WORK IN PROGRESS: DO NOT CITE OR QUOTE WITHOUT PERMISSION
COMMENTS WELCOME

Immigration and the Neighborhood

Abstract

What impact does immigration have on neighborhood dynamics? While there is evidence of a strong positive effect of immigration on *average* housing values at the metropolitan area level, we do not know much about its *relative* impact at the neighborhood level. Immigration raises the demand for housing in the metropolitan areas where immigrants concentrate, but immigrant enclaves may be perceived by some natives as relatively less attractive neighborhoods. Within metropolitan areas, we find evidence that housing prices have grown *relatively* more slowly in areas of dense immigrant settlement. We propose three nonexclusive explanations for this fact: changes in quality, reverse causality (immigrants are attracted by areas where housing prices are declining in relative terms), or the hypothesis that natives find immigrant enclaves relatively less attractive. We find that the three explanations are quantitatively important. We deploy a "social diffusion" model based on a gravity equation that predicts the number of new immigrants in a neighborhood using past densities of the foreign-born in the surrounding neighborhoods. We use the predictions of this "diffusion" model to instrument for the actual number of new immigrants in a census tract. Subject to the validity of our instruments, the evidence is consistent with a causal interpretation of a modest impact from growing immigration density to relatively slower housing price appreciation, but this impact is smaller than what OLS results would suggest. Further results indicate that these results may be more driven by the fact that immigrants are of low socio-economic status than by nationality *per se*. Given the growing demographic importance of immigration in the US, the results do not bode well for the expeditious disappearance of the new "immigrant ghetto."

Keywords: Immigration, housing prices

JEL: J61, R23, R31

Albert Saiz
The Wharton School
University of Pennsylvania
saiz@wharton.upenn.edu
215-898-28 59

Susan Wachter
The Wharton School
University of Pennsylvania
wachter@wharton.upenn.edu

What impact does immigration have on neighborhood dynamics? Is immigration pushing up the demand for living in immigrant neighborhoods? Both questions, one relating to tastes for diversity and the other to housing markets, can be answered by estimating the impact of immigration on local housing prices.

The existing literature on the impact of immigration has concentrated on its labor market implications. The labor market has also come to occupy a central role in the research on the interactions between natives and the foreign born in Economics. Many studies (Scheve & Slaughter, 2002; Mayda, 2003) use a labor market factor-proportions approach to predict native *attitudes* towards immigrants and immigration policies (Goldin, 1994). These studies generally find that native workers who are more likely to be in direct competition with immigrants in the labor market tend to have negative views on immigration. But a good deal of variance in attitudes towards immigrants remains to be explained. Some authors (O'Rourke, 2004, Dustman and Preston, 2000) have suggested that a number of individuals exhibit negative attitudes towards immigration for factors other than the labor market. Indeed, if natives exhibit negative preferences towards interacting with immigrants, we will be able to capture this effect through residential choices and housing market dynamics. After all, immigration is not so much defined by the consumption of foreign labor, which can also be achieved by international trade, international outsourcing, off-shoring, or telecommunications (the internet and calling centers). Immigration is truly defined by the physical presence of immigrants in the host country.

While some natives in cities that do not receive immigration flows may oppose foreign trade, international outsourcing, or immigration in the rest of the host country, natives *who do live* in immigrant areas may engage in further considerations: are there native preferences towards living and socially interacting with people of similar culture, language, ethnic, or socio-economic background? From the point of view of the social scientist trying to understand the impact of immigration, as suggested by the hedonic model (Rosen, 1974), native preferences towards living with immigrants can be gauged from the local housing price impact of immigration.

In previous papers (Saiz, 2003a, 2003b) one of us has showed that immigration has a positive impact on rental and house price growth in the metropolitan areas that receive immigration. This is a quite simple natural consequence of a local upward sloping supply for housing and population growth in metropolitan areas where immigrants concentrate. However, it is not clear a priori whether, within a metropolitan area, prices in the neighborhoods where immigrants settle should grow at a faster rate. In fact, if residential preferences by natives or immigrants are not based on foreign-born or socioeconomic status, conventional spatial equilibrium models would suggest a similar impact in all neighborhoods so that the prospective marginal mover into any of them is indifferent. However, as we discuss later, preferences for residential segregation may change the potentially neutral impact of immigration on housing values within a city. If immigrants have preferences towards living with other immigrants, (but natives are indifferent) this should not necessarily imply a price growth differential as long as there are marginal natives still living in immigrant areas, but may translate into faster appreciation in areas where there are no (mobile) natives remaining. If natives have preferences for living with natives, or if immigrants are of a different socio-economic status and there are preferences for socio-economic segregation (*à la* Benabou, 1996, Bayer, Ferreira, McMillan, 2004), then immigration may actually be associated with a relative negative impact on housing prices. In the paper we do find evidence that, controlling for the evolution of prices at the metropolitan area level, increases in the share of immigrant population in a neighborhood are associated with lower price appreciation.

This empirical fact is, indeed, consistent with the idea that natives are on average willing to pay a premium for living in predominantly native areas, but this may be due to reasons other than foreign-born status *per se*. It is also consistent with reverse causality: immigrants may be attracted by areas that are becoming relatively less expensive. Therefore, we use a "social diffusion" model (akin to an epidemiological "contagion" model) to generate predictions on the pattern of new immigrant settlement. We use these predictions as instruments for the actual changes in immigrant density in a neighborhood. The instrumental variables (IV) results eliminate the possibility that our estimates are the results of immigrants mechanically "chasing" locations that are becoming less expensive. However, it is still possible that the neighborhoods that are generally close to previous areas of immigrant settlement have characteristics that are becoming relatively less valuable to natives. We try to deal with this issue by using an IV estimation procedure that is conceptually similar to a differences-in-differences approach. We effectively compare the evolution of prices in neighborhoods that are *all* close to areas of previous immigrant settlement, but for which expected new immigration flows are different. The evidence is consistent with a statistically significant, albeit economically small, causal impact of immigration. For instance, in an area where the share of the foreign-born changes from 0 to 30 percent of the population, housing values can be expected to be about 5% smaller.

We also find that the relative negative association between immigrant density and price growth at the neighborhood level is concentrated in areas where most residents self-classified as non-Hispanic white prior to immigration "shocks." In areas dense with minorities, the association between immigration and slower price growth is much weaker or non-existent. Similarly, in areas where housing values were relatively low initially, the association between immigration and slower price appreciation is more tenuous. Therefore, immigration might actually be associated with "revitalization" in poor neighborhoods or neighborhoods with a high existing concentration of minorities.

The results are important for understanding the social impact of immigration on receiving areas and, unfortunately, seem to bode badly for the integration of immigrants. Indeed, recent research finds that immigrant segregation in the US has been on the rise during the last 3 decades. The new "immigrant ghetto" may be mostly due to the tendency of immigrants to spatially cluster, but the paper shows that at least some natives may also have preferences for avoiding immigrant areas. Why? Our final results shed some light on this issue. In our sample of immigrant-dense cities, the correlation (at the census tract level) between the foreign-born share and the share of adults with less than a high-school diploma is 0.49. The correlation between decennial *changes* in the share foreign-born and decennial *changes* in the share of high-school dropouts is a remarkable 0.35. The fact that neighborhoods with growing relative concentrations of immigrants are becoming relatively less educated (an endogenous outcome to immigration inflows), explains a good deal of the association between immigration and housing prices, since areas with less educated population are being increasingly perceived as relatively less attractive places to live (Glaeser and Saiz, 2004). Thus, *immigrant neighborhoods* are not becoming relatively less attractive because they are populated by the foreign-born *per se,* but mostly because they are more likely to contain population with low socio-economic status.

The results are also important, in general, for the study of housing markets. Immigration has accounted for 1/3 of population growth in the US during the last decade. Population projections tell us that without immigration, population growth between 1997 and 2050 would be halved (National Research Council, 1997).

From a general housing market perspective, it is important to stress that immigration does generally push up housing prices and rents in the metropolitan areas where immigrants concentrate. The results in this paper do not necessarily imply that housing prices decrease in the neighborhoods where immigrants concentrate, but that appreciation in those neighborhoods is relatively *slower*.

The rest of the paper is organized as follows. In the next section (section 1) we propose a conceptual framework to understand the interaction between immigrants, natives and residential choice. In section 2 discuss the data that we use in the empirical implementation. In section 3, we show the general association between changes in the immigrant share and the evolution of average housing prices in a neighborhood, which we proxy by the 2000 census tract definition. Section 4 develops a social diffusion model to account for changes in the share of immigrants in each census tract. In metropolitan areas that are receiving considerable inflows of immigrants, these tend to cluster in areas that are in close proximity to areas of previous immigrant concentration. Since immigration inflows may be endogenous to the evolution of housing prices or to changes in neighborhood amenities that drive land values, we use the predicted "immigrant attraction" from our social diffusion model to instrument for the change in the share of immigrants. In section 5 we present further results relating to where and why immigration matters for the evolution of housing values. Section 6 concludes.

1. The economics of immigration and neighborhood residential choice

We propose a simple framework to better understand and measure the importance of preferences for immigration on residential choice and immigrant segregation. We assume a city with an exogenously given native population of measure one. Among natives, income has a uniform distribution so that a measure I of inhabitants has income equal or below $\chi + I$, where χ is the minimum income (maybe a government transfer) and $I \in [0,1]$. Immigrants tend to cluster in specific city neighborhoods. In the 1980s, 95% of the change in the number of immigrants (75% in the 1990s) was concentrated in a number of Census tracts that corresponded to about 25% of the 1980 metropolitan US population. We thus assume that there are four neighborhoods and that immigrants will tend to concentrate in one of them (for example, neighborhood 4). The "immigrant" neighborhood may possess ethnic-specific amenities, or immigrants may just coordinate to live there. Natives and immigrants are fully mobile within the city. We are assuming that immigrants have a, perhaps mild, preference to live with other immigrants. Nevertheless, it is important to point out that if natives have preferences for living with other natives, then the final equilibrium in the housing market will imply clustering of immigrants *even if immigrants are indifferent as to neighborhood ethnic composition.*

The utility function of native i is Cobb-Douglas in consumption (C_i) and the share of natives in the neighborhood where i resides (ϕ_i):

(1) $$U_i = C_i^{\varphi} \cdot \phi_i^{(1-\varphi)}.$$

Each person consumes an identical unit of housing. Housing supply is assumed to be produced with unit elasticity, and rents in neighborhood K (R_K) have the simple functional form:

(2) $$R_K = \beta \cdot POP_K,$$

Where POP_K is the total population in neighborhood K. Consumption depends on income and rents so that $C_i = \chi + I - R_i$, where R_i is the rent in the location chosen by individual i. In this simple model all houses are of the same quality and house prices are directly proportional to rents, since they capitalize their present discounted value:

$$\text{Price}_K = \frac{R_K}{Discount\ Rate}.$$

Without immigration, all the equilibria in the residential market imply that the population is spread throughout each of the neighborhoods (population is ¼ in each neighborhood). If population (and thus rents) were lower in one of the neighborhoods, everyone would like to move in there. There are multiple all-native equilibria with different income mixes by neighborhood. With immigration, the equilibrium in the housing markets implies that the poorest natives will live in the immigrant neighborhood, since there is an income effect on the demand for segregation (see proof 1 is Appendix 2). The rest of the (wealthier) population will be evenly distributed in the 3 other neighborhoods. In a "mixing" equilibrium there is a marginal native with income $\underline{I}$ who is indifferent between living in the immigrant neighborhood and the rest of the city:

$$(3) \qquad \left(\chi + \underline{I} - \beta \cdot [N_I + \underline{I}]\right)^{\varphi} \cdot \left(\frac{\underline{I}}{N_I + \underline{I}}\right)^{1-\varphi} = \left(\chi + \underline{I} - \beta \cdot \left[\frac{1-\underline{I}}{3}\right]\right)^{\varphi},$$

N_I is the number of immigrants. Since all immigrants cluster in neighborhood 4 we use $\phi = \left(\frac{\underline{I}}{N_I + \underline{I}}\right)$. Under some parameters and with major immigration inflows, there may not be an equilibrium with a marginal native (i.e. the model may "tip" toward total segregation). However, the income effect typically helps to achieve some mixing: as the immigrant population in the "immigrant neighborhood" increases, the number of natives decreases but the marginal native is poorer, and thus has a lower ability to pay for segregation.[1] We think this to be a quite realistic feature of the model. Since low-income individuals do not have the financial resources to respond for their tastes for segregation by moving to "native" neighborhoods, they may actually display stronger preferences for immigration limits or voice stronger opposition (in the Hirschman, 1970 sense) to immigration through their political choices, or in opinion surveys and daily behavior. Equation (3) implicitly defines the number of natives in neighborhood 4 ($\underline{I}$) as a function of the number of immigrants (for some values of the parameters and the immigration inflows). If we take the derivative of the equation with respect to N_I, after some manipulation we obtain:

[1] Note that, with native preferences for segregation, the only possible stable equilibria are those with all immigrants clustered in the immigrant neighborhood (for reasonable immigration levels). See Appendix 1 for a proof.

