey. Given that the immigration variables from IPUMS are only available at the PUMA or county-group level, we follow Burchardi et al. (2019) and apply their transition matrices to map the immigration variables in our sample years to consistent historical 1990 counties. We also use the Census microdata from 1980–2019 and transition matrices to construct average years of education by destination county. The population weighted average number of new adult, non-European immigrants during the last 5 years is around one thousand, which increases the local population of a county by an average of 0.01 percent. The average educational attainment of new immigrants is 12 years of education, which corresponds to finishing high school.

To measure housing supply conditions at the county level, we use a definition of new housing supply based on Glaeser and Gyourko (2018), who define new housing supply as the number of building permits issued divided by the existing number of housing units at the beginning of the period. Our definition of new housing supply is the following:

$$S_{d,t} = \frac{\text{permits}_{d,t}}{\text{total units}_{d,t-5}}$$

where $\text{permits}_{d,t}$ is the sum of all building permits from the US Census Building Permit Survey issued in a given county between t-5 and t. Total $\text{units}_{d,t-5}$ is the total number of existing housing units in a county at t-5. The forth last row of Table 1 reports the average

number of permits issued within a 5-year period in a given county (2075), which implies a relative share of the total housing units.

The last two rows of Table 1 describe the control variables we use in our empirical specification. For US county population, we use the annual county-level population statistics from the Bureau of Economic Analysis (BEA). To construct the population growth excluding recent immigrant inflows, we subtract recent European and non-European immigration from the population growth between the current period and the beginning-of-period population. The other control variable is the county-level unemployment rate from the Bureau of Labour Statistics. Since the county-level unemployment rate is only available at the county level starting in 1990, we linearly interpolate a county-level unemployment rate using the commuting-zone unemployment rate in 1980 and the county-level unemployment rate in 1990.

4 Empirical Strategy

4.1 Identification Strategy

Studying the relationship between immigration and shelter prices presents a clear endogeneity problem. Immigrants tend to choose their destinations based on housing and rent affordability or on factors such as the state of the local economy that are strongly correlated with housing affordability. This would create a spurious correlation and bias our estimates upwards if we were to examine this relationship using ordinary least squares. Past studies have generally used the shift-share instrument to identify exogenous variation in immigration and estimate a causal relationship (e.g., Saiz 2007). However, more recent literature has cast doubt on whether this instrument can overcome the endogeneity problem (Jaeger et al., 2018). More recently, Burchardi et al. (2019) and Terry et al. (2023) have developed an instrument for immigration that is orthogonal to both country of origin and destination of settlement. The instrument leverages the ancestry composition of current residents in the US resulting from previous waves of immigration and a careful empirical approach to net out any factors related to the origin country or destination county that may be correlated to current economic conditions in the destination county.

We closely follow the methodology of Terry et al. (2023) to instrument for immigration in our analysis. The main differences in the construction of our instrument compared to Terry et al. (2023) are that we restrict our sample to only immigrants aged 25 and above and that we include data up to the year 2019, which gives us two additional sample periods. The remainder of this section outlines a brief summary of the construction of the instrument.

As in Terry et al. (2023), we focus exclusively on non-European immigration in the construction of the immigration shock instrument and in our main analysis. The construction of the instrument begins with the prediction of $A_{o,d,t}$, the current stock of

individuals who report ancestry from origin country o living in a destination county d in year t. Since ancestry could still plausibly be correlated with both immigration and housing prices, we begin by predicting current ancestry based on historical migration patterns and ensure that predicted ancestry is exogenous to both the country of origin and destination county. We predict ancestry using the following regression:

$$A_{o,d,t} = \delta_{o,r(d),t} + \delta_{c(o),d,t} + \rho X_{o,d} + \sum_{\tau=1880}^{t} a_{r(d),\tau} I_{o,-r(d),\tau} \frac{I_{Europe,d,\tau}}{I_{Europe,\tau}} + \omega_{o,d,t} \tag{1}$$

where $\delta_{o,r(d),t}$ and $\delta_{c(o),d,t}$ are country of origin–region and continent–US county fixed effects. $X_{o,d}$ is a set of country of origin and county-specific controls. In our case, $X_{o,d}$ only includes controls for geographical distance. The $I_{o,-r(d),\tau} \frac{I_{Europe,d,\tau}}{I_{Europe,\tau}}$ terms are sets of push-pull factors for each available census period leading up to year t, and $\omega_{o,d,t}$ is the error term. The push factor, $I_{o,-r(d),\tau}$, equals the observed immigration from country-of-origin o to all regions other than the census region that includes the destination county d in year τ. This captures historical factors that "pushed" individuals to immigrate from country o to the US in year τ but are uncorrelated with the destination county d. $\frac{I_{Europe,d,\tau}}{I_{Europe,\tau}}$, the pull factor, captures the share of total European immigrants (excluded from our immigrant sample) who immigrated to county d in year τ. This captures historical factors that "pulled" individuals from other countries to immigrate to county d in year τ but are uncorrelated with country-of-origin o. We compute the following sum to obtain our "predicted" ancestry:

$$\hat{A}_{o,d,t} = \sum_{\tau=1880}^{t} \hat{a}_{r(d),\tau} \left(I_{o,-r(d),\tau} \frac{I_{Europe,d,\tau}}{I_{Europe,\tau}} \right)^{\intercal} \tag{2}$$

where $\hat{a}_{r(d),\tau}$ are the coefficients from equation (1) and are estimated for each destination county region r(d) in each of the historical years τ. $\intercal$ indicates that each of these push-pull terms have been residualized with respect to the fixed effects and the controls $X_{o,d}$. That is, we regress the push-pull terms on the fixed effects $\delta_{o,r(d),t}$, $\delta_{c(o),d,t}$ and controls $X_{o,d}$ from equation (1) for each period t, calculate the residuals and multiply them with the $\hat{a}_{r(d),\tau}$ coefficients in equation (2). This residualization removes any factors specific to the origin continent or destination region and considers only predicted ancestry relative to other countries in the same continent or relative to other destination counties in the same census region. To build intuition, consider a shock specific to destination county d in 1975 (such as the development of a new industry in that county that attracts foreign talent) that simultaneously made that county attractive to all immigrants. Without the residualization of the push-pull factors, this shock could plausibly increase predicted ancestry from all countries of origin and at the same time impact long-run trends in housing prices, creating an endogeneity concern that the instrument would not be able to address.

Once we have predicted ancestry, we apply a shift-share approach following Card

(2001) to predict current levels of immigration from country o in destination d at time t. The first step is to run the following regression:

$$I_{o,d,t} = \delta_{o,r(d),t} + \delta_{c(o),d,t} + X_{o,d} + b_t[\hat{A}_{o,d,t-1}\tilde{I}_{o,-r(d),t}] + u_{o,d,t} \tag{3}$$

where observed immigration is a function of fixed effects $\delta_{o,r(d),t}$ and $\delta_{c(o),d,t}$, the control variable $X_{o,d}$, and observed immigration to all regions r outside of destination d ($\tilde{I}_{o,-r(d),t}$), scaled by relative European immigration $\frac{I_{Europe,r(d),\tau}}{I_{Europe-r(d),\tau}}$ and apportioned by predicted ancestry from country-of-origin o in destination d prior to the inflow of immigrants in $t-5$. Running this regression for each year in the sample gives us time-varying predicted coefficients $\hat{b}_t$ that measure the importance of predicted ancestry in explaining observed immigration inflows. In the second step, we compute the instrument for the level of immigrants in d by summing the ancestry predicted level of immigration across all countries of origin:

$$\hat{I}_{d,t} = \sum_o \hat{b}_t[\hat{A}_{o,d,t-1}\tilde{I}_{o,-r(d),t}] \tag{4}$$