(4) $$\frac{\partial \underline{I}}{\partial N_I} = \frac{-\beta \cdot \phi^{\frac{1-\varphi}{\varphi}} \cdot \underline{I} - C_{NAT} \cdot \frac{1-\varphi}{\varphi} \cdot \phi}{(1+\beta/3) \cdot \underline{I} - (1-\beta) \cdot \phi^{\frac{1-\varphi}{\varphi}} \cdot \underline{I} - (1-\phi) \cdot \left(\frac{1-\varphi}{\varphi}\right) \cdot C_{NAT}},$$

Where $C_{NAT} = \left(\chi + \underline{I} - \beta \cdot \left[\frac{1-\underline{I}}{3}\right]\right)$ is the initial consumption by the marginal native in the native neighborhoods. This expression is generally negative for equilibria with some ethnic mixing. To see an example of that, assume that the initial level of immigration is zero (and thus $\phi = 1$) to obtain:

(5) $$\left.\frac{\partial \underline{I}}{\partial N_I}\right|_{\phi=1} = \frac{-\beta \cdot \underline{I} - C_{NAT} \cdot \frac{1-\varphi}{\varphi}}{\frac{4}{3} \cdot \beta \cdot \underline{I}}$$

Regardless of the initial level of ϕ, if natives are indifferent about the ethnic composition of their neighborhoods ($\varphi = 1$), and without massive levels of immigration (this is with $N_I \leq \frac{1}{3}$) we have that (proof 2):

(6) $$\left.\frac{\partial \underline{I}}{\partial N_I}\right|_{\varphi=1} = -\frac{3}{4}$$

Since the population in each of the 3 native neighborhoods is $POP_j = \left(\frac{1-\underline{I}}{3}\right)$, and population in the immigrant neighborhood is $POP_4 = N_I + \underline{I}$ we would then have that:

(7) $$\left.\frac{\partial POP_j}{\partial N_I}\right|_{\varphi=1} = \left.\frac{\partial POP_4}{\partial N_I}\right|_{\varphi=1} = \frac{1}{4}$$

And therefore:

(8) $$\left.\frac{\partial R_j}{\partial N_I}\right|_{\varphi=1} = \left.\frac{\partial R_4}{\partial N_I}\right|_{\varphi=1} = \frac{\beta}{4}$$

Thus, *even if immigrants exhibit a preference for clustering together in one neighborhood*, prices will increase in all neighborhoods equally as long as there are mobile marginal natives in the immigrant quarters, and natives are indifferent about the ethnic composition of the neighborhood. It is thus important to stress that in the model, within a city, and with no preferences for segregation, we should not expect any special correlation between immigration settlement and prices. In fact, immigration is pushing up housing values in all neighborhoods.

With $\varphi < 1$ (native preferences for homogeneity), and a modest initial number of immigrants, it is easy to show that housing price growth needs to be *slower* in the immigrant areas: $\left.\frac{\partial R_j}{\partial N_I}\right|_{\phi=1,\varphi<1} > \left.\frac{\partial R_4}{\partial N_I}\right|_{\phi=1,\varphi<1}$. Thus, with native preferences for segregation there is a negative relationship between the immigrant share and housing value growth. With a very high distaste for diversity among natives, price growth in immigrant areas may even be negative despite the fact that the average city rent growth is positive.

In Figure 1, we present the results of simulations of the model, where we assume the parameters to be $\beta = 1$, $\varphi = 1$, and $\chi = 0.5$. With these parameters, rents (and thus prices) are growing in both the immigrant and non-immigrant neighborhoods. However the rate of growth is faster in the non-immigrant neighborhoods.

It is interesting to note that, once there are no natives remaining in the immigrant neighborhood,[2] further immigration inflows into the area involve growing prices in the immigrant ghetto and no price inflation in the rest of the city. Also note that if natives actually exhibit a preference for diversity ($\varphi > 1$), prices (and population) will go up in the immigrant neighborhood: in this case some natives would actually move into the immigrant neighborhood. Thus, *immigration will push housing values in a neighborhood only if there are no marginal natives remaining in a neighborhood, or when natives have preferences for diversity*.

Moreover, *immigration needn't generally be associated with faster price growth at the neighborhood level, and will be associated with relative falling values if natives have preferences for segregation*. In that case immigration will be associated with "native" flight of relatively high income individuals: income in the neighborhood is clearly endogenous to immigration, and will decrease with increasing immigrant shares. Through an income effect, low-income individuals will have an incentive to remain in the immigrant neighborhoods due to the compensating differential of lower housing prices.

[2] Absolute segregation may be very difficult, since there are natives who are not mobile, who are not marginal (for instance they value that location very highly), or native children of immigrants.

This implies that, if one wanted to use changes in housing values as a “money metric” for tastes in ethnic homogeneity, the parameters obtained correspond to the relatively low income individuals who are in that margin.

In all cases, immigration will push average metropolitan housing prices up. Even with tastes for segregation, prices may increase in immigrant neighborhoods (this depends on the parameter of the model and on immigration levels), but just not as fast as in the rest of the metropolitan area.

2. Data and its methodological implications

To check on the statistical association between immigrant inflows and changes in neighborhood housing values, we use decennial data for the metropolitan areas of the United States at the Census tract level. A Census tract is a small Census-defined geographic level, which, on average, encompasses a population of about 4,000 inhabitants in the 1990 and 2000 Censuses. The version of the data that we use is provided by Geolytics Inc. Census tract geographic definitions change decennially. However, our data are processed so that we keep the geographic tract definitions constant over the years 1980, 1990, and 2000. These Census tract and Metropolitan Statistical Area boundaries correspond to the 1999 definition. The US Census defines tracts as areas with relatively homogeneous population. Thus, Census tracts can be interpreted as a geographical measure of neighborhoods and have been used in this sense by many previous researchers (Cutler, Glaser, and Vigdor, 1999).

Several variables concerning the socioeconomic characteristics of the neighborhood are available and will be used: housing stock characteristics (age, number of detached housing units, number of rooms, presence of kitchen facilities, plumbing, and others), income, population, employment, education, age structure, ethnic composition, number of foreign born individuals, distributions of marital and family status, data on housing prices, ownership rates, vacancy rates, latitude and longitude, state, metropolitan area, county, minor civil division, and school district. We are also able match the census tract data to geographic data from the United States Geological Survey (USGS) on land use by tract in 1992.

In most of the empirical analysis of the paper, we will concentrate on cities that are a magnet for immigrants. Due to data availability we focus on the last two decades (1980, 1990, and 2000). In areas with scant international migration inflows, the location of immigrants and its impact may be very idiosyncratic and it is not studied. We therefore select metropolitan areas and years for which the decennial change in the number of the foreign born amounted to or more than 5% of the initial MSA population (the population in the previous Census), or an average of 0.5% of the initial population annually.[3] In the 2000 Census, for example, this encompassed some 67 metropolitan areas, which received 76.5% of all metropolitan immigration inflows (whereas the other 264 metro areas only accounted for 23.5% of new immigrants). Overall we have 34,835 tract observations in 122 MSA-year groups.

Several limitations of the data are worth mentioning. We would have liked to have more elaboration on the characteristics of immigrants, rather than a general variable on the number of the foreign-born. The Census micro-data (IPUMS) can be used to cross-tabulate foreign-born status with other characteristics (education, income, ethnicity, English proficiency) but, unfortunately, the data do not allow for the identification of the exact neighborhood where the individuals are located. Thus, the paper tries to identify the average treatment effect of immigration (ATE) on the neighborhoods where immigrants locate. For 1990 and 2000, however, we have been able to create immigration counts by nationality using published census tracts cross-walks.

Also, we do not know if the foreign-born are new immigrants, or have stayed in the US for a long period. We will use the change in the share of the foreign-born in a neighborhood as our independent variable. On the one hand, this may overestimate the perceived "foreignness" (this is, the perception of the person as an immigrant by natives and other immigrants) of individuals who have resided in the United States for very long periods. On the other hand, it may actually underestimate the perceived "foreignness" (as

[3] The results are not sensitive to that threshold. We have performed regressions in which we censor the sample to MSA and decades with immigration amounting to more than 2.5% of the initial population and the main qualitative results do not change. It is not clear whether small concentrations of immigrants in areas where immigration is not salient constitute "treatments" of interest if one wants to learn about the impact of the foreign born within areas *which do experience major immigration inflows*. Moreover, our "gravity pull" model does not make much sense in areas that have received relatively small immigration inflows.

defined earlier) of young members of immigrant families who are born in the United States.

Despite the limitations, the wealth of data will be extremely useful in identifying the average impact of the foreign-born on the dynamics of neighborhoods in immigrant cities.

3. The econometrics of immigration and neighborhood dynamics

Basic results

In this section, we present the results of the initial empirical analysis. Following the discussion in section 1, we are interested in knowing whether changes in the immigrant share are related to changes in housing prices. To do so, we follow the evolution of average housing values in the census tracts in "high immigration" metropolitan areas in the 80s and 90s as defined in the data section.

In Table 1, we start by regressing the inter-census (10-year) *change* in the log of the average house value in a neighborhood on the change in the share of the foreign-born in that Census tract. Using *changes* in housing prices and the share of the foreign-born in a neighborhood (a Census tract) helps to control for time-invariant omitted variables related to neighborhood quality, the relative valuation of which stays relatively constant across decades, and which may be correlated with immigration and housing values. The model that we estimate takes the form:

(9) $$\Delta \ln P_{i,M,T} = \alpha_{M,T} + \lambda \cdot \Delta(1-\phi_{i,M,T}) + \Delta Z_{i,M,T} \cdot \mathrm{A} + X_{i,M,T-10} \cdot \mathrm{B} + \xi_{i,M,T}$$

Subscripts *i, M,* and *T* are for neighborhood (Census tract), MSA, and year, respectively. P is the average house price in the neighborhood, the α's are a group of MSA-by-year fixed effects, Z is a vector of average housing stock traits, and X is a vector of initial socio-economic characteristics of the neighborhood. The regressions are weighted using the initial number of owner-occupied housing units in the neighborhood as weights.[4]

The first column in Table 1 includes, besides the main variable of interest ($\Delta(1-\phi_{i,M,T})$, the change in the share of the foreign-born), fixed effects for each MSA-by-year combination. Thus we concentrate on the effects of immigration *within* a metropolitan

[4] We use the initial number of renter households as weights in the regressions where the dependent variable is rents.

area and year.[5] The results are quite remarkable. A change of one percentage point in the share of immigrants in a neighborhood is associated with a relative decrease of roughly 0.42 log points in the neighborhood average housing price.

In column 2 we control for contemporaneous changes in the observable characteristics of the housing stock in the census tract. The variables that we use are specified in the data descriptive statistics table (Appendix Table 1). Obviously, housing prices will be a function of the physical attributes of the housing units in a neighborhood. While changes in observable housing characteristics may be endogenous to immigration, (for instance the quality of housing desired by immigrants may be lower) we want to focus on the impact of immigration on *quality-adjusted* housing values. In column 2, we do not only control for changes in housing characteristics, but also for the initial housing characteristics and other lagged socio-economic neighborhood variables in levels.[6] We do not believe in a model where lagged level variables have an *infinitely* durable impact on growth levels, but the valuation of place specific characteristics has been changing in the last part of the 20th century, and some of these initial variables are good predictors of *subsequent* housing price growth (Glaeser, Kolko, and Saiz, 2002, Glaser and Saiz, 2004). The initial level of the socio-economic variables should capture these evolving trends in the valuation of *preexisting* neighborhood traits. The coefficient of the change in the foreign born is reduced by about 43% using these controls. The main drivers of the difference between columns 1 and 2 are the changes in the observable quality of housing. Nevertheless, most of the association remains after controls are introduced. In column 3, we add two indicators of the environmental quality of the neighborhood: the share of area covered by water and the share of area in the tract devoted to industrial or commercial uses in 1992. The latter variable is somewhat endogenous to the evolution of land values in a tract in a residential use (lower land values in a residential use foster shifting to alternative uses) so we may underestimate the impact of immigration, but may also capture pre-existing patterns of industrial location. Results do not change much.

---

[5] As the results in Saiz (2003a, 2003b) and the model in section 2 suggest, allowing the variation *between* cities does show that prices in the metropolitan areas where immigrants cluster tend to grow faster.

[6] We obviously do not control for changes in socio-economic characteristics of the neighborhood, since these are endogenous to immigration. In other words, immigration clearly has an impact on housing values because the attributes of the individuals who move into the neighborhoods (the new immigrants) are different. We will think of these impacts as the relevant *treatment effect* of immigration. Later, we will discuss through which channels the treatment effect of immigration on local prices may work.

It is well known that housing values tend to mean-regress (Case and Shiller, 1995; Rosenthal, 2004). Likewise, we know that immigrants tend to locate in areas with initially low housing values. We therefore include in column 4 the initial log of housing values to allow for mean-reversion. More generally, this variable may capture the general evolution of prices in neighborhoods of different initial housing quality (which might, for instance, be affected by widening income inequality). While we find evidence of strong mean-reversion over the period that we examine, this fact does not affect substantially our main estimate.

Are the results just driven by differential trends in the neighborhoods where immigrants settle? For instance, immigrants may find more attractive, affordable, or available those areas in which housing prices had been declining in previous decades. In this case, previous trends of relative decline may account for both the changes in the immigration share and home value dynamics. To control for that, column 5 includes on the right-hand-side home value growth in the previous decade (and column 6 also controls for the change in the log of income in the previous decade). In fact, the results of the main variable of interest do not change much after the inclusion of these trends.

Is the impact of changes in the share foreign-born nonlinear? Classical "tipping" models (*a la* Schelling, 1978) suggest bigger impacts when minority concentrations are bigger. Conversely, if relatively minor immigration inflows forecast bigger inflows in the future, most of the impact may be concentrated in the initial stages of the process of immigrant settlement. In our data, higher order polynomials on the change in foreign-born density are never economically significant. This can be appreciated graphically in Figure 2. The figure displays a scatter plot where the change in the share of the foreign-born appears on the horizontal axis and the change in the log of housing values on the vertical axis. Both variables are partialed out of the other controls in Table 1, and the line displays the prediction from an OLS regression. These decennial data, however, may not be the most suitable to analyze *how* and *how fast* transitions to different steady states occur.

In Table 2, we extend our findings in several directions. Many of the neighborhoods where new immigrants settle were already quite distinctively "immigrant-dense." One could argue that, on average, established foreign-born residents may be better at choosing those neighborhoods that will become more affordable in the future. New immigrants may just be following the previously settled foreign-born into these neighborhoods. To focus on the changes in prices in initially “native” neighborhoods that become “immigrant” neighborhoods, we restrict our sample to those tracts with initial immigrant densities below the MSA median (Table 2, column 1). The negative association between immigrants and prices does not seem to be associated with general trends in the “port of entry” neighborhoods.

The regression in Table 2, column 2 uses the log of median house value, rather than average house price. We do have median home values by Census tract for 1990 and 2000 only, so we restrict our attention to the 1990s. Are our baseline results driven by the upper or lower tails of the “within-tract” housing value distribution? Not really, since the results using median values are remarkably close to the previous results with average home prices.

In the last column of Table 2, we include our measure of immigrant density in the initial year. Again, we want to control for general trends in amenities and housing values in the areas where immigrants tended to settle in the past. Controlling for this variable does not change the coefficient of interest.

In unreported specifications we also conducted separate regressions for each of the available decades (80s, and 90s). The relative association of the change in the foreign-born and housing price inflation was negative in both decades.

The results do show a clear negative contemporaneous correlation between changes in housing prices and the growth in immigrant density. As we will examine in more depth below, this may mean that immigrants are attracted to areas in which prices *grow* less slowly (as opposed to areas with low price *levels*), or that there are omitted variables that are correlated with both international migration and house values. However, part of the negative association *may* be causal. As discussed in the model, there may be tastes for socio-economic homogeneity among natives that account for the results. As an alternative causal interpretation of the results, one could think of a housing ‘filtering’ story, where the housing quality desired by immigrants is lower than the existing quality. In this story, immigrants (or their landlords) do not make substantial investments in the housing units and the price of these units goes down, without any negative *capitalization* in land values.

We do include controls for changes in quality in our regressions, but some quality attributes may remain unobservable to us. We may argue, nevertheless, that quality is rather unlikely to explain the results, since it would imply a physical depreciation of immigrant-occupied homes substantially bigger than 25% in a decade (land values are typically high in these areas). However, this is an issue that is worthwhile exploring. To do so, we use data from the American Housing Survey. The 2001 and 2003 issues of the survey do include information about the foreign-born status of the different household members in the sample. The data also contain detailed information on housing quality and investments in renovation, maintenance, alterations, and repairs at the household level. The model that we use to examine whether housing quality and investment are reduced when immigrants move into a housing unit is the following:

(10) $$Q_{h,T} = \beta_h + \beta \cdot FB_{h,T} + W_{h,T} \cdot \Psi + \zeta_{h,T}$$

In this empirical model *h, T* are subscripts for the housing unit and year respectively, Q signifies an indicator of housing quality or, alternatively, housing investment, β_h is a housing unit fixed effect, *FB* is an indicator that takes value one if any of the household members is foreign-born[7] and zero otherwise, *W* is a vector of other control variables, and ζ is an i.i.d. perturbation. Since we have two time observations, this fixed effects model is identified from changes in the immigrant status of the homeowner. Changes in this variable are bound to imply a recent move into the housing unit. It is well known that recent movers tend to spend more on renovations initially, regardless of their nativity status. Therefore, in order to avoid the changes in the foreign-born variable to capture the general impact of recent movers, one of the variables that we control for is a dummy for recent movers. This variable always takes value one in 2003. In 2001 it takes value 1 if the household is the same as in 2003 and 0 if a different household moved into the housing unit in 2003. Thus, the first differences of this variable serve as an indicator for recent movers. The results in Table 3 are remarkably consistent. In no case is a change towards immigrant ownership of a housing unit associated with lower quality. Since quality is a *stock* variable and may evolve very slowly, (we only have two observations, two years apart) the dependent variable used in the last column is the total expenditure on

[7] We obtain similar results if we use the foreign-born status of the person reference instead.

maintenance and renovation. This is a *flow* or *control* variable that is under direct control of the household. Again, the evidence does not support the view that immigrant homeowners may depreciate faster their housing assets by investing less in maintenance and renovation.

4. A gravity model of immigrant residential choice

From our previous discussion, we do not believe that changes in physical housing quality account for all of the association between growth in immigration density and housing price growth. The main problem with the interpretation of the results above is that immigration inflows may be endogenous to the contemporaneous evolution of housing prices between Census years. It is not too complicated to think about two reasons why that may be the case. One is reverse causation. Immigrants may be looking for "affordable" housing and may tend to avoid those areas where home values are booming or simply growing faster than the metropolitan area's mean. In this case, the association between immigrant inflows and relative price inflation is negative, but for causes other than international migration itself.

The second reason that changes in the share of the foreign born may not be exogenous to the error term is omitted variables. Newly arriving immigrants do not have to pay any moving costs. They are, initially, freely mobile and can decide where to locate. Maybe, immigrants tend to select the best new locations in the city: these locations that are experiencing improvements in public goods or amenities, or nicer, high-quality new housing developments. Or, they may be attracted to neighborhoods with improving job prospects. That would lead to a positive bias in the association between the growth in the foreign born population and price inflation, and thus our estimate may not appear as negative as it should be. Alternatively, and more plausibly, omitted variables, such as the changing valuation of neighborhood characteristics that are correlated with immigration, could bias the relevant coefficient downward. Despite the fact that we are controlling for some 45 variables in our baseline regression, (see Appendix Table 1), there may be some relevant omitted characteristics left out.

To deal with reverse causation and omitted variables, we would optimally want to have an exogenous immigration "shock" into a neighborhood and analyze the subsequent evolution of housing values. We devise an instrumental variable strategy that tries to emulate that ideal experiment.

Immigrants tend to cluster in proximity to where other immigrants live, which is a very well documented fact both in sociology and economics (Borjas, 1992, 1995, Moebius, 2002). There are many reasons for this immigrant clustering, most of them having to do with the advantages that are derived from the proximity to people in the same national, ethnic, linguistic, or socioeconomic group (such as sharing information and use of common local public goods).

We use immigrant clustering to partially predict the patterns of new immigrant settlement in US metropolitan areas. Again, we limit ourselves to metropolitan areas with major immigration inflows.[8] In our model, areas that are geographically close to existing immigrant enclaves have a higher probability of becoming immigrant areas. We start by defining a variable that may proxy the appeal of a neighborhood to immigrants (or immigrant "pull") using the following gravity equation:

(10) $$Pull_{i,T} = \sum_{\substack{j \neq i \\ j \in M}} \frac{(1-\phi_{j,T-10}) \cdot Area_j}{\left(d_{ij}\right)^{\beta}}$$

$Pull_{i,T}$ is our estimate of the immigrant 'geographical gravity' appeal of a neighborhood i (which is located in a metropolitan area *M*) at time *T*. $(1-\phi_{j,T-10})$ is the share of immigrants in neighborhood j in the previous Census (ten years ago), $Area_j$ is the area (square miles) of the corresponding j^{th} census tract, and d_{ij} is the distance between neighborhoods *i* and *j*. Thus, the appeal of a neighborhood to prospective immigrants is a weighted average of the immigrant density of neighboring communities, where the weights are directly proportional to the area of neighboring tracts and inversely proportional to their distance from the relevant neighborhood.

[8] If there are no new immigration inflows, reversion to the mean is expected: immigrant clustering would be decreasing every year and predicting the change in the immigrant share by neighborhood would be a dubious exercise.

The intuition for this social diffusion approach can be easily grasped by looking at Figure 3. The grids in the figures represent the census tracts in a metropolitan area. Immigrant density is represented by a darker background. At time T-10, census tract A is surrounded by immigrant-dense neighborhoods. Tract B is further from the areas of immigrant settlement, and C is further yet. At time T (after 10 years), and assuming that the city is receiving further immigrant inflows and that immigrants keep clustering, we would expect tract A to receive a higher immigration intake.

An important parameter in the gravity model is β, the coefficient of spatial decay. We do not have strong priors on the exact magnitude of this parameter and so we let the data convey that information. In general, however, we expect β not to be too close to zero, since we believe that distance from established immigrant communities does deter somewhat immigrant inflows. Conversely, β cannot really be too big, since we expect immigrants to value general access to a portfolio of neighboring communities and not only to focus on one point in space.

In practical terms we measure distance from two census tracts as the Euclidean distance in a longitude-latitude degree two-dimensional plane.[9] In order to choose the parameter beta, we simulate different patterns of spatial correlation. Concretely, we use different values of the parameter β to estimate alternative values for $Pull_{i,T}$ using equation (10). For each potential β,we use the data from the 1990s to fit the model:

(11) $$(1-\phi_{i,2000,M}) = A_M + \gamma \cdot Pull_{i,2000,M} + \varepsilon_{i,2000,M}$$

M is a subscript for metropolitan area and A is a metro area fixed effect. We are trying to find the parameter β that maximizes the R-squared in equation (11).

The results from this exercise can be seen in Figure 4. There is a clearly concave relationship between β and the fit of our lagged spatial correlation model. The maximum predictive power of the model is obtained for a spatial decay parameter close to 1.6, which is the number that we settle for.[10]

---

[9] This approximation does not take into account the curvature of the earth, but this should barely affect the relative distance estimates for two census tracts in the same metropolitan area.

[10] The results in the paper would not change much if we set beta to be equal to 2, the classical Newtonian gravity parameter.

Once we have determined $\beta = 1.6$, the next step is to calculate the 'geographical gravity' appeal to immigrants for all metropolitan Census tracts in 2000 and 1990 using the lagged values of immigration in neighboring areas and equation (9). Note that $Pull_{i,T}$ is just a nonlinear combination of the immigrant density in neighboring tracts in the previous decade. We will use the variable $Pull_{i,T}$ and interactions with this variable as an instrument for the appeal of a neighborhood to prospective migrants that is plausibly exogenous to the contemporaneous evolution of prices in the census tract of interest.

How well can we predict changes in immigration density using our "social diffusion" model? The answer is that $Pull_{i,T}$ is an excellent instrument, but there is a lot of variation left to explain outside of the gravity model. This can be seen graphically in Figure 5. The Figure shows a scatter plot with the calculated $Pull_{i,T}$ (partialed out of MSA-year fixed effects) on the horizontal axis and the change in the share of the foreign born in each tract (similarly partialed out of MSA and year influences) on the vertical axis. The line of best fit (OLS prediction) can be observed with a significantly positive slope. However, much variation in the changes in immigrant density remains to be explained.

In Table 4, we present the IV results of a regression where we use directly $Pull_{i,T}$ as an instrument for the change in the immigrant share in a neighborhood. Appendix Table 3 shows the first stage of this regression. Indeed, neighborhoods that were located close to previous centers of foreign-born settlement attracted new immigrants *subsequently*. The F-test for the excluded exogenous variable is 75.75. The results in Table 4, column 1 still point to a strongly negative impact of immigration on the relative evolution of prices within a city. Column 2 adds the control variables in the baseline specification of column 2 in Table 1, and obtains much more imprecise estimates that still suggest a negative association between immigrant density and the evolution of housing prices. Note the loss in the power of the instrument in the first stage.

One of the problems of $Pull_{i,T}$ as an instrumental variable is the fact that is very likely to be strongly correlated with the share of immigrants in the neighborhood in the past Census. Census tracts that are already highly immigrant-dense are bound to be in proximity to other immigrant-dense tracts. It may be the case that the $Pull_{i,T}$ variable captures the general evolution of prices in an *already heavily immigrant* neighborhood as opposed to a neighborhood that *is becoming more densely foreign-born*. To avoid this, we add the actual share of immigrants in the neighborhood at T-10 as an independent variable in column 3. We can think of the instrument now as the variation in $Pull_{i,T}$ that is orthogonal to the existing past immigrant density in each tract. Doing this we obtain similar results to the ones in column 1, but due to the strong correlation between $Pull_{i,T}$ and past immigrant density this is the most imprecise estimate.

A potential criticism to our IV results hinges in the exogeneity assumption of lagged immigrant density in neighboring tracts with respect to the subsequent evolution of prices. It is certainly possible that immigrants are attracted to neighborhoods with characteristics that are becoming relatively less valuable to natives. Note that this argument hinges on *unanticipated changes* in the valuation of neighborhood traits, since we expect previous price levels to capitalize the future value of these characteristics. If we were to assume this criticism we would have, nevertheless, to explain why controlling for the lagged share of the foreign-born in the census tract of interest does not affect the relevant coefficient in the OLS and IV specifications.