In addition to instrumenting for the overall level of immigration, we also need to instrument for the average educational attainment of these immigrants. To do so, we predict the average educational attainment of immigrants by leveraging the fact that the educational attainment of immigrants varies across countries of origin. For example, if Indian immigrants have, on average, a higher level of education than Mexican immigrants, then a location that receives relative more immigrants from India compared to immigrants from Mexico should have a higher average level of education. To implement this idea, we disaggregate the baseline instrument in equation (4) by country of origin $\hat{I}_{d,t} = \sum_o \hat{b}_t[\hat{A}_{o,d,t-1}\tilde{I}_{o,-r(d),t}]$ for the top 25 countries of origin that send the most immigrants to the US over our entire sample period. In the first stage, we use these 25 instruments to predict the average years of education variables as follows:

$$\overline{educ}_{d,t}\frac{I_{d,t}}{N_{d,t-5}} = \delta_t + \sum_{o=1}^{25}\gamma_o\hat{I}_{o,d,t} \tag{5}$$

where the vector of coefficient estimates γ_o captures how important immigrants from each country-of-origin o are in explaining average years of education by destination county. If γ_o is positive and significant, then immigrants from country o are associated with counties that have a higher average level of education.

The last main identification concern relates to the endogenous responses in the regulatory environment to changes in house prices. In general, the number of building permits will depend on house price growth as builders are more likely to file for permits when prices grow more. To address this issue, we calculate the number of new building permits issued between 1980 and 1985 relative to the total housing units in 1980 in the destination county and keep this variable fixed over time. We suppose that the permits issued between 1980

and 1985 capture initial pre-determined regulatory conditions and that these regulatory conditions are persistent over time.

In sum, in this section we discussed identification issues related to our main variables of interest: the inflow of immigrants to a locality, their average years of education and the local regulatory supply conditions in the destination county. In the next section, we discuss the empirical framework and the results.

4.2 Baseline estimation

Our baseline estimation is based on the empirical model used by Saiz (2007) and takes the following form:

$$\Delta \log(r_{d,t}) = \beta_1 \frac{I_{d,t}}{M_{d,t-5}} + \beta_2 \overline{educ}_{d,t} \frac{I_{d,t}}{M_{d,t-5}} + \beta_3 S_{d,1980} \frac{I_{d,t}}{M_{d,t-5}} + \beta_4 S_{d,1980} + \beta_5 X_{d,t} + \delta_t + \delta_s + \epsilon_{d,t} \tag{6}$$

The dependent variable is the 5-year log difference in the rental or housing price variable of interest ($r_{d,t}$), which is a function of the share of new immigrants entering the county in the 5-year period ending at t scaled by the beginning-of-the-period $t-5$ county population ($\frac{I_{d,t}}{M_{d,t-5}}$), the demeaned average years of education of immigrants moving to county d in year t ($\overline{educ}_{d,t}$) and $S_{d,1980}$, the percentile of the counties with the highest/lowest issuance of building permits between 1980 and 1985 demeaned by the median issuance of building permits in that period. The highest/median/lowest issuance of building permits are assigned values of 1, 0 and -1, respectively.

Our education and regulatory supply variables are both interacted with ($\frac{I_{d,t}}{M_{d,t-5}}$) and are instrumented using the methodology described in the previous section. Additionally, we include controls for the non-interacted version of our housing regulatory supply conditions measure, $S_{d,1980}$, local population movements measured by the log difference in county-level population excluding the inflow of recent immigrants, and economic conditions summarized by the unemployment rate at the beginning of the period. Finally, we include time fixed effects δ_t to control for factors such as business cycle patterns that may impact housing prices across the US and geography fixed effects δ_s to control for factors that may impact housing supply at the region or state level. This regression is weighted by beginning-of-period county-level population.

In equation (6) we interpret β_1 as the increase in housing prices following a 1 percentage point increase in the population from new immigrants. Since we include the interaction terms, β_1 can be thought of as the shelter price impact of immigrants who have an average level of education entering a county with an average issuance of building permits. β_2 can be interpreted as the additional impact of the population increase if the average years of education of immigrants happens to be one year higher than the average immigrant entering the US between $t-5$ and t. Finally, β_3 can be interpreted as the additional

impact on shelter prices if the population increase takes place in the county with the greatest issuance of building permits compared to the county with the median issuance of permits. We expect that β_1 and β_2 will have positive signs as we expect that, all else being equal, an inflow of immigrants will increase shelter demand and have a positive impact on prices. We expect that this effect will be greater when immigrants have a greater level of education and likely a greater means of paying for houses and rent. Finally, we expect β_3 to have a negative sign as we expect that a county with a higher issuance of building permits will be better able to adjust to increased demand for housing.

5 Results

5.1 Does immigration affect shelter price growth?

We begin with a discussion of Table 2, which shows our baseline results with the log change in reported median housing and reported median contract rent prices, respectively, on the left-hand side. Running this regression accounting only for the number of immigrants entering the county, as in Column (1), we find that a 1 percentage point increase in the population due to the arrival of new immigrants is roughly associated with a 1.4 percent increase in housing prices and a 0.61 percent increase in rental prices. However, the full specification in Column (3) tells us that, once we account for the heterogeneity of immigrants in terms of their education level and in terms of the housing supply conditions in their destination counties, the point estimates greatly increase. A 1 percent increase in the population from new immigrants is associated with a 3.8 (2.1) percent increase in median house prices (rental prices) if immigrants have an average education level and move to the county with the median issuance of building permits. If all immigrants moving to county d were to increase their education level by one year, the impact on housing prices in county d would increase by 1.2 (0.8) percent. Similarly, if county d went from having an average issuance of building permits to having the highest issuance of building permits, the impact of immigration would be roughly cancelled out. These baseline results are robust to including region, state and time-state fixed effects. The first stages for the regressions in Columns 1–3 are shown in Appendix Table A1.

Next, we use the estimates in Column (3) to shed light on regional heterogeneity in the predicted effect on shelter price growth. We proceed by computing fitted values based on the observed inflow of immigrants, their location decision, and their educational composition and take the average on a county-by-county basis across all years in our sample. Figure 2 plots the results for housing prices and shows that regions in dark red experience immigration-induced house price growth of 3 to 10 percent over a period of 5 years. In contrast, regions in dark blue experience immigration-induced reductions in house price growth of 3 to 10 percent over a period of 5 years relative to a location that did not receive any immigration. The fall in house prices in these regions is a product

of 2 factors: (1) these locations issue a relative high number of permits, which dampens house price growth, and (2) immigrants in these locations tend to have a lower level of education. Conversely, locations with high house price growth tend to be cities that issue relative few permits and that receive mainly highly educated immigrants. To be specific, the county with the highest predicted house price growth is Hudson County, New Jersey, where the average education of immigrants is 1.1 years higher than the national average and regulatory supply is at the 10th percentile in terms of building permit issuance (counties at a lower percentile are the more restrictive ones where relatively few permits were issued). On the flip side, the county with the lowest predicted house price growth is San Benito County, California, where the average education of immigrants is 4.1 years lower than the national average and is at the 94th percentile in terms of building permit issuance. Compared to Figure 1, which plots the average immigration shock relative to the pre-existing population over the sample period, we find that the distribution of the estimated impact of immigration changes greatly when we account for heterogeneity of immigrants and differences in location choice.

These regional differences are consistent with different types of immigrants increasing (decreasing) relative demand for houses with higher-than-average price in a given locality. This could be because more educated immigrants are more likely to demand homes in good school districts or in low-crime areas, relative to high-density apartment buildings. The reduction in housing prices when immigrants with a relatively low level of education arrive could be a result of outmigration of current residents or a change in preferences of natives away from counties that disproportionately attract these immigrants, due to discrimination and perceived (or actual) consequences of immigrants in a locality – a finding consistent with Boustan (2007). Below we will investigate how migration patterns of current residents affect the results more closely.