An additional, very related, self-criticism to our IV strategy hinges on the possibility that proximity to immigrant neighborhoods may be actually associated with increasing (*changing*) negative externalities. For instance, hypothetically, assume that immigrants are more likely to be victims of crime because they seem to be "easier prey" for criminals (we do know that the criminal propensity of immigrants is actually lower than that of natives, Butcher and Piehl, 2001). Assume also that higher crime *gradually* spills over to neighboring communities, pushing down housing price there regardless of further migration inflows.

We conduct a further test in which we control for the general trend in the evolution of prices in communities that are close to immigrant enclaves. $Pull_{i,T}$ may be a worse predictor of future growing immigration in neighborhoods that are already heavily immigrant. For example, if 100% of the population in a tract is already composed of immigrants, proximity to other foreign-born areas will not increase its immigrant density. We model the fact that "social diffusion" of immigration is more likely to go *from more* immigrant dense neighborhood *to less* immigrant dense neighborhoods by interacting the

$Pull_{i,T}$ variable with the lagged share of the foreign born. This idea can be seen in Figure 6. Tracts A and B are exposed to similar immigrant densities in their neighboring tracts (period T-10). However we might expect immigration density to grow faster in tract B, since tract A is already more immigrant-dense, and B has a longer way to go until the steady state in period T.

We apply a similar idea to the general MSA level of immigration. If there is no new immigration into the city, we would not expect the "gravity pull" of a neighborhood to be a good predictor of changes in the immigrant share. Thus, the interaction between the $Pull_{i,T}$ variable and the relative magnitude of immigration in a metropolitan area is likely to improve our prediction of the change in the foreign-born density of a neighborhood.[11] This research design can be seen in Figure 7. At time T-10, tract A1 (in city 1) and tract A2 (in city 2) are identical in terms of proximity to existing centers of foreign-born settlement. But since new immigration is more sizable in city 1, we can expect our "social diffusion" model to predict higher immigration in A1 than in A2.

Using the interactions of $Pull_{i,T}$ with the initial share of the foreign-born and immigration per capita in the MSA, we can control for the "gravity pull" of a neighborhood on the right hand side together with the initial immigrant share (see first stage regressions in Appendix Table 3). The identification here is conceptually similar to that in a *diffs-in-diffs* approach. We are comparing two census tracts with the exact same estimated "gravity pull" (i.e., immigrant density in neighboring tracts), but with different initial immigrant densities or with different immigration "shocks" at the MSA level. While neighborhood dynamics, unobserved characteristics, and externalities should be similar in these neighborhoods, the propensity of their foreign-born share to grow is different. The results from that experiment are presented in column 5.[12] We still find a significantly negative, albeit smaller, impact of immigration in otherwise similar communities, and the precision of our estimates increases. The latter results suggest that reverse causation or neighborhood characteristics may account for up to 25% of the negative impact of immigration on changes in values in the regressions with controls, and up to 55% of the

[11] We divide the number of new immigrants in an MSA by its initial population to obtain the relative size of immigration.

[12] See also column 4 where the interactions are simply used to improve the fit of our social diffusion model.

raw correlation. The rest seems to be causal. In order to obtain a sense for orders of magnitude, assume that a neighborhood goes from having no immigrants to having a foreign-born density equivalent to 30% of the population. The results in Table 5, columns 4 and 5, suggest that housing prices will grow about 5.4% more slowly in these areas over a period of ten years (median housing price growth is 0.41 log points per decade in these cities during these 2 decades).[13]

5. Further results

Native mobility and "white flight"

It is interesting to map changes in immigrant concentration to changes in the native population. Trivially, increases in the share of the foreign-born imply commensurate negative changes in the share of natives. In order to learn about this issue, therefore, we use the change in the *number* of immigrants, natives, and non-Hispanic whites, divided by the original tract population as measures of the relative impact of immigration on population in the cities and years that we consider here. In Table 5, columns 1 and 3, not surprisingly, we find that in areas with more immigrants, native and white population also grew. This is not surprising because immigration is endogenous: we should expect growing areas to attract a growing share of the city's population (native and immigrant alike). In fact, depending on the initial shares of the foreign-born, it is possible that some of these areas are becoming relatively *less* immigrant dense. A more interesting exercise is to use our most demanding IV strategy (as in Table 4, column 5) to asses the impact of *exogenous* immigration "shocks." Remarkably these are associated with an absolute decrease in native population. All of this decrease can be explained by the shrinking of the non-Hispanic white population in these areas. The difference between columns (4) and (2) is quite consistent with the fact that the typical immigrant family has about 0.45 native children per immigrant, and with the fact that in the areas where the instrument has

[13] In Appendix Table 4 we reproduce some of the results in Table 5, but this time, using $\Delta Pull_{it}$ as an instrument for the change in the foreign-born density. The identification now does not rely so much on past *levels* of immigrant density in neighboring tracts, but on its past *changes*. In Census tracts that did not have immigrant neighbors 20 years ago, but had those 10 years ago, the chances of receiving immigrants must have increased in the last decade. The results are not too dissimilar from the ones in the OLS regressions, and suggest a stronger impact of immigration. However, they are quite imprecisely estimated, and we prefer to rely on the more conservative estimates in Table 4, columns 4 and 5.

most of its “bite” (with high immigrant concentrations) immigrants tend to be minorities (mostly Hispanic and Asian).

Heterogeneous treatment effects

In Table 6, we speculate about the possibility that the treatment effect of immigration is different in different types of neighborhoods. Concretely, we interact the change in immigrant density with the initial values of two variables: share of non-Hispanic white population and the log of initial housing values. The regressions (columns 1 to 3) control for all the other relevant variables in our baseline specification.[14] The results are quite remarkable. The association between immigrant density and slower housing price growth is found to be much more relevant in those neighborhoods where population is predominantly white in the initial period. Similarly, the impact of immigration seems to be stronger in neighborhoods that were initially more expensive. These results are suggestive of heterogeneous treatment effects. Indeed, column 3 raises the possibility that the impact of immigration on prices *may* be positive in minority neighborhoods with very low initial housing values. This issue deserves further investigation in the future.

Rents

In Table 7 we show how the negative association between immigration and housing prices is also present in the case of the rental market (rents). We limit our sample to those metropolitan areas without rent control regulations. In this case the association is weaker. However, the magnitude can be explained by the fact that rental units tend to be in areas denser with minority households, and that we learnt in Table 6 that the negative association between prices and immigration is weaker in minority-dense areas. The interacted model in column 2 yields an estimate that is surprisingly close to that in Table 6 column 1.

What are the channels through which immigration impacts neighborhood dynamics?

[14] We do, however, substitute the log of lagged income by the log of lagged housing values when using the interaction between immigration and housing values. The correlation between the log of incomes and the log of values is 0.9, so the two variables play a similar role as controls, and we avoid multicollinearity problems.

In Figure 8, we carefully lay out the likely avenues trough which immigration may be associated with changes in local neighborhood housing values. We think the figure to be extremely illustrative of the issues surrounding our empirical approach and thus, we recommend the reader to study it carefully. In Tables 1, 2, and 3 we have determined that no more than 0.18 log points of the initial negative association (0.42) between changes in immigrant density and price appreciation can be explained by changes in the quality of the housing stock.

Our IV strategies do not provide an exact point estimate. Notwithstanding this fact, we can conservatively use the estimates in Table 5 (columns 5 and 6) to conclude that *up to* an extra 0.06 log points may be accounted by omitted variables and reverse causation. But then, what does account for the remaining causal impact (42% of the initial raw correlation)? In Figure 8, we propose several alternative avenues through which immigration may affect the demand for housing in a neighborhood. First, as in our model, natives may have preferences for living with other natives. Second and third, natives may have preferences for living with individuals of the same ethnicity, or with individuals of higher socio-economic status. This latter preference is consistent with models based on local human capital externalities (Benabou, 1993), and with empirical evidence of segregation by income in the United States (Davidoff, 2004). In fact, income segregation has been on the rise in the US metropolitan areas (Watson, 2003). Under these two scenarios, the model discussed earlier in the paper is still applicable, but now, rather than nationality *per se*, the salient characteristic that determines residential segregation is race or socio-economic status.[15]

Finally, another possibility is that the quality of education changed in the areas where immigrants concentrate or that at least, parents perceive this to be the case. For instance, if schools have to devote more resources towards English as a Second Language programs that may detract from the resources devoted to other educational programs. We start by testing if broad trends in school quality or finances (as in Fernandez and Rogerson, 1996) can explain our results. We do so by including school district-by-year fixed effects. If quality of education is very important to explain our results, we would

[15] So residential preferences are defined, for instance, by the share of highly educated individuals in the utility function.

expect the association between immigrant density and prices to be more important between school districts rather than within school districts. We show the results of the regression that includes school district-by-year fixed effects in Table 8, column 2. The results of our baseline regression (shown again for convenience in column 1) do not change much.

In column 3, we explore the possibility that the impact of immigration *goes through* changes in the socio-economic status of neighbors. In this regression, we include the contemporaneous change in the share of individuals with a bachelors' degree, and with less than a High School diploma, and the change in the average log income in the neighborhood. Notice that these variables are not controls in the classical sense of the word. These variables are clearly affected by the treatment.[16] For instance, a simple regression with the share of high school dropouts on the left hand side and the share of the foreign-born on the right-hand-side yields an estimated elasticity of 0.65 (the t-statistic is 126).[17] Immigrants are associated with traits such as income and education. Major immigrant inflows change the average characteristics of a neighborhood directly, and also indirectly if such inflows are associated with additional sorting of households between neighborhoods. The results in Table 8 column 3 open up the hypothesis that part of the association between immigration and changes in housing values may actually go through the channel of changes in the socio-economic status of the neighbors in the tract. In column 4, we show that controlling for changes in the share of white individuals does away with the association between changes in the share foreign-born and housing price appreciation. The models in Table 8 are unidentified, and the exact parameters we estimate should not be taken *face value*. Since all variables are clearly endogenous to immigration and, simultaneously, to the error term it is unclear that we can learn much from these regressions, except the fact that the (small) impact of immigration might be working through socio-economic status and ethnicity. Changes in immigrant density, race, socio-economic status, and housing prices go hand-in-hand in our sample.

[16] As shown in Rosenbaum (1984), controlling for variables that have been affected by the treatment yields an estimate of the treatment effect that goes through channels other than the endogenous variables. However, in this case, it is unlikely that such variables themselves are uncorrelated with the error term.

[17] These regressions contain MSA-by-year fixed effects.

To learn more about this issue we deploy our IV strategy to data on immigration by nationality. Each immigrant national group is associated with different average characteristics (education, income, race, ability to speak English). Indeed, the raw association between changes in immigrant density and changes in housing prices differs quite a bit depending on country of origin (see Appendix Table 6). Therefore, we estimate our "pull" variable for a group of World countries or regions. This allows us to use each country "pull" variable and the associated interactions similar to Table 4, column 4, to instrument for changes in the socio-economic characteristics of a neighborhood. In order to see if the impact of immigration goes through cultural channels that are associated with the perception of "foreignness" of a group, we include the change in the percentage of people speaking English as one of the relevant controls. The results in Table 9 clearly indicate that the impact of immigration all goes through socio-economic channels, and does not reflect a reaction by natives to "cultural dissonance."

A case example: Manhattan China Town.

We close the paper with 3 suggesting maps of housing rents and immigration dynamics in Manhattan (NYC). We focus on the example of a very salient immigrant enclave: Manhattan's China Town. We are motivated by the question: are housing prices in China Town higher or lower than in comparable areas in southern Manhattan? Although it is hard to notice a clear pattern when looking at the share of foreign-born in the entire Manhattan area, we see a very high share of foreign-born living near the Upper Manhattan and Bronx border (Washington Heights, Fort George and Inwood), and in certain tracts of the east part of Lower Manhattan (Figure 9). These tracts contain Chinatown, where Asian populations are heavily concentrated (Figure 10). The color gradations in Figure11 show the housing rents by tract in 2000.[18] While rents are highest in the Financial District, in Chinatown they are *lower* than anywhere else in Lower Manhattan, Midtown or Upper Manhattan.

[18] We focus on rents, since a good deal of data on housing prices by tract is missing.

6. Conclusions

While previous research (Saiz, 2003a, 2003b) shows that metropolitan areas with major immigration inflows have tended to experience faster housing price inflation *on average*, we do not know much about the impact of immigration on local housing markets.

In a theoretical model with perfect mobility, immigration should not have a positive impact on the relative housing prices of the neighborhoods where immigrants concentrate. However, if immigrant enclaves are perceived as less desirable places to live by natives, then we should expect a relative negative association between immigration density and housing prices.

Empirically, we find that, controlling for MSA-by-year fixed-effects, housing values grow relatively more slowly in neighborhoods with increasing immigrant density. This empirical fact is, indeed, consistent with the idea that natives are willing to pay a premium for living in predominantly native areas. It is also consistent with reverse causality: immigrants may be attracted by areas that are becoming relatively less expensive. Therefore, we use a "social diffusion" model (akin to an epidemiological "contagion" model) to generate predictions on the pattern of new immigrant settlement. We use these predictions as instruments for the actual changes in immigrant density in a neighborhood. Subject to the validity of our instruments, the evidence is consistent with a partial causal interpretation from growing immigration density to relatively slower housing price appreciation. It is important to point out, though, that the causal impact is estimated to be 57% smaller than the raw correlation between changes in prices and immigrant density. Further results indicate that the negative association between immigration and local price growth may be more driven by the fact that immigrants are of low socio-economic status than by nationality *per se*.

Finally, we briefly look at a case-study: Manhattan's China Town. Housing rents in China Town are the lowest in southern Manhattan. In a map, the negative correlation between rents and the percentage of (mostly foreign-born) Asians in South Manhattan is visually striking. While immigrants may be generally attracted to less desirable areas, it seems difficult to see what is keeping rents so low in such a prime location of South Manhattan other than the residential dynamics directly related to the immigrant enclave.

Given the growing demographic importance of immigration in the US, the results in the paper do not bode well for the expeditious disappearance of the new “immigrant ghetto.”

References

Benabou, Roland J. (1993). "Workings or a City, Location, Education, and Production." The Quarterly Journal of Economics, 108, No. 3, pp. 619-652.

Borjas, George J. (1992). "Ethnic Capital and Intergenerational Mobility." The Quarterly Journal of Economics, 107, No. 1, pp. 123-150.

Borjas, George J. (1995). "Ethnicity, Neighborhoods, and Human Capital Externalities." American Economic Review, 85 (3), pp. 365-390.

Case, Carl E. and Robert J. Shiller (1989). "The Efficiency of the Market for Single-Family Homes." American Economic Review, 79, pp.125-137.

Cutler, David M., Glaeser, Edward L. and Vigdor, Jacob L. (1999). "The Rise and Decline of the American Ghetto." Journal of Political Economy, 107, No. 3, pp. 455-506.

Davidoff, Thomas (June 7, 2004). "Income Sorting: Measurement and Decomposition." Fisher Center for Real Estate & Urban Economics Working Paper # 291.

Dustmann, Christian and Preston, Ian (2000). "Racial and Economic Factors in Attitudes to Immigration." IZA Discussion Paper No. 190. http://ssrn.com/abstract=251991.

Fernandez, Raquel and Rogerson, Richard (1996). "Income Distribution, Communities, and the Quality of Public Education." The Quarterly Journal of Economics, 111, No. 1, pp. 135-164.

Glaeser, Edward L., Kolko, Jed and Saiz, Albert, "Consumer City." (2000). Harvard Institute of Economics Research Paper No. 1901. http://ssrn.com/abstract=237462

Glaeser, Edward and Saiz, Albert (2004) "The Rise of the Skilled City." Brookings-Wharton Papers on Urban Affairs.

Goldin, Claudia. "The Political Economy of Immigration Restriction in the U.S., 1890 to 1921." In Claudia Goldin and Gary Libecap, editors, The Regulated Economy: A Historical Approach to Political Economy. Chicago: University of Chicago Press, 1994, pp. 223-257.

Mayda, Anna Maria (2004). "Who is Against Immigration? A Cross-Country Investigation of Individual Attitudes toward Immigrants." IZA Discussion Paper No. 1115. http://ssrn.com/abstract=533802

Mobius, Markus M. "The Formation of Ghettos as a Local Interaction Phenomenon." Harvard University Working Paper.

O'Rourke, Kevin. H. and Sinnott, Richard (2001). "What determines attitudes towards protection? Some cross-country evidence." In Collins, S. M. and Rodrik, D., editors, Brookings Trade Forum 2001, pp. 157–206. Brookings Institute Press.

Rosen, Sherwin (1974). "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." Journal of Political Economy, Vol. 82 (1), Jan./Feb., pp. 34-55.

Rosenthal, Stuart S. (2004). "Old Homes and Poor Neighborhoods: A Dynamic Model of Urban Decline and Renewal." Syracuse University Working Paper.

Saiz, Albert (2003). "Room in the Kitchen for the Melting Pot: Immigration and Rental Prices." Review of Economics and Statistics 85(3), pp. 502-521.

Saiz, Albert (2003). "Immigration and Housing Rents in American Cities." Zell-Lurie Real Estate Center Working Paper # 433.

Schelling, Thomas C. (1978). Micromotives and Macrobehavior. New York: Norton.

Scheve, Kenneth F. and Slaughter, Matthew J. (2001). "Labor Market Competition and Individual Preferences over Immigration Policy." Review of Economics and Statistics, 83, 133-145.

Smith, James P. and Edmonston, Barry, editors. "The new Americans: Economic, Demographic, and Fiscal Effects of Immigration." Panel on the Demographic and Economic Impacts of Immigration, National Research Council. National Academy Press, 1997.

Watson, Tara (2002). "Inequality and the Rising Income Segregation of American Neighborhoods." Harvard University, unpublished paper (June).

Figure 1
Immigrant Density and Housing Prices in a Simple Model

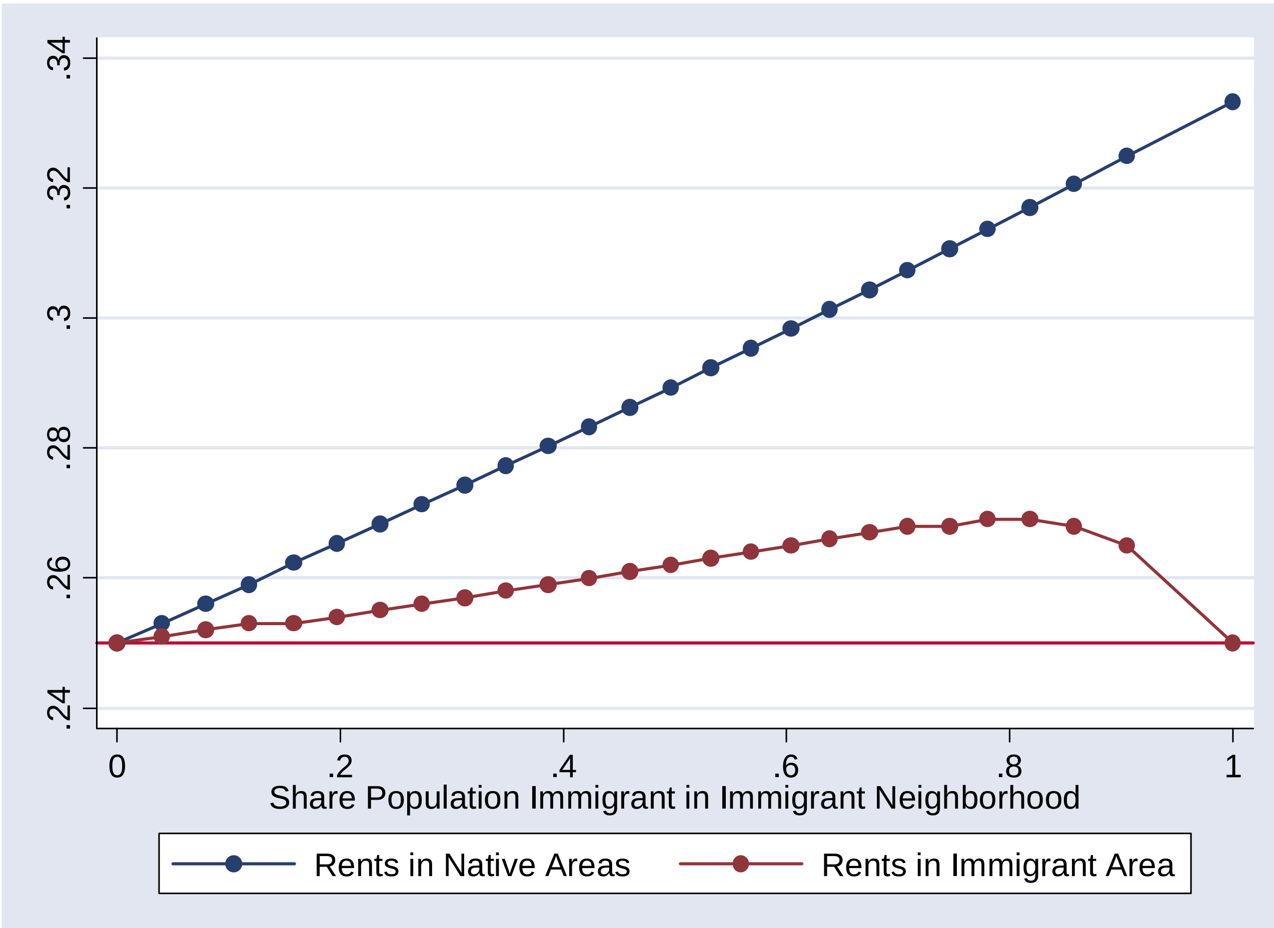


Figure 2

Nonlinearities?

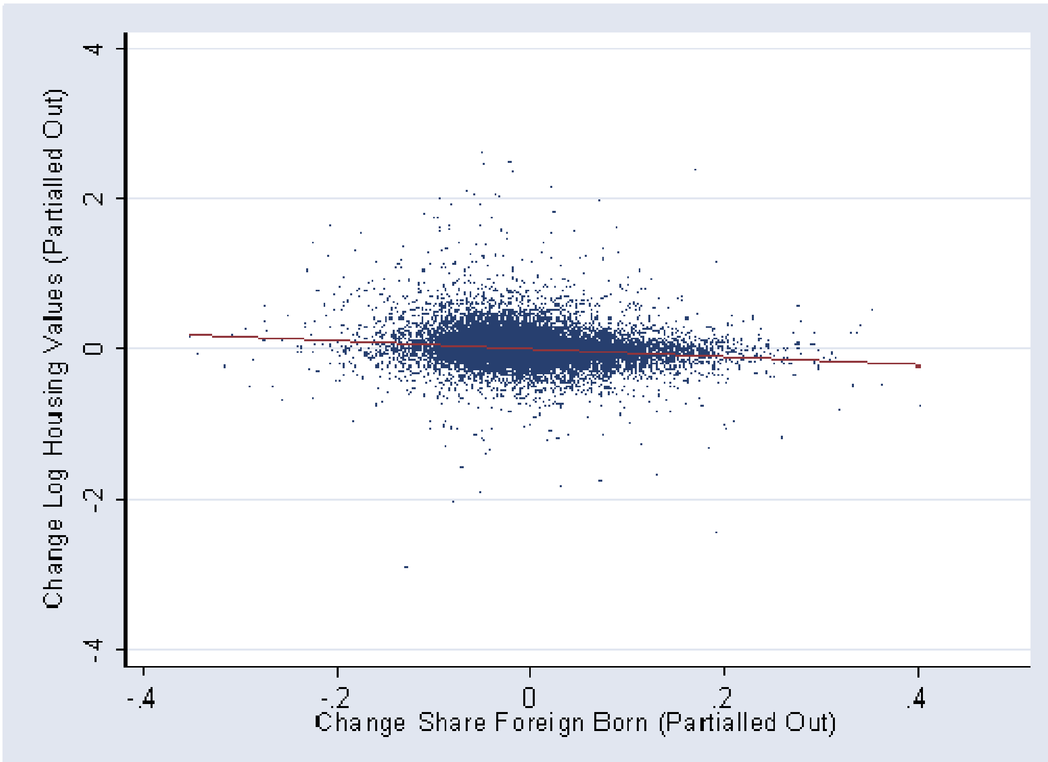


Figure 3
Diffusion of Immigrant Density (cities with growing immigration)