5.2 Why is the impact on house price growth stronger than on rent prices?

The results in Table 2 show that house prices react more to immigration inflows than rent prices in all specifications. This finding is consistent with previous papers in the literature (Saiz, 2007). This observation carries over to the reaction of house prices and rent prices when we interact the demand shocks with the variables capturing education heterogeneity and supply heterogeneity. Based on Column (3) estimates, one year of additional education increases house prices by 1.4 percent while rent prices only increase by an additional 0.9 percent. Similarly, for a given demand shock, going from a location with the median level of initial regulatory supply to the locations with the most restrictive regulatory supply increases house prices by an additional 1.9 percent and rent prices by only 1.0 percent. Note that this result is unlikely to be driven by differences between immigrants and natives in terms of their preference to own a house instead of renting. If this were the case, we would have expected immigrants to have a stronger demand for renting, thus leading to a

higher response for rent prices than for housing prices.

One explanation for the lower price response of rents is that the supply for rental units is much more elastic than for houses. The house price information from the US Census captures the median value of owner-occupied housing units, which mainly covers single-family homes, while rental units are mainly multi-unit condominiums. If housing markets are not completely integrated, differences in regulatory supply for different types of housing units can explain the differential response of shelter prices to the demand shock of immigrants.

Next, we consider regulatory responses to immigrant inflows of both single-unit and multi-unit building construction. The number of new permits issued for single-unit buildings proxies the change in the supply of owner-occupied housing units, while the number of new permits issued for multi-unit buildings relates to supply for rental units. Table 3 shows the response of new permits issued relative to the pre-existing stock of housing units for the two different types of buildings. The results for single-family units (see Column (1)) show that issuance of new permits either decreases or does not significantly change when new immigrants arrive. In our preferred specification (Column (3)) the estimated coefficient suggests that for a 1 percent increase in the population, the share of new permits issued for single-unit homes relative to existing homes decreases by 0.13 percentage points. This negative effect is amplified in locations that issued a relatively high number of permits between 1980 and 1985, implying that supply becomes more restrictive in places where initial regulatory supply was high. In contrast, the issuance of new permits for multi-unit homes significantly increases when new immigrants arrive and also tends to increase more in locations where initial regulatory supply was high. In the median location, a 1 percent increase in the population increases the issuance of new permits for multi-unit homes relative to existing housing supply by 0.7 to 0.8 percentage points. Taken together, these results suggest that the difference in house price growth and rent price growth relates to compositional changes in the housing market. Housing markets that experience greater population inflows issue relatively less permits for single-unit housing, which drives up house prices. At the same time, these places tend to issue more multi-unit permits, which mitigates the demand effect and dampens the impact on rent prices.

One of the consequences of a segmented housing market may be changes in the ownership composition of homes. If it is more expensive to buy multi-unit homes and mainly new multi-unit homes are being built, then home ownership may decline. To investigate potential changes in home ownership rates, we regress the share of housing units that are owner-occupied over the total number of occupied housing units on our immigration variables and their interactions. The results in Panel (a) of Table 4 suggest a substantive decline in home ownership in locations where demand increases. The coefficient in our preferred specification (Column (3)) implies that a percentage point increase in the local population reduces home ownership by 6 percentage points. These effects are more pronounced in locations where immigrants are, on average, less educated and where

regulatory housing supply is more inelastic. These results suggest that when housing demand increases, the housing market expands by issuing relatively more permits for multi-unit buildings compared to single-unit buildings and, given that ownership is more concentrated for multi-unit homes, home ownership in the locality declines.

Another reason why home ownership declines is that in these locations houses become less affordable (e.g., house prices increase by more than incomes), which makes it hard for people to become first-time home owners. In Panel (b) of Table 4, we estimate the impact on housing affordability defined as the log ratio of house prices over average income per capita in the location. All columns of Table 4 suggest that house prices increase significantly more than incomes, leading to a reduction in housing affordability.[2] Given that people need a place to live, local governments reacted by issuing more permits for multi-unit houses, thereby easing the price pressure on rents.

5.3 Are the effects comparable across the shelter price distribution?

The impact of immigrants on shelter prices may be different for different quartiles of the shelter price distribution. If new immigrants experience greater difficulty obtaining mortgages, for example, because of shorter credit history relative to permanent residents, purchasing a more expensive home may be more difficult. This would result in lower demand for higher priced homes (Kartashova and Tomlin, 2017). A similar argument may apply to the rental market. To shed light on distributional effects, we replace the dependent variable in our baseline regression from equation (6). Instead of the median shelter price, we use the 25th and 75th quartiles of house and rent prices on the left-hand side. First, considering housing price, the results in Table 5 show that the estimated coefficients for the 25th and 75th percentiles are very similar to the baseline estimates in Table 2. When we perform a t-test, we find no evidence for a significant difference in the point estimates across the house price distribution.

Focusing on the results for rent prices, Table 6 shows that the estimated coefficients for the upper and lower quartiles for rental prices are largely consistent with the median results in terms of signs and significance. However, impacts are consistently more muted for the lower quartile compared to the median and upper quartile, suggesting that immigrants have stronger demand effects for higher priced rental units than for lower priced rentals. One explanation is that these higher priced rentals are closer substitutes to owning a house and if single-unit houses are not built, the demand for higher priced units in multi-unit buildings increases.

Taken together, the evidence presented in this section implies important housing market changes in localities where housing demand increases. These places face significant

[2]Table A4 in the appendix shows a reduction in the affordability of renting as rent prices increased faster than incomes.

increases in house prices with lower price increases for rents. The reason is that housing supply reacts by providing more multi-unit houses that are more likely to be rented out, leading to a concentration of home ownership.

5.4 Do natives respond to inflows of immigrants?

It has been argued (e.g., Mussa et al. 2017; Sanchis-Guarner 2023) that the movement of non-immigrants in response to an inflow of immigrants is critical to determining the impact of immigrants on shelter prices. An outflow of natives as a result of an inflow of immigrants could dampen or reverse the impact on housing prices. We run an additional regression to examine the impact of immigration on movements in the pre-existing population. To measure this, we use the log difference between population excluding recent immigrants and total beginning-of-period population.

$$\frac{\Delta M_{d,t}}{M_{d,t-5}} = \beta_1 \frac{I_{d,t}}{M_{d,t-5}} + \beta_2 \overline{educ}_{d,t} \frac{I_{d,t}}{M_{d,t-5}} + \beta_3 S_{d,1980} \frac{I_{d,t}}{M_{d,t-5}} + \beta_4 S_{d,1980} + \beta_5 X_{d,t} + \delta_t + \delta_s + \epsilon_{d,t} \quad (7)$$

This is the variable we used as a control in previous regressions. These results are shown in Table 7. The point estimates suggest that an inflow of immigrants is associated with an outflow of the pre-existing population. This result is robust to the different specifications used in our baseline scenarios.

Additionally, to address concerns about the endogeneity of our non-immigrant population growth control, we show in our appendix that our baseline results are robust to not including the control at all (Appendix Table A2) and are robust to instrumenting non-immigrant population growth using the Bartik instrument (Appendix Table A3).