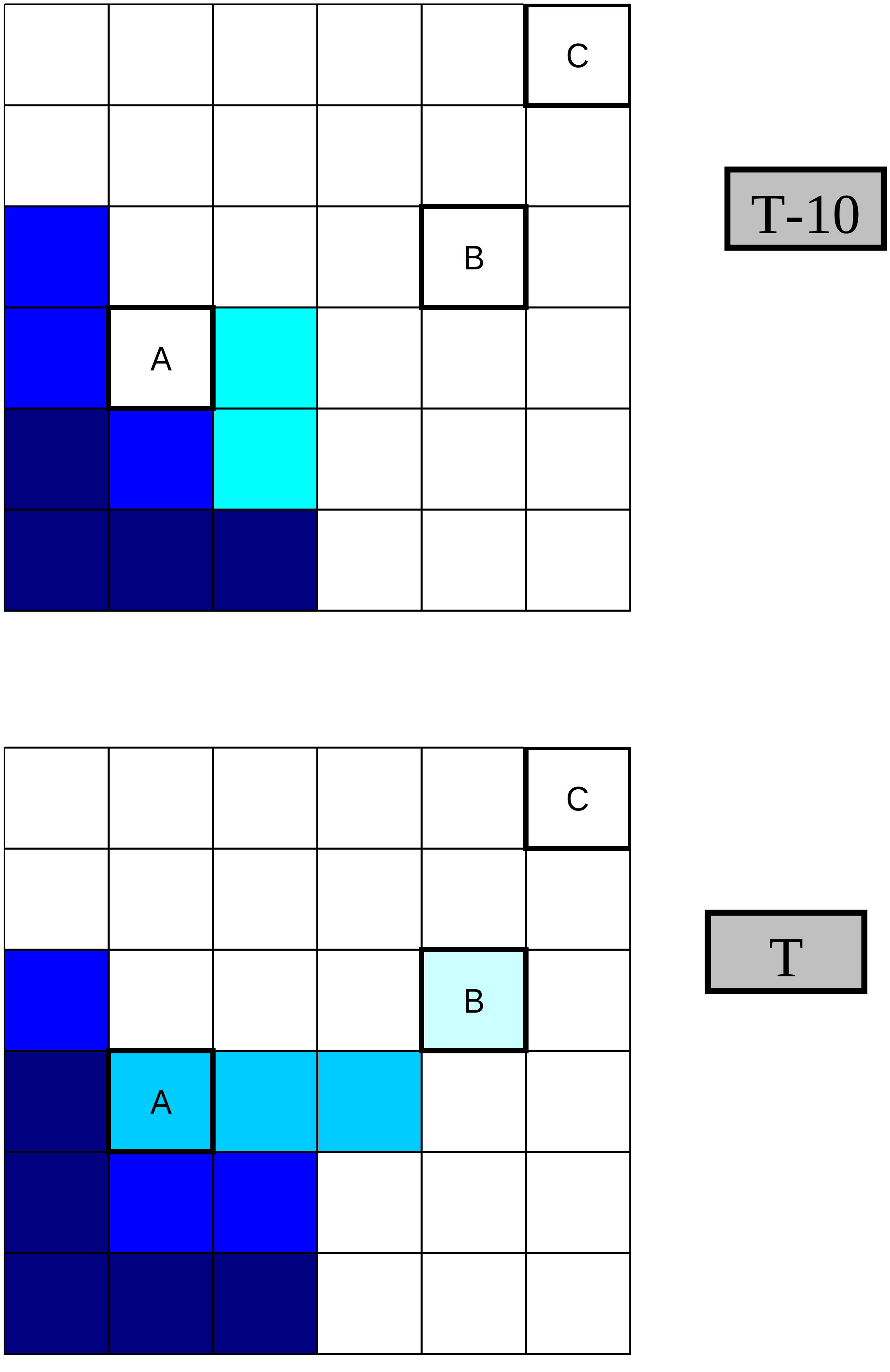


Figure 4

Spatial Correlation in Immigrant Settlement

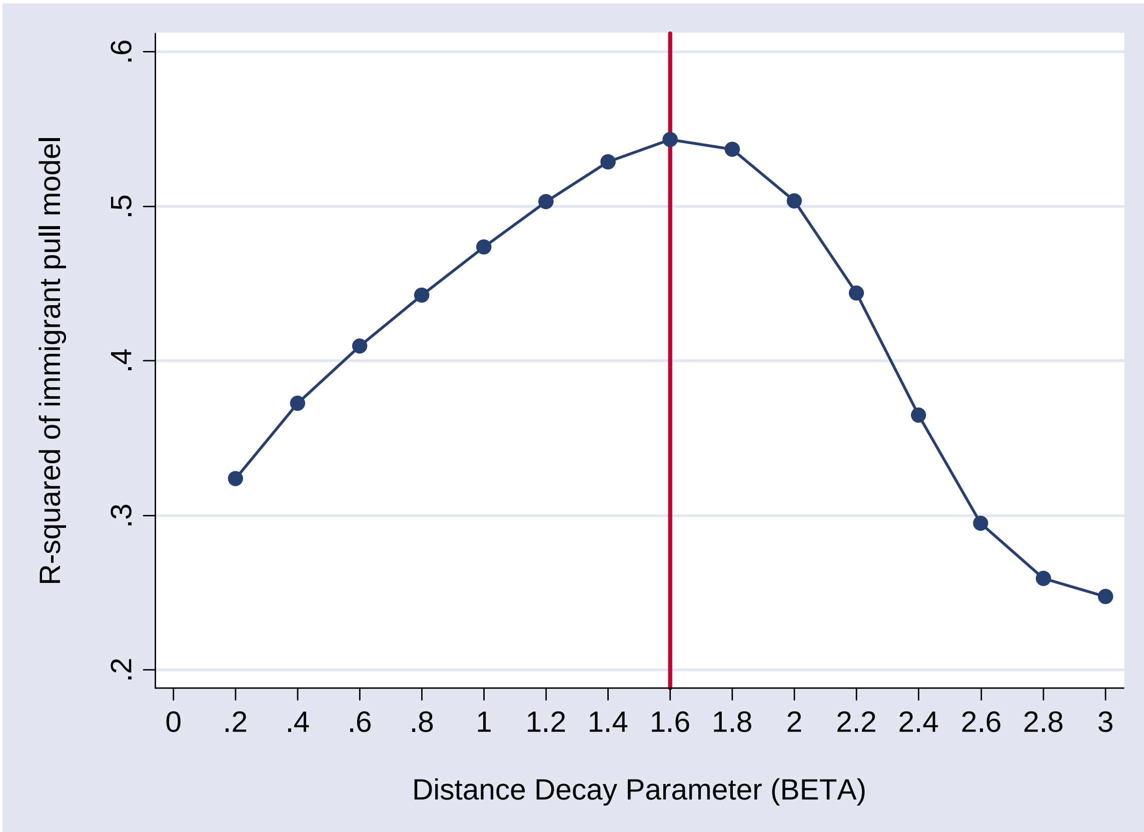


Figure 5

Power of IV Instrument

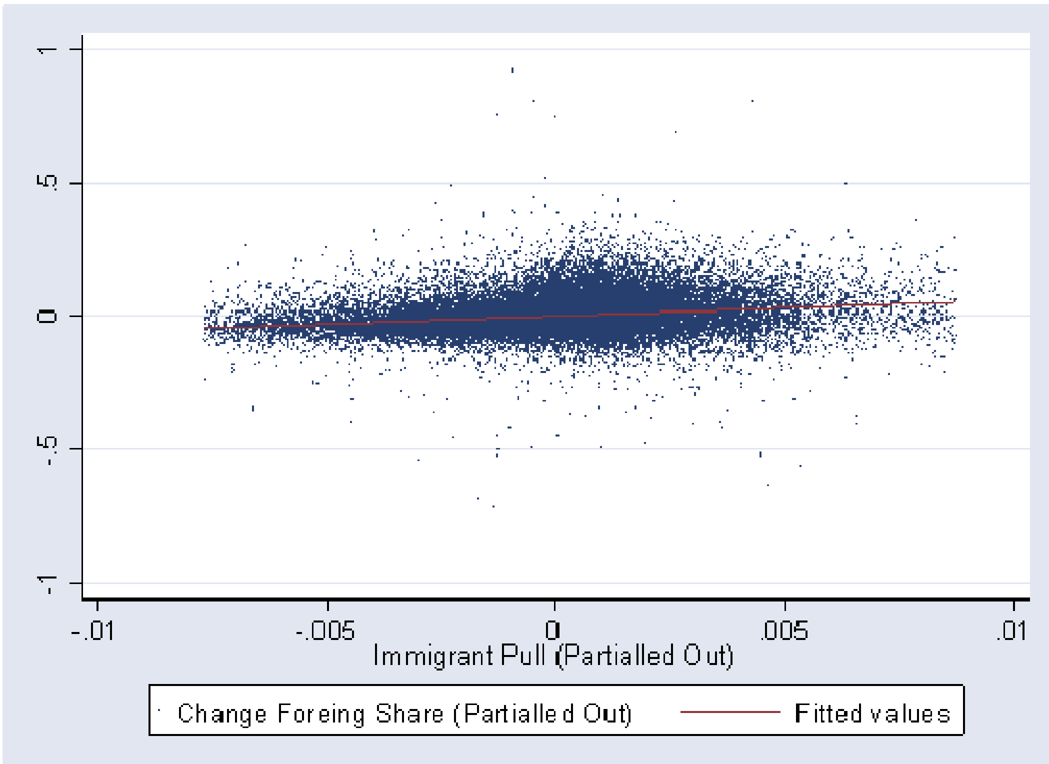


Figure 6
Diffusion of Immigrant Density. Similar Neighbors, different initial immigrant densities

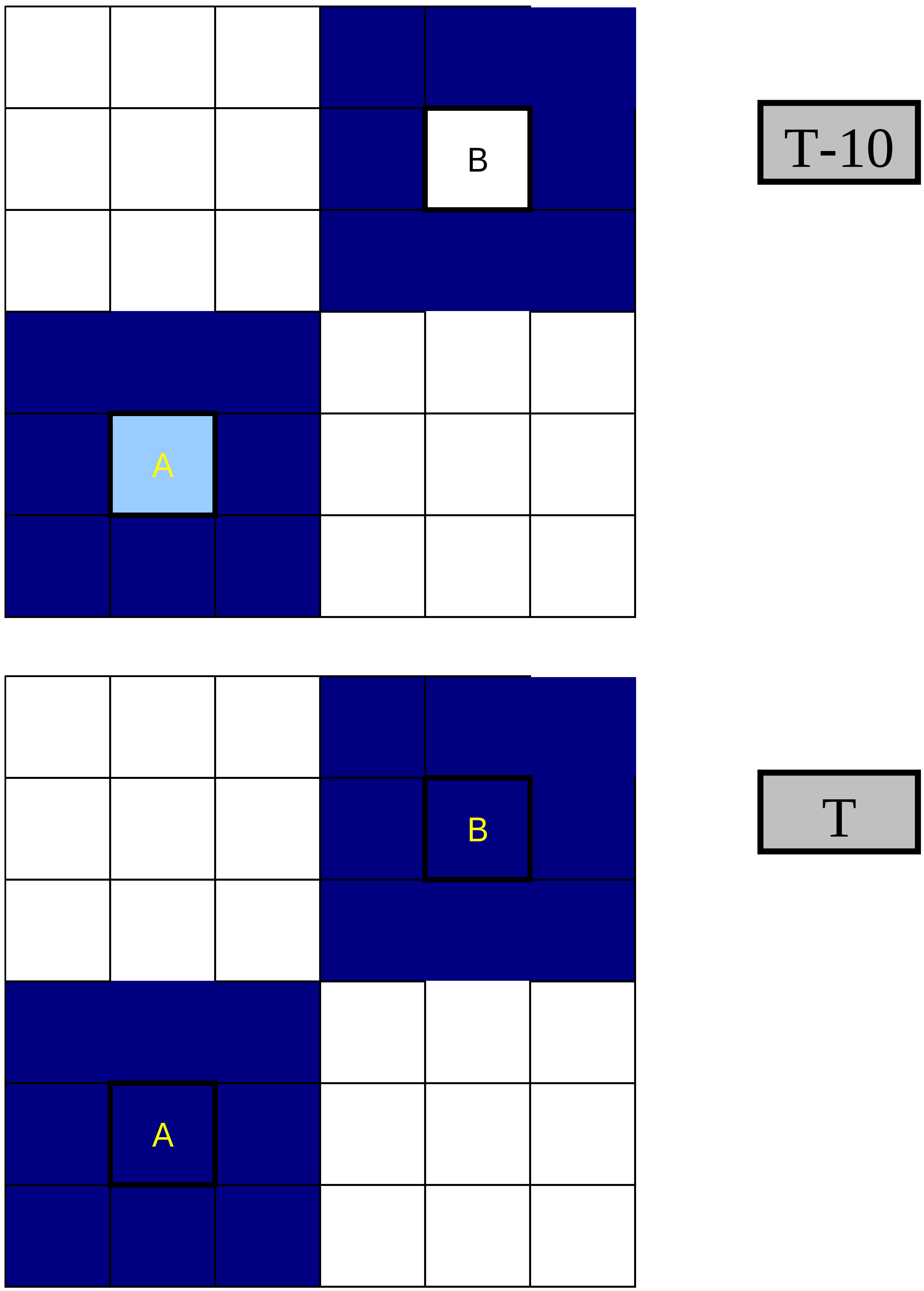


Figure 7
Diffusion of Immigrant Density. Similar Neighbors, different immigration inflows at the MSA level