6 How much does immigration explain in overall shelter price growth?

Equipped with our estimates from Table 2, we can calculate how much of the overall change in shelter prices is explained by the size of the immigration shock, the education of immigrants and regulatory housing supply effects at the aggregate level. Based on the coefficients from Table 2 and the observed inflow of immigrants as well as their education and the characteristics of their destination locations, we obtain predicted effects on house and rent prices for each county in each year. We then aggregate the county-level effects by taking a population-weighted sum and report the total predicted shelter price growth in Table 8. Column (1) reports the observed change in shelter prices in the data over our sample period. Column (2) reports predicted shelter prices from the immigration-only model shown in Column (1) of Tables 2 (a) and (b). The contribution to house price growth from immigration was relatively small, particularly in the immigration-only model. On average over all years, the increase in house price in the sample was 17% while the predicted increase in house prices by immigration was only 1.3%. For rents, the predicted

increase in prices by immigration was 0.6%, much lower than the observed average increase of 16.5%.

Accounting for the heterogeneity of immigrants and their location choices increases the predicted impact of immigration on shelter prices. For house prices, the average predicted effect across the years in our sample is 2.1% for house prices and 1.4% for rent prices (see Column (6) in the respective Panels (a) and (b)). Table 8 also breaks down the total predicted effect into the contributions coming from the size of the immigration shock (Column 3), the education of immigrants (Column 4) and the supply conditions in the destination counties (Column 5). The first observation is that the contribution from the immigration shock triples compared to the baseline because the estimated coefficient for the size of the immigration shock increases when we account for heterogeneity. This is partly due to the definition of the average years of education of immigrants, which we demean relative to the national average in each year. This normalization implies that the aggregate contribution of education is reflected in the coefficient of the immigration shock. The demeaned education heterogeneity variable only helps to explain differences in house price growth across counties and has an aggregate contribution that is close to zero. With regards to supply heterogeneity, our results imply a negative contribution to aggregate impacts shelter prices. This finding suggests that the location decision of immigrants mitigates shelter price growth as immigrants tend to settle in locations that issued relatively more building permits in the past. As Table 8 shows, these locations experienced lower shelter price growth, which can explain why immigrants settled in these locations.

One of the reasons why the overall contribution of immigrants on US shelter prices is modest even when we account for heterogeneity is that the size of shock, i.e., the increase in population caused by new immigrants, is small. As shown in the rightmost column of Table 8, the shock from new immigrants aged 25 and above over the 5-year periods in the sample corresponds roughly to a 1 percent increase in the population on average, which is small compared to overall population movements within the US. The average change in the population of a county over a 5-year cycle amounts to 1.1 percent of the initial population.

6.1 Accounting for population movements within the United States

To extend this exercise, we now consider within-US population changes and assess whether these movements combined with our regression estimates can explain shelter price growth. To do so, we examine 3 county-level changes in the population: (1) natives (which we define as any person born in the US), (2) non-recent immigrants (which we define as anyone who was not born in the US and did not immigrate in the past 5 years) and (3) recent immigrants as defined above but now including European immigrants. To calculate their impact on shelter prices, we assume that adding one additional native or non-recent

immigrant to the local population has the same marginal impact on shelter prices as recent immigrants.

Since the public census data does not provide education- and nativity-specific information on county-to-county migration patterns, we rely on net migration flows defined as 10-year population differences for each of these groups. To take into account the heterogeneity effects, we use the 10-year county-level differences in average years of education as a measure for changes in the average years of education for each of these groups. More precisely, we calculate the predicated change in shelter prices of location d at time t as

$$\Delta \log(r_{d,t}) == \hat{\beta}_1 \frac{\Delta N_{d,t}}{M_{d,t-10}} + \hat{\beta}_2 \Delta \overline{educ}_{d,t} \frac{\Delta N_{d,t}}{M_{d,t-10}} + \beta_3 S_{d,t-10} \frac{\Delta N_{d,t}}{M_{d,t-10}} \tag{8}$$

where $\Delta N_{d,t}$ is the change in the native population, $(\Delta \overline{educ}_{d,t})$ is the change in the average years of education for the native population and $\hat{\beta}_1$, $\hat{\beta}_2$ and $\hat{\beta}_3$ are the estimated coefficients from the regression model in equation (6). We then calculate the analogous equation for recent and non-recent immigrants (which we now define as individuals who immigrated to the US more than 10 years before year t). Adding these effects, we obtain an estimate of the total change in housing prices accounted for by population changes.

The results in Table 9 show that 10-year average population movements can account for approximately 59.1 percent of the change in median housing prices and 47.0 percent of the change in median rent prices. Breaking our estimates down into the contributions coming from each of the three groups, we find that recent immigrants, non-recent immigrants and natives account for 25.8 percent, 27.2 percent and 47 percent, respectively, of the total effect on housing prices caused by population movements. Results are similar when looking at the breakdown of these contributions on the rent price effect. Appendix Table A5 shows the decomposition of these total effects into the population change, education change and housing supply effect.

Although the effect of population change is largest for natives since they are by far the largest of the three groups, the offsetting effect from housing supply is very large for natives when compared to recent and non-recent immigrants. This reveals a difference in location choice between those born in the US and those born outside the US. Natives tend to move to locations with higher building permit issuance, which gives them a disproportionately small effect on median shelter prices compared to their share of the population. Although the shelter price effect is negative for all groups (meaning that all migrants are relatively more likely to move to places that issue relatively more building permits), the offsetting effect is highest for natives. These stark differences imply that the impact of within-country population changes does not only depend on the number of people who move but also on their location choice as even relatively small population changes accounted for by immigrants had a disproportionately high impact on shelter price inflation compared to that of natives. This evidence is consistent with natives being more likely to move to rural areas while immigrants are more likely to move to urban areas.

7 Conclusion

We make use of rich and granular US microdata to estimate the causal impact of immigration on county-level housing and rent prices. We differ from the traditional literature by using county-level census data and by following the identification approach of Terry et al. (2023). We also account for the education level of immigrants (to proxy their income level) as well as the building permit issuance of their destination county (to proxy housing supply conditions). In addition to median prices, we also consider the impact of immigration on changes in the 25th and 75th percentile shelter prices. Finally, we extend our baseline exercise to also consider non-immigrant population changes and their impact on shelter prices.

We find that, before accounting for the heterogeneity of immigrants and their location choices, our county-level analysis results in higher point estimates of the impact of immigration on rents and house prices compared to traditional literature, which considers impacts at the MSA level (e.g., Saiz 2007). We find that a higher level of education among immigrants contributes positively to this effect while looser housing supply conditions contribute negatively. Accounting for these two factors roughly doubles the point estimate of the average effect of an immigration shock on median housing and rent prices. Doing so also changes the distribution of the predicted impact across US counties, leading to larger estimates in cities with constrained housing supply or that tend to receive highly educated immigrants. Once we aggregate the predicted impacts to the national level, our results suggest that the distribution of immigrants by education level did not contribute strongly to total shelter price growth. However, the tendency for immigrants to settle in locations with relatively higher issuances of building permits contributed negatively to aggregate shelter price growth. The effects that we estimate are relatively consistent for different quartiles of housing prices. However, for rental prices, we find that immigrants have a relatively muted impact on lower the lower quartile and a relatively stronger effect on the higher quartile.

We extend our baseline exercise by using our estimated coefficients to quantify the impact of all US population movements including changes in the population of natives and non-recent immigrants. Decomposing this change, we find that the population movements of immigrants (natives) have a disproportionately large (small) impact on housing prices. This result is mainly driven by the location choices of immigrants and natives. Although both groups tend to move to areas that issue relatively more building permits, this effect is higher for natives than for immigrants (both recent and non-recent), leading to a larger offsetting effect of housing supply on their shelter price impact.

This analysis highlights the importance of accounting for the income level of incoming immigrants and the housing supply conditions in their destination locations when assessing their impact on shelter prices. As our analysis showed, estimates of immigrants' inflationary impact on housing prices change greatly depending on whether these factors are taken

into account. We also found in the extension of our baseline exercise that even small population movements can have a disproportionately large impact on shelter price inflation if people move to areas where housing supply tends to be constrained. The richness of US data allowed us to quantify these effects. However, the lessons that can be drawn from this exercise are equally relevant to other countries that experience large inflows of new immigrants. Next steps in our analysis include looking at the extent to which the movement of natives in response to an inflow of immigrants influences our results.

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9 Tables

Table 1: Summary Statistics

	1990		2019	
	mean	sd	mean	sd
NHGIS Median House Price Growth	0.23	0.11	0.18	0.11
NHGIS Median Rent Growth	0.26	0.06	0.14	0.06
NHGIS 75th Percentile House Price Growth	0.21	0.13	0.16	0.09
NHGIS 25th Percentile House Price Growth	0.22	0.14	0.19	0.13
NHGIS 75th Percentile Rent Growth	0.24	0.09	0.15	0.06
NHGIS 25th Percentile Rent Growth	0.28	0.09	0.14	0.07
Over 25 Non-EU Immigration Per Capita	0.01	0.01	0.01	0.01
Over 25 Immigration Per Capita	0.01	0.01	0.01	0.01
Over 25 Immigration (1000s)	22.62	68.18	12.95	23.36
Average Education of Immigrants	11.55	2.35	12.83	1.53
BPS New Permits Issued Rel. Housing Stock	0.07	0.06	0.04	0.03
Homeownership Rate	64.28	11.59	51.61	3.82
Population Growth (excluding immigrants)	0.02	0.08	0.01	0.04
Unemployment Rate	5.74	2.22	3.98	1.14

Notes: Population-weighted means and standard deviations are reported for 3,079 counties.

Table 2: The Effect of Immigration on NHGIS Median Shelter Price Growth

(a) Median House Price Growth

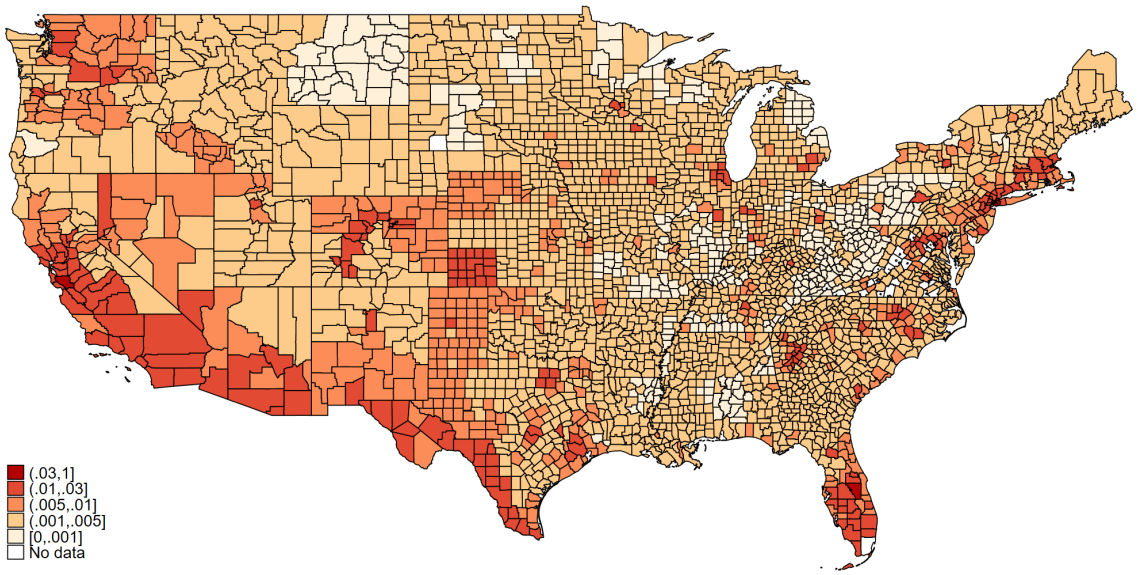
Dependent Variable	Log Difference in Prices				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	1.407***	2.920***	3.486***	3.026***	1.959***
	[0.203]	[0.642]	[0.862]	[1.042]	[0.551]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		1.161**	1.377***	1.647***	0.678*
		[0.564]	[0.487]	[0.575]	[0.404]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-1.896*	-4.633***	-2.031***
			[1.037]	[1.052]	[0.616]
$S_{d,1980}$	-0.019***	-0.025***	-0.009	-0.005	-0.002
	[0.004]	[0.005]	[0.008]	[0.007]	[0.003]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21490	21490	21490	21490	21483
IV F-Stat	43	33	19	21	23

(b) Median Rent Price Growth

Dependent Variable	Log Difference in Prices				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	0.611***	1.765***	2.041***	1.477***	1.208***
	[0.148]	[0.327]	[0.446]	[0.490]	[0.339]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.813***	0.854***	0.886***	0.616***
		[0.287]	[0.252]	[0.253]	[0.188]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-1.018*	-2.118***	-1.233***
			[0.561]	[0.533]	[0.354]
$S_{d,1980}$	-0.013***	-0.018***	-0.010**	-0.013***	-0.010***
	[0.002]	[0.003]	[0.004]	[0.004]	[0.002]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21487	21487	21487	21487	21480
IV F-Stat	43	33	19	21	23

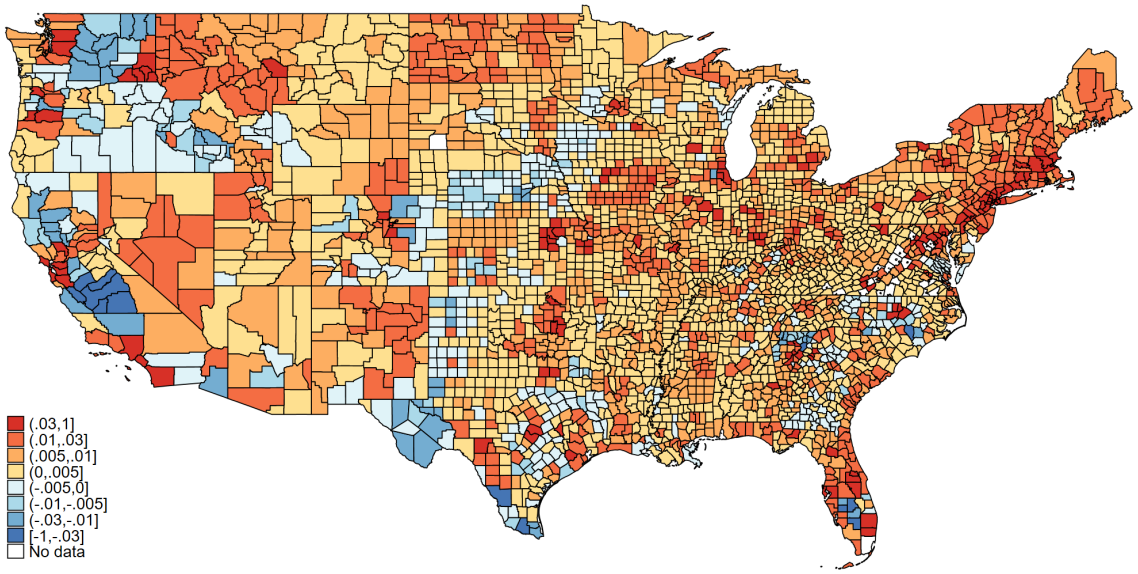
Notes: The dependent variables are the log difference in NHGIS median house prices for owner-occupied units and rent prices for renter-occupied units, in Panels (a) and (b), respectively. County-level controls are the unemployment rate, population growth between $t-5$ and t excluding recent immigration, and $S\_d, 1980$. Observations are weighted by county-level population at $t-5$. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Figure 1: Distribution of Average Immigration Per Capita - Sample Average



Notes: Distribution of average immigrants aged 25+ between $t-5$ and t relative to total population at $t-5$.