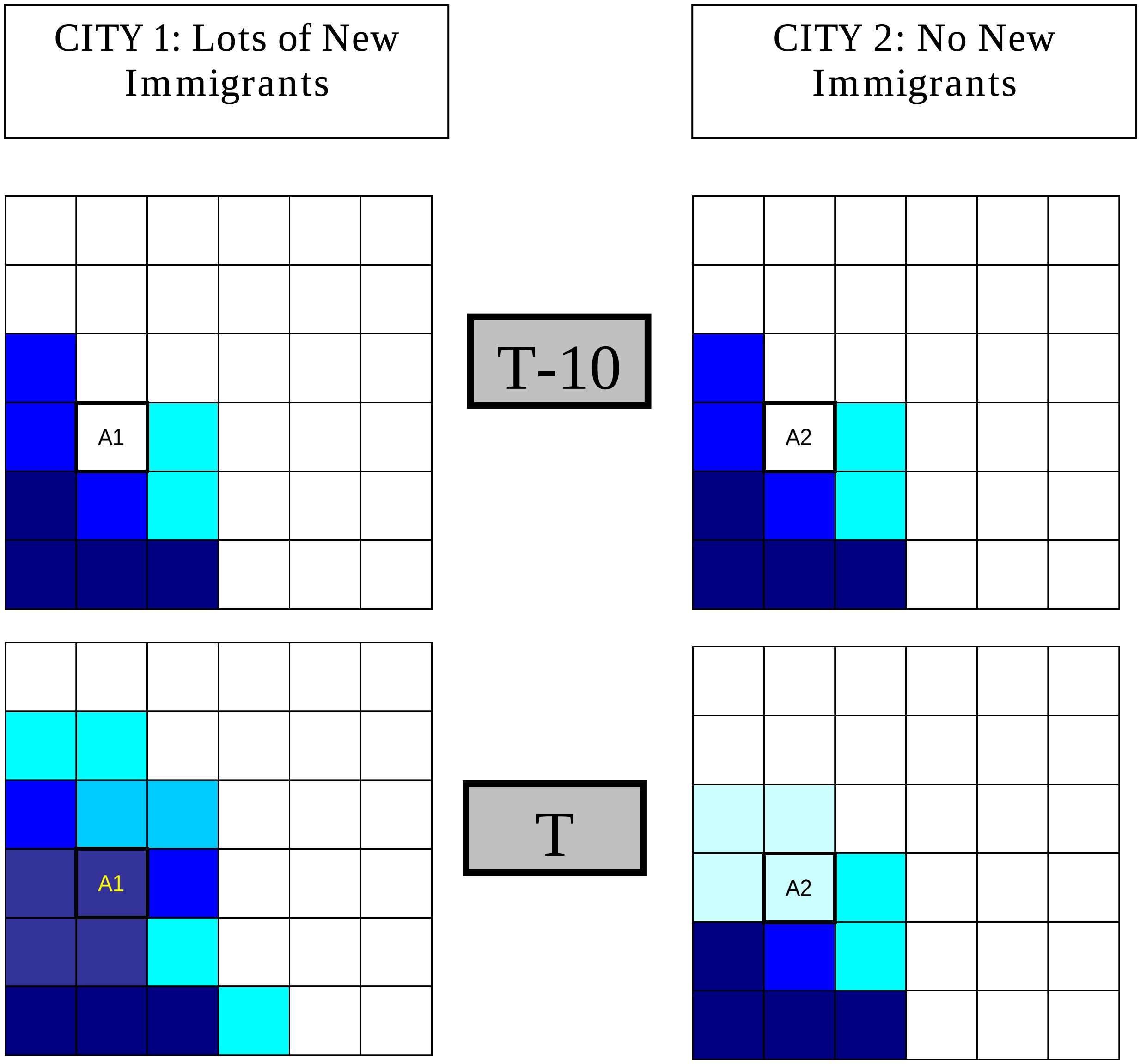


Figure 8
Changes in Immigrant Density and Relative Housing Price Growth. Potential Channels

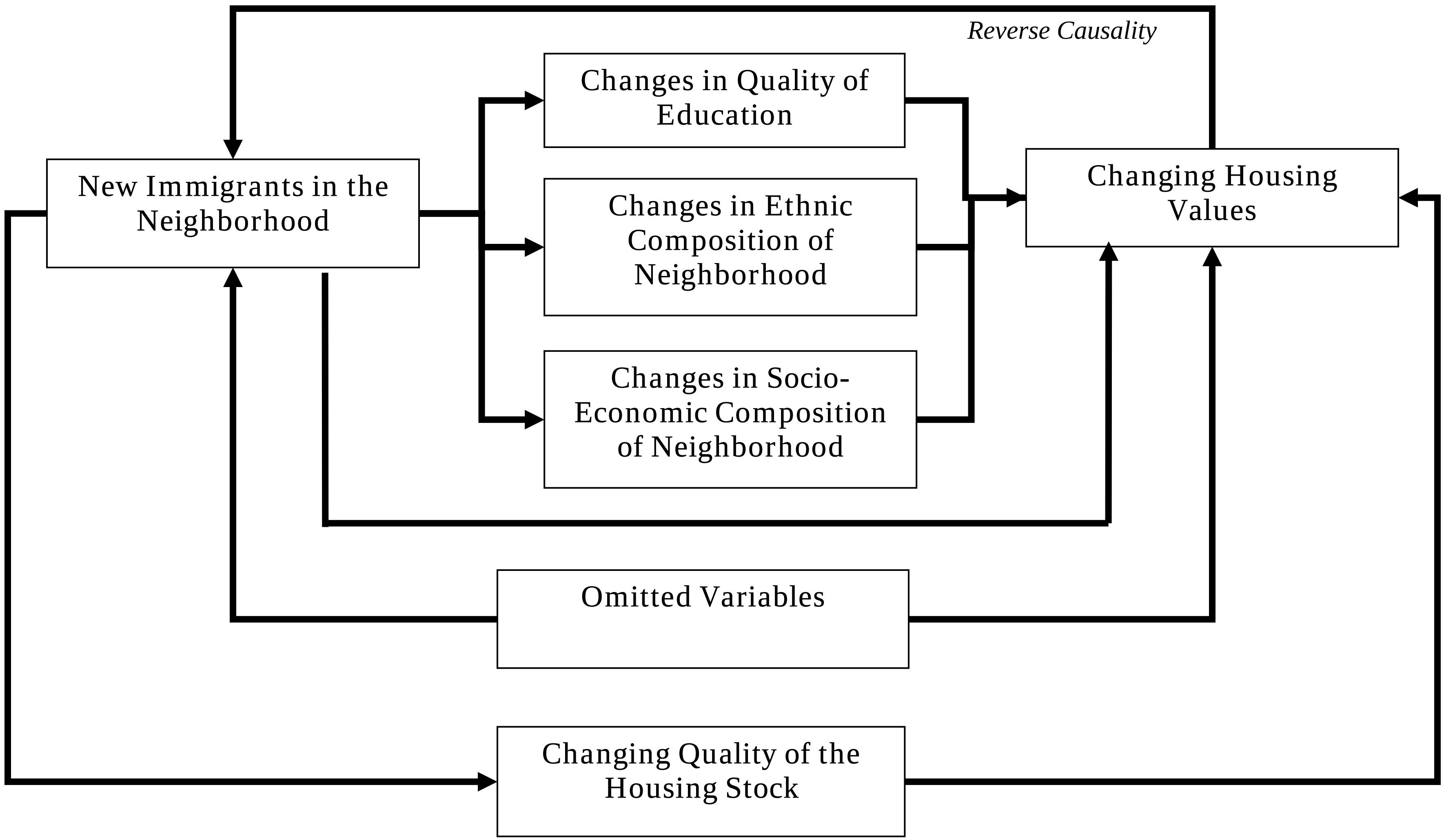
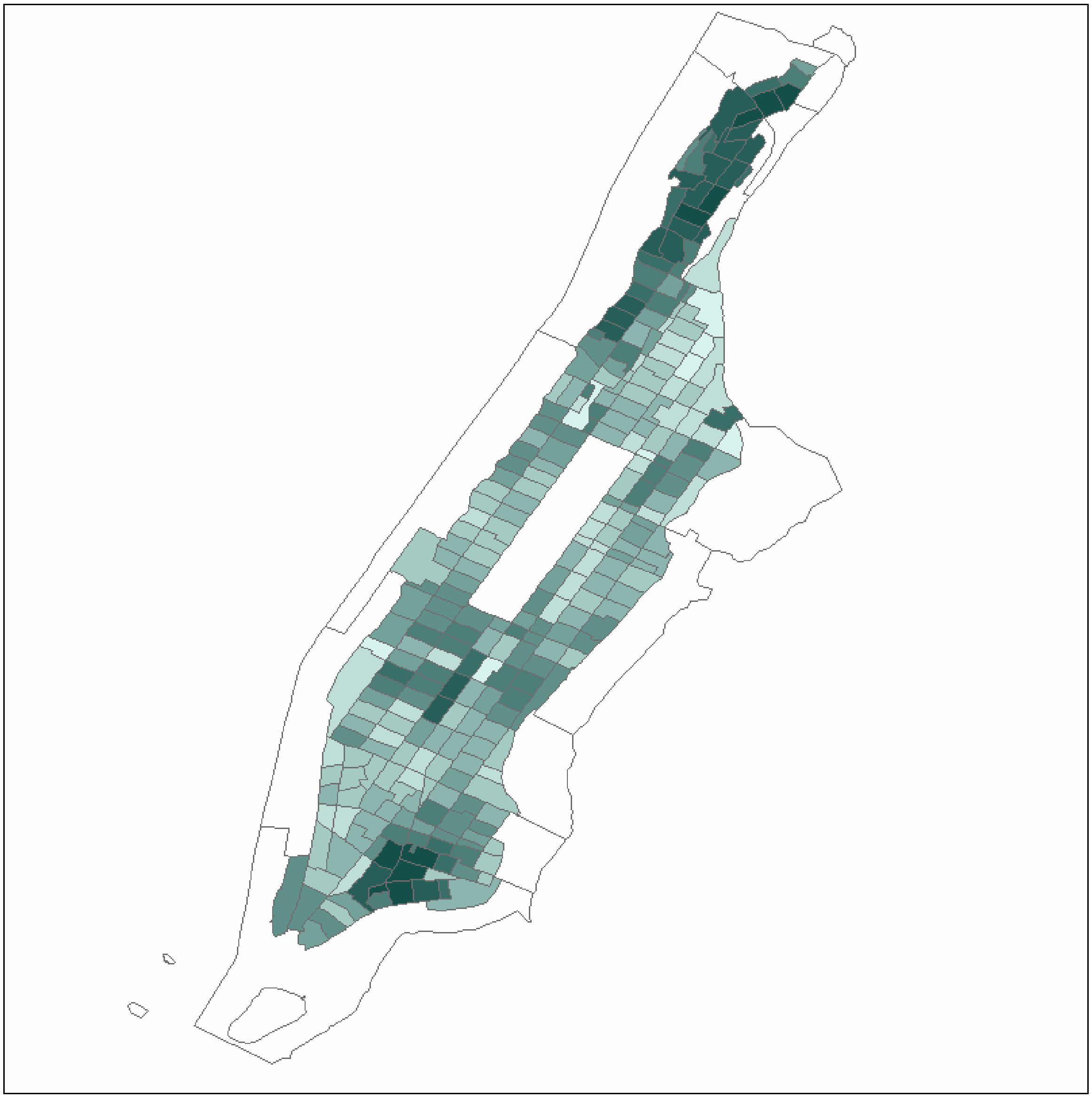


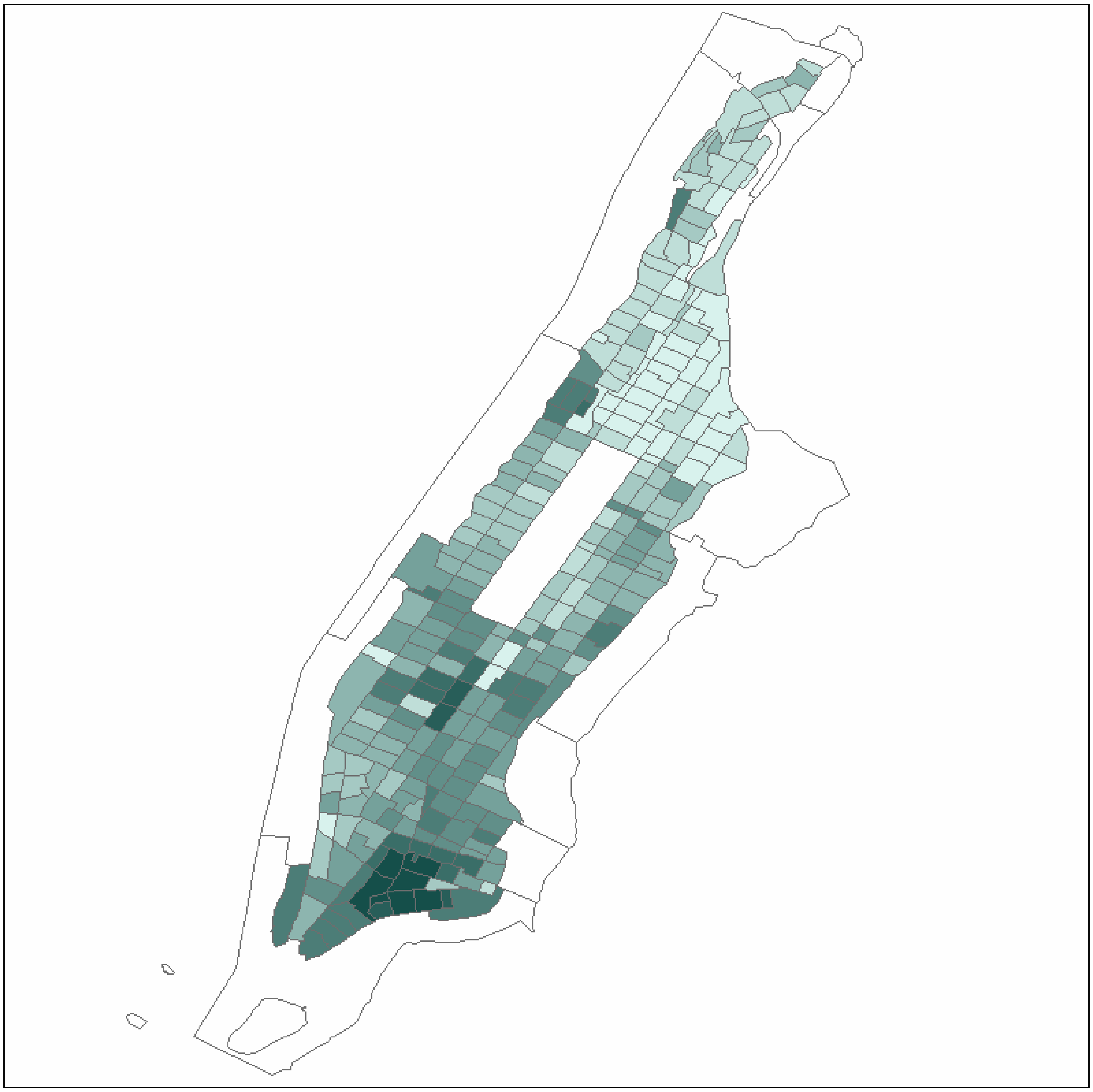
Figure 9

Manhattan. Share Foreign-Born by Tract. 2000



Notes: The color gradations correspond to ten deciles of the foreign-born density. Darker is higher. Tracts in white do not have available data.