Figure 2: Distribution of House Price Impact - Model with Heterogeneity



Notes: Distribution of the average across years of the fitted values obtained from Column (3) of Table 2 for housing prices.

Table 3: The Effect of Immigration on Building Permit Issuance

(a) Building Permits for Single-Family Homes

Dependent Variable	Single-Family Building Permits Relative to Existing Housing Supply				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	-0.472***	-0.263**	-0.134**	0.027	-0.136
	[0.063]	[0.119]	[0.065]	[0.091]	[0.100]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		-0.037	-0.055	-0.079	-0.148
		[0.094]	[0.089]	[0.089]	[0.165]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-0.531***	-0.488**	-0.448*
			[0.179]	[0.190]	[0.252]
$S_{d,1980}$	0.012***	0.011***	0.015***	0.015***	0.016***
	[0.001]	[0.001]	[0.002]	[0.002]	[0.002]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21306	21306	21306	21306	21299
IV F-Stat	43	33	19	21	23

(b) Building Permits for Multi-Unit Construction

Dependent Variable	Multi-Unit Building Permits Relative to Existing Housing Supply				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	0.625***	0.755***	0.711***	0.833***	0.918***
	[0.054]	[0.098]	[0.085]	[0.107]	[0.110]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.014	0.015	-0.020	-0.078
		[0.098]	[0.084]	[0.084]	[0.087]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			0.173	0.303*	0.379**
			[0.163]	[0.184]	[0.164]
$S_{d,1980}$	0.003***	0.002**	0.001	0.002	0.002**
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21306	21306	21306	21306	21299
IV F-Stat	43	33	19	21	23

Notes: The dependent variables are the log difference in building permits issued between $t-5$ and t relative to the existing housing stock at $t-5$. Panel (a) shows results for single-family homes and Panel (b) shows results for multi-unit buildings. Building permits are from the US Census Building Permit Survey and denote the total number of units approved. The existing housing stock is the total number of housing units obtained from the NHGIS. County-level controls are the unemployment rate, population growth between $t-5$ and t excluding recent immigration, and $S\_d, 1980$. Observations are weighted by county-level population at t-5. 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: The Effect of Immigration on Affordability and Homeownership

(a) Homeownership Rate

Dependent Variable	Owner-Occupied Units Rel. Total Occupied Units				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	-6.911***	-6.725***	-8.210***	-8.509***	-9.004***
	[0.355]	[1.170]	[1.492]	[1.571]	[1.777]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		1.170*	1.375***	1.468***	1.434**
		[0.682]	[0.420]	[0.444]	[0.702]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			6.103***	6.483***	6.787***
			[1.935]	[1.562]	[1.619]
$S_{d,1980}$	0.001	0.002	-0.049***	-0.060***	-0.062***
	[0.007]	[0.010]	[0.011]	[0.010]	[0.009]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21495	21495	21495	21495	21488
IV F-Stat	43	33	19	21	23

(b) Housing Affordability

Dependent Variable	Difference in Housing Prices Relative to Income				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	2.048***	2.382***	2.720***	2.451***	1.822***
	[0.210]	[0.501]	[0.607]	[0.706]	[0.423]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.235	0.472	0.436	-0.233
		[0.410]	[0.421]	[0.455]	[0.500]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-0.977	-3.034***	-1.692***
			[0.854]	[0.696]	[0.574]
$S_{d,1980}$	-0.013***	-0.015***	-0.007	-0.001	0.002
	[0.004]	[0.004]	[0.007]	[0.006]	[0.004]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21488	21488	21488	21488	21481
IV F-Stat	43	33	19	21	23

Notes: The dependent variables in Panels (a) and (b) are the log difference in NHGIS median house prices relative to personal income per capita and the NHGIS number of owner-occupied housing units divided by the total number of occupied units. County-level controls are the unemployment rate, population growth between $t-5$ and t excluding recent immigration, and $S\_d, 1980$. Observations are weighted by county-level population at $t-5$. 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: The Effect of Immigration on House Price Growth Across the Distribution

(a) 25th Percentile House Price Growth

Dependent Variable	Log Difference in 25th Percentile House Prices				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	1.839***	2.818***	3.421***	2.681***	1.909***
	[0.183]	[0.626]	[0.846]	[0.960]	[0.574]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.938*	1.170**	1.581***	0.416
		[0.555]	[0.457]	[0.556]	[0.304]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-2.022*	-4.675***	-1.733***
			[1.045]	[1.081]	[0.626]
$S_{d,1980}$	-0.012***	-0.015***	0.002	0.010	0.010***
	[0.004]	[0.005]	[0.007]	[0.007]	[0.004]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21487	21487	21487	21487	21480
IV F-Stat	43	33	19	21	23

(b) 75th Percentile House Price Growth

Dependent Variable	Log Difference in 75th Percentile House Price				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	0.731**	3.050***	3.649***	3.465***	2.383***
	[0.323]	[0.662]	[0.892]	[1.093]	[0.741]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		1.192**	1.290***	1.497***	0.726*
		[0.554]	[0.430]	[0.516]	[0.391]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-2.198**	-3.648***	-1.587**
			[0.979]	[1.037]	[0.630]
$S_{d,1980}$	-0.018***	-0.028***	-0.010	-0.007	-0.002
	[0.004]	[0.006]	[0.007]	[0.007]	[0.004]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21490	21490	21490	21490	21483
IV F-Stat	43	33	19	21	23

Notes: The dependent variables are the log difference in NHGIS 25th and 75th percentile house prices for owner-occupied units in Panels (a) and (b), respectively. County-level controls are the unemployment rate, population growth between $t-5$ and t excluding recent immigration, and $S\_d, 1980$. Observations are weighted by county-level population at $t-5$. 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 Rent Price Growth Across the Distribution

(a) 25th Percentile Rent Price Growth

Dependent Variable	Log Difference in 25th Percentile Rent Prices				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	0.193	1.161***	1.428***	1.371***	1.000***
	[0.169]	[0.199]	[0.243]	[0.305]	[0.203]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.549**	0.596***	0.640***	0.342**
		[0.226]	[0.185]	[0.221]	[0.143]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-0.972***	-1.669***	-0.504*
			[0.338]	[0.442]	[0.300]
$S_{d,1980}$	-0.008***	-0.012***	-0.004	-0.007**	-0.007***
	[0.002]	[0.002]	[0.003]	[0.003]	[0.002]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21475	21475	21475	21475	21468
IV F-Stat	43	33	19	21	23

(b) 75th Percentile Rent Price Growth

Dependent Variable	Log Difference in 75th Percentile Rent Price				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	0.908***	2.208***	2.504***	1.800***	1.570***
	[0.268]	[0.325]	[0.481]	[0.491]	[0.384]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.935**	0.886***	0.900**	0.592**
		[0.369]	[0.311]	[0.358]	[0.273]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-1.227**	-1.855***	-0.803**
			[0.603]	[0.518]	[0.358]
$S_{d,1980}$	-0.006*	-0.011***	-0.000	-0.002	-0.000
	[0.003]	[0.003]	[0.004]	[0.003]	[0.002]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21469	21469	21469	21469	21462
IV F-Stat	43	33	19	21	23

Notes: The dependent variables are the log difference in NHGIS 25th and 75th percentile rent prices for renter-occupied units, in Panels (a) and (b), respectively. County-level controls are the unemployment rate, population growth between $t-5$ and t excluding recent immigration, and $S\_d, 1980$. Observations are weighted by county-level population at $t-5$. 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: The Effect of Immigration on the Pre-existing Population

Dependent Variable	Population Growth (Excluding Recent Immigrants)				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	-3.000***	-1.701***	-1.748***	-1.651***	-2.203***
	[0.183]	[0.349]	[0.397]	[0.314]	[0.401]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		-0.249	-0.454	-0.538*	-0.058
		[0.293]	[0.322]	[0.305]	[0.374]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-0.063	-0.485	-1.429***
			[0.475]	[0.482]	[0.479]
$S_{d,1980}$	0.064***	0.058***	0.058***	0.048***	0.055***
	[0.004]	[0.003]	[0.005]	[0.004]	[0.004]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21495	21495	21495	21495	21488
IV F-Stat	43	40	19	22	25

Notes: The dependent variable is the log difference between population in t excluding immigrants who arrived in the last five years and total population in t-5. County-level controls are the unemployment rate and $S\_d, 1980$. Observations are weighted by county-level population at $t-5$. 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: Predicted Five-Year Changes in Shelter Prices

(a) Median House Prices

Year	Observed Δ Prices	Imm-Only Model	Model with Heterogeneity				25+ Imm. Rel. Pop
			Imm	Educ	Supply	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1990	.2307	.014	.0346	-.0001	-.0072	.0273	.0105
1995	.1963	.02	.0495	-.0005	-.0126	.0364	.015
2000	.156	.0164	.0407	-.0006	-.0045	.0356	.0123
2005	.2832	.0201	.0498	-.0007	-.0086	.0405	.015
2010	.2124	.0083	.0207	-.0001	-.0041	.0165	.0062
2015	-.0504	.0131	.0324	0	-.0059	.0265	.0098
2019	.1782	.0105	.026	-.0001	-.0073	.0186	.0079

(b) Median Rent Prices

Year	Observed Δ Prices	Imm-Only Model	Model with Heterogeneity				25+ Imm. Rel. Pop
			Imm	Educ	Supply	Total	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1990	.2638	.0061	.0202	0	-.0039	.0163	.0105
1995	.18	.0087	.029	-.0003	-.0067	.0219	.015
2000	.1509	.0071	.0239	-.0004	-.0024	.0211	.0123
2005	.1673	.0087	.0292	-.0005	-.0046	.0241	.015
2010	.1415	.0036	.0121	-.0001	-.0022	.0098	.0062
2015	.1084	.0057	.019	0	-.0031	.0158	.0098
2019	.1443	.0046	.0152	0	-.0039	.0113	.0079

Notes: The above results are the population-weighted sum of the fitted values from Table 2 across all counties. Results from the immigration-only model are derived from the fitted values of Table 2, Column 1, for house prices and rent prices, respectively. Results for the model with heterogeneity are derived from the fitted values of Table 2, Column 3, for house prices and rent prices, respectively. Note that in computing the total effect of recent immigrants, we include European immigrants who were not included in the sample for our regressions.

Table 9: Effect of All Population Movements on Shelter Prices

(a) Median House Prices

	Recent Immigrants	Non-recent Immigrants	Natives	Total Predicted Change	Total Observed Change
Pct Change in Prices	.058	.088	.129	.275	.326
Pct of Observed Change	.177	.269	.396	.842	.
Pct of Predicted Change	.211	.319	.47	.	.

(b) Median Rent Prices

	Recent Immigrants	Non-recent Immigrants	Natives	Total Predicted Change	Total Observed Change
Pct Change in Prices	.035	.053	.079	.167	.298
Pct of Observed Change	.116	.178	.267	.561	.
Pct of Predicted Change	.208	.317	.476	.	.

Notes: The above results are the population-weighted sum of the fitted values from Table 2 across all counties. We apply these coefficients to the population changes in recent immigrants aged 25+, non-recent immigrants aged 25+ and natives aged 25+ as well as the changes in education levels and housing supply conditions in destination counties.

10 Appendix

Table A1: First Stage for Table 2 (a) and (b), Columns 1, 2, 3

Dependent variable	$\frac{I_{d,t}}{M_{d,t-5}}$	$\frac{I_{d,t}}{M_{d,t-5}}$	$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$	$\frac{I_{d,t}}{M_{d,t-5}}$	$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$	$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$
$\hat{I}\_d,t$	0.000***	0.160*	0.084	0.165*	0.130	-0.062
	[0.000]	[0.084]	[0.096]	[0.086]	[0.100]	[0.040]
$\hat{I}\_1,d,t$		-0.161*	-0.085	-0.165*	-0.130	0.061
		[0.084]	[0.096]	[0.086]	[0.101]	[0.040]
$\hat{I}\_2,d,t$		-0.119	-0.093	-0.125	-0.144	0.071*
		[0.078]	[0.096]	[0.080]	[0.101]	[0.039]
$\hat{I}\_3,d,t$		-0.162*	-0.072	-0.166*	-0.104	0.057
		[0.091]	[0.092]	[0.091]	[0.095]	[0.042]
$\hat{I}\_4,d,t$		-0.114	-0.019	-0.121	-0.084	0.086**
		[0.097]	[0.094]	[0.100]	[0.102]	[0.042]
$\hat{I}\_5,d,t$		-0.134*	-0.036	-0.140*	-0.088	0.057
		[0.081]	[0.080]	[0.084]	[0.088]	[0.036]
$\hat{I}\_6,d,t$		-0.211**	0.012	-0.215**	-0.025	0.014
		[0.090]	[0.109]	[0.091]	[0.111]	[0.046]
$\hat{I}\_7,d,t$		-0.040	-0.281*	-0.021	-0.112	0.076
		[0.110]	[0.144]	[0.109]	[0.150]	[0.065]
$\hat{I}\_8,d,t$		-0.162**	-0.122	-0.170**	-0.194	0.082**
		[0.079]	[0.158]	[0.083]	[0.162]	[0.041]
$\hat{I}\_9,d,t$		-0.186**	-0.149	-0.191**	-0.199*	0.041
		[0.084]	[0.098]	[0.086]	[0.103]	[0.040]
$\hat{I}\_10,d,t$		-0.344***	0.039	-0.368***	-0.185	-0.003
		[0.108]	[0.166]	[0.140]	[0.224]	[0.082]
$\hat{I}\_11,d,t$		-0.160*	-0.063	-0.164*	-0.096	0.053
		[0.086]	[0.098]	[0.087]	[0.101]	[0.040]
$\hat{I}\_12,d,t$		-0.206*	0.227	-0.218*	0.114	-0.132
		[0.125]	[0.179]	[0.128]	[0.195]	[0.080]
$\hat{I}\_13,d,t$		-0.157*	-0.111	-0.158*	-0.118	0.059
		[0.089]	[0.110]	[0.088]	[0.107]	[0.041]
$\hat{I}\_14,d,t$		-0.258	-0.389**	-0.257	-0.384**	0.087
		[0.174]	[0.193]	[0.170]	[0.188]	[0.086]
$\hat{I}\_15,d,t$		-0.207	0.194	-0.263	-0.327	-0.012
		[0.264]	[0.290]	[0.285]	[0.443]	[0.156]
$\hat{I}\_16,d,t$		-0.151	0.419*	-0.168	0.258	0.160*
		[0.145]	[0.242]	[0.152]	[0.223]	[0.082]
$\hat{I}\_17,d,t$		0.128	-0.851	0.127	-0.867*	0.463***
		[0.288]	[0.545]	[0.284]	[0.500]	[0.179]
$\hat{I}\_18,d,t$		-0.255	-1.483*	-0.179	-0.773	-0.717***
		[0.434]	[0.799]	[0.437]	[0.751]	[0.276]
$\hat{I}\_19,d,t$		0.004	1.116	0.033	1.383*	0.722***
		[0.310]	[0.743]	[0.313]	[0.742]	[0.211]
$\hat{I}\_20,d,t$		-0.056	-1.217**	-0.101	-1.636***	0.052
		[0.368]	[0.575]	[0.387]	[0.610]	[0.261]
$\hat{I}\_21,d,t$		1.243**	-1.307	1.221**	-1.509*	0.911**
		[0.579]	[0.851]	[0.584]	[0.804]	[0.435]
$\hat{I}\_22,d,t$		-0.727***	0.360	-0.709***	0.533**	-0.275*
		[0.240]	[0.225]	[0.236]	[0.233]	[0.167]
$\hat{I}\_23,d,t$		-1.323**	-1.349	-1.274**	-0.894	0.124
		[0.653]	[1.284]	[0.618]	[1.307]	[0.488]
$\hat{I}\_24,d,t$		-1.569***	1.189**	-1.651***	0.421	0.214
		[0.354]	[0.484]	[0.430]	[0.550]	[0.226]
$\hat{I}\_25,d,t$		-0.390	-1.784***	-0.350	-1.404**	-0.250
		[0.370]	[0.661]	[0.386]	[0.558]	[0.286]
$S\_d,1980\hat{I}\_d,t$				-0.000	-0.002**	0.002***
				[0.000]	[0.001]	[0.000]
County Controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year	Year
Observations	21490	21490	21490	21490	21490	21490

Notes: We report 20 of the 25 instruments used for $\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$. The list of countries used for individual instruments (in order from largest to smallest): Mexico, China, India, Philippines, Puerto Rico, Vietnam, El Salvador, Dominican Republic, Cuba, Guatemala, Canada, Colombia, Japan, Jamaica, Honduras, Haiti, Brazil, Peru, Ecuador, Iran (Islamic Republic of), Pakistan, Venezuela (Bolivarian Republic of), Nigeria, Nicaragua, Thailand.

Table A2: The Effect of Immigration on NHGIS Median Shelter Price Growth, No Population Control

(a) Median House Price Growth

Dependent Variable	Log Difference in Prices				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	0.523***	2.303***	2.822***	2.453***	1.518***
	[0.156]	[0.535]	[0.708]	[0.916]	[0.522]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		1.108*	1.248**	1.475***	0.670
		[0.613]	[0.503]	[0.572]	[0.437]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-1.972**	-4.840***	-2.336***
			[0.995]	[1.028]	[0.621]
$S_{d,1980}$	-0.000	-0.003	0.015*	0.013*	0.009**
	[0.004]	[0.005]	[0.008]	[0.007]	[0.004]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21490	21490	21490	21490	21483
IV F-Stat	43	40	19	22	25

(b) Median Rent Price Growth

Dependent Variable	Log Difference in Prices				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	0.018	1.334***	1.583***	1.058**	0.866***
	[0.125]	[0.259]	[0.347]	[0.415]	[0.318]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.743**	0.738***	0.745***	0.607***
		[0.316]	[0.261]	[0.260]	[0.211]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-1.038**	-2.228***	-1.453***
			[0.510]	[0.521]	[0.348]
$S_{d,1980}$	-0.001	-0.003	0.006	-0.001	-0.001
	[0.002]	[0.002]	[0.004]	[0.004]	[0.002]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21487	21487	21487	21487	21480
IV F-Stat	43	40	19	22	25

Notes: The dependent variables are the log difference in NHGIS median house prices for owner-occupied units and rent prices for renter-occupied units, in Panels (a) and (b), respectively. County-level controls are the unemployment rate and $S\_d, 1980$. Observations are weighted by county-level population at $t-5$. 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 NHGIS Median Shelter Price Growth, Instrumenting Population Growth with the Bartik Shock

(a) Median House Price Growth

Dependent Variable	Log Difference in Prices				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	-7.771	2.232***	2.475***	2.460**	1.346
	[12.881]	[0.671]	[0.894]	[1.116]	[0.850]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		1.056*	1.117**	1.504***	0.671
		[0.620]	[0.534]	[0.579]	[0.448]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-2.095**	-4.764***	-2.441***
			[0.934]	[0.982]	[0.636]
$S_{d,1980}$	0.178	-0.002	0.026**	0.010	0.013
	[0.271]	[0.012]	[0.011]	[0.012]	[0.012]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21330	21330	21330	21330	21330
IV F-Stat	0	45	35	38	11

(b) Median Rent Price Growth

Dependent Variable	Log Difference in Prices				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	-3.825	1.811***	1.947***	1.614***	1.295**
	[6.369]	[0.420]	[0.533]	[0.611]	[0.569]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.800***	0.820***	0.932***	0.615***
		[0.281]	[0.255]	[0.263]	[0.184]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-1.087**	-2.047***	-1.164***
			[0.529]	[0.535]	[0.413]
$S_{d,1980}$	0.082	-0.021***	-0.006	-0.018**	-0.012
	[0.133]	[0.007]	[0.007]	[0.007]	[0.008]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21328	21328	21328	21328	21328
IV F-Stat	0	45	35	38	11

Notes: The dependent variables are the log difference in NHGIS median house prices for owner-occupied units and rent prices for renter-occupied units, in Panels (a) and (b), respectively. County-level controls are the unemployment rate, population growth between $t-5$ and t excluding recent immigration, and $S\_d, 1980$. Observations are weighted by county-level population at $t-5$. Population change between t-1 and t is instrumented by the Bartik shock. Robust standard errors, clustered at the county level, are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively.

Table A4: The Effect of Immigration on Rent Affordability

Dependent Variable	Difference in Rent Prices Relative to Income				
	(1)	(2)	(3)	(4)	(5)
$\frac{I_{d,t}}{M_{d,t-5}}$	2.048***	2.382***	2.720***	2.451***	1.822***
	[0.210]	[0.501]	[0.607]	[0.706]	[0.423]
$\overline{educ}_{d,t}\frac{I_{d,t}}{M_{d,t-5}}$		0.235	0.472	0.436	-0.233
		[0.410]	[0.421]	[0.455]	[0.500]
$S_{d,1980}\frac{I_{d,t}}{M_{d,t-5}}$			-0.977	-3.034***	-1.692***
			[0.854]	[0.696]	[0.574]
$S_{d,1980}$	-0.013***	-0.015***	-0.007	-0.001	0.002
	[0.004]	[0.004]	[0.007]	[0.006]	[0.004]
County Controls	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year	Year	Year	Year State
Geography FE	N/A	N/A	N/A	State	Year State
Observations	21488	21488	21488	21488	21481
IV F-Stat	43	33	19	21	23

Notes: The dependent variable is the log difference in NHGIS median rent prices relative to personal income per capita. County-level controls are the unemployment rate, population growth between $t-5$ and t excluding recent immigration, and $S\_d, 1980$. Observations are weighted by county-level population at $t-5$. 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: Effect of All Population Movements on Shelter Prices - Breakdown by Population Type

(a) Median House Prices

	Recent Immigrants	Non-recent Immigrants	Natives
Pct Change from Population	.075	.106	.166
Pct Change from Education	-.001	.009	.024
Pct Change from Housing Supply	-.017	-.028	-.061
Pct Change - Total	.058	.088	.129

(b) Median Rent Prices

	Recent Immigrants	Non-recent Immigrants	Natives
Pct Change from Population	.044	.062	.097
Pct Change from Education	-.001	.006	.015
Pct Change from Housing Supply	-.009	-.015	-.033
Pct Change - Total	.035	.053	.079

Notes: The above results show the contributions of the population change (immigration), education and housing supply to the total impact on housing prices accounted for by population movements. We apply the Table 2, Column 3, coefficients to the population changes in recent immigrants aged 25+, non-recent immigrants aged 25+ and natives aged 25+ as well as the changes in education levels and housing supply conditions in destination counties.