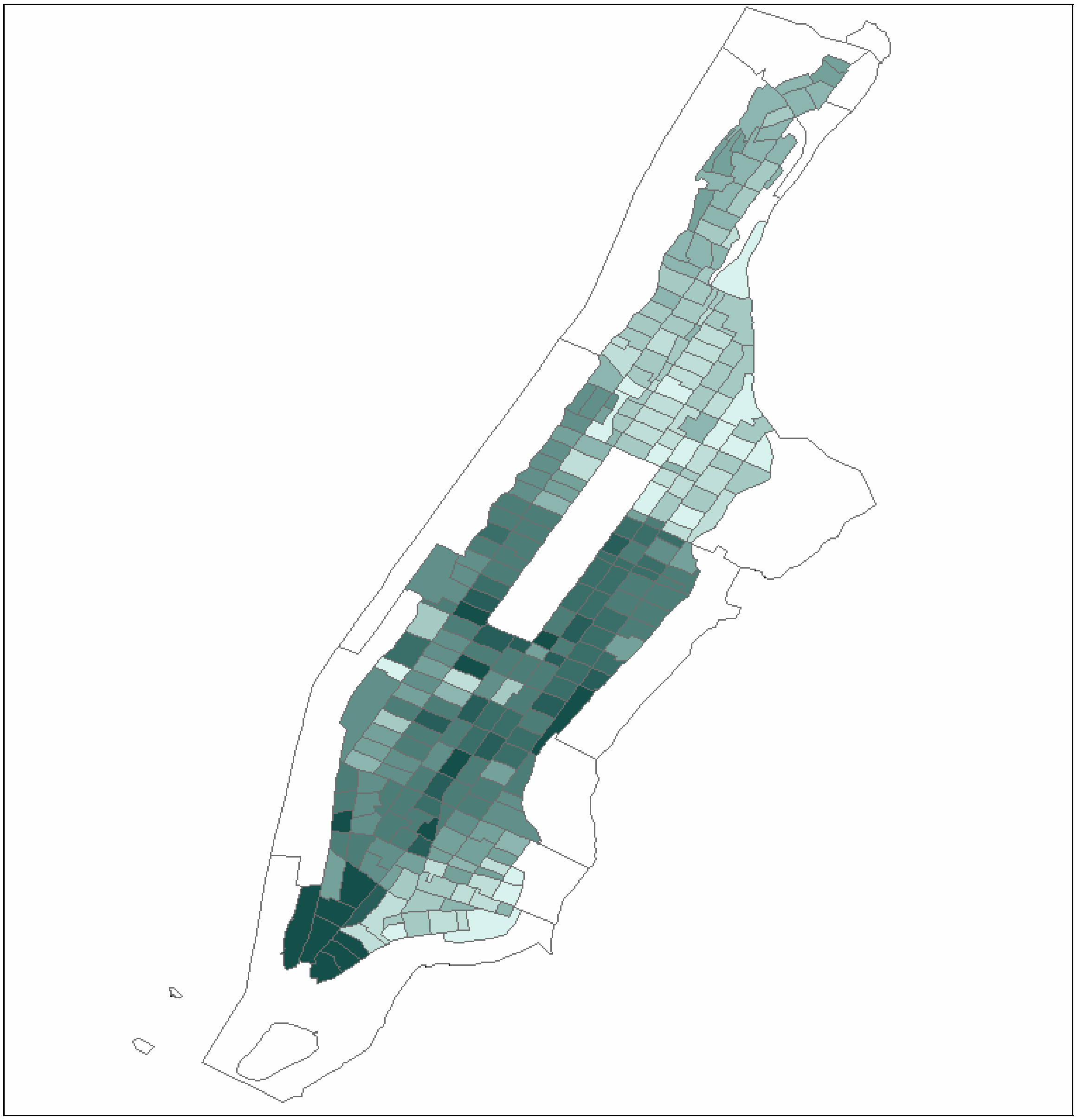
Figure 10
Manhattan. Share Asian by Tract. 2000



Notes: The color gradations correspond to ten deciles of the Asian ethnicity density. Darker is higher. Tracts in white do not have available data.

Figure 11

Manhattan. Housing Rents by Tract. 2000



Notes: The color gradations correspond to ten deciles of the distribution of rents across tracts. Darker is higher. Tracts in white do not have available data.

TABLE 1
Changes in the Foreign Born Share and Neighborhood Housing Values

	Change in Log Average Value					
	(1)	(2)	(3)	(4)	(5)	(6)
Change in Foreign Population/Population	**-0.418**	**-0.24**	**-0.237**	**-0.251**	**-0.249**	**-0.242**
	(0.016)***	(0.015)***	(0.015)***	(0.015)***	(0.015)***	(0.015)***
Share with Bachelor's Degree at T-10		0.188	0.187	0.277	0.273	0.277
		(0.013)***	(0.013)***	(0.014)***	(0.014)***	(0.014)***
Share High School Drop Outs at T-10		0.222	0.223	0.226	0.239	0.232
		(0.013)***	(0.013)***	(0.013)***	(0.014)***	(0.014)***
Log Family Income at T-10		0	-0.001	0.125	0.118	0.091
		(0.007)	(0.007)	(0.009)***	(0.009)***	(0.010)***
Share Non-Hispanic White at T-10		0.026	0.026	0.044	0.036	0.036
		(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***
Share 24 or younger		-0.175	-0.177	-0.294	-0.296	-0.298
		(0.027)***	(0.027)***	(0.029)***	(0.031)***	(0.031)***
Share 65 or older at T-10		-0.14	-0.143	-0.139	-0.169	-0.167
		(0.022)***	(0.022)***	(0.022)***	(0.023)***	(0.023)***
Share Households Familiy+Kids at T-10		0.008	0.006	0.049	0.031	0.026
		(0.016)	(0.016)	(0.016)***	(0.017)*	(0.017)
Ownership Rate at T-10 (Households)		-0.081	-0.084	-0.124	-0.117	-0.117
		(0.013)***	(0.013)***	(0.013)***	(0.014)***	(0.014)***
Vacancy Rate at T-10		0.057	0.053	0.088	0.068	0.063
		(0.022)***	(0.022)**	(0.023)***	(0.024)***	(0.024)***
Log Density at T-1		-0.011	-0.011	-0.011	-0.011	-0.011
		(0.001)***	(0.001)***	(0.001)***	(0.001)***	(0.001)***
Share Water Land Cover (1992)			0.057	0.078	0.07	0.068
			(0.016)***	(0.017)***	(0.018)***	(0.018)***
Share Commercial, Industrial, Mining Land Cover (1992)			-0.033	-0.04	-0.048	-0.049
			(0.009)***	(0.009)***	(0.009)***	(0.009)***
Log Average House Value at T-10				-0.168	-0.153	-0.146
				(0.008)***	(0.008)***	(0.008)***
Change in Log Value at T-10					-0.015	-0.026
					(0.004)***	(0.005)***
Change in Log Family Income at T-10						0.056
						(0.008)***
Change in Log Family Income at T-10						0.101
						(0.012)***
MSA-Year Fixed Effects	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Change in Housing Quality	*no*	*yes*	*yes*	*yes*	*yes*	*yes*
Housing Quality at T-10	*no*	*yes*	*yes*	*yes*	*yes*	*yes*
Observations	34835	34833	34833	34833	31117	31116
R-squared	0.79	0.85	0.85	0.85	0.86	0.86

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 2
Immigration and Neighborhood Housing Values : Further Results

	Change in Log Value: Initially Non-Immigrant neighborhoods	Change in Log Median Value (1990s)	Change in Log Average Value
	(1)	**(2)**	**(3)**
Change in Foreign Population/Population	**-0.287**	**-0.279**	**-0.234**
	(0.027)***	(0.057)***	(0.015)***
Share with Bachelor's Degree at T-10	0.191	-0.063	0.204
	(0.019)***	(0.046)	(0.013)***
Share High School Drop Outs at T-10	0.249	-0.041	0.251
	(0.022)***	(0.051)	(0.014)***
Log Family Income at T-10	0.025	0.095	0.002
	(0.010)**	(0.021)***	(0.007)
Share Non-Hispanic White at T-10	0.01	0.005	0.019
	(0.006)	(0.018)	(0.005)***
Share 24 or younger	-0.188	0.465	-0.221
	(0.039)***	(0.087)***	(0.028)***
Share 65 or older at T-10	-0.112	0.266	-0.137
	(0.031)***	(0.076)***	(0.022)***
Share Households Familiy+Kids at T-10	0.059	0.277	0.049
	(0.024)**	(0.057)***	(0.017)***
Ownership Rate at T-10 (Households)	-0.085	-0.106	-0.084
	(0.018)***	(0.046)**	(0.013)***
Vacancy Rate at T-10	0.064	0.12	0.054
	(0.029)**	(0.067)*	(0.022)**
Log Density at T-1	-0.011	0.004	-0.011
	(0.002)***	(0.005)	(0.001)***
Foreign Population at T-10/Population at T-10			-0.09
			(0.013)***
MSA-Year Fixed Effects	*yes*	*yes*	*yes*
Change in Housing Quality	*yes*	*yes*	*yes*
Housing Quality at T-10	*yes*	*yes*	*yes*
Observations	17364	21681	34833
R-squared	0.85	0.39	0.85

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 3

Immigrants and Housing Quality/Investments (AHS: 2001 and 2003)

	Open cracks wider than dime (1)	Neighbor-hood has crime (2)	Windows covered with metal bars (3)	Windows broken (4)	Holes/ cracks or crumbling in foundation (5)	Roof has holes (6)	Roof missing shingles/ other roofing materials (7)	Outside walls missing siding/ bricks/etc. (8)	Roof's surface sags or is uneven (9)	Outside walls slope/lean/sl ant/ buckle (10)	Evidence of rodents in unit (11)	Garage or carport with unit (12)	Holes in floor (13)	Neighbor-hood has bad smells (14)	Total Renovation Expenditures (15)
Any foreign-born person in household (1=Yes, 0=No)	-0.003	0.001	0.009	0.004	0.001	0.001	0.012	0.004	-0.009	0	-0.001	0.006	0.003	0.007	99.462
	(0.009)	(0.014)	(0.006)	(0.008)	(0.007)	(0.006)	(0.009)	(0.007)	(0.007)	(0.005)	(0.016)	(0.010)	(0.004)	(0.010)	(600.262)
ln(Income) (Income for Column 15)	-0.002	-0.004	0.003	-0.001	0	0	-0.001	-0.002	-0.002	-0.001	0.006	0	-0.001	-0.001	0.003
	(0.002)	(0.003)	(0.001)**	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)**	(0.002)	(0.001)	(0.002)	(0.001)***
Married (1=Yes, 0=No)	0.004	0.017	0.003	-0.001	0.01	0.004	-0.008	0.003	0.007	-0.003	-0.004	0.009	-0.001	-0.007	259.155
	(0.007)	(0.012)	(0.005)	(0.007)	(0.006)*	(0.005)	(0.007)	(0.006)	(0.006)	(0.004)	(0.014)	(0.009)	(0.003)	(0.008)	(492.479)
Sex of householder (1=Male, 0=Female)	-0.013	-0.007	-0.007	-0.008	-0.007	-0.015	0.003	0.002	-0.011	-0.001	-0.013	-0.007	-0.005	0.008	-126.111
	(0.007)*	(0.011)	(0.005)	(0.007)	(0.006)	(0.005)***	(0.007)	(0.005)	(0.005)**	(0.004)	(0.013)	(0.008)	(0.003)	(0.008)	(471.364)
Age of householder	-0.001	0	0	-0.001	0	0	-0.001	0	-0.001	0	0	0	0	-0.001	-40.97
	(0.000)**	(0.000)	(0.000)	(0.000)**	(0.000)	(0.000)*	(0.000)***	(0.000)	(0.000)***	(0.000)	(0.000)	(0.000)	(0.000)**	(0.000)*	(17.943)**
Head of household is white (1=Yes, 0=No)	-0.015	0.012	-0.013	0.004	-0.02	-0.002	0	-0.019	-0.012	-0.003	-0.026	0.008	-0.01	0.003	-432.127
	(0.009)	(0.015)	(0.007)*	(0.009)	(0.007)***	(0.006)	(0.009)	(0.007)***	(0.007)*	(0.005)	(0.017)	(0.011)	(0.004)**	(0.010)	(615.095)
Same Household as in 2001 (2003 always 1; 2001: 1=Yes, 0=No)	-0.007	0.043	0.004	-0.001	0.019	-0.003	-0.01	-0.009	-0.007	-0.012	0.069	-0.008	-0.007	0.002	1,886.89
	(0.009)	(0.015)***	(0.007)	(0.009)	(0.008)**	(0.006)	(0.009)	(0.007)	(0.007)	(0.005)**	(0.017)***	(0.011)	(0.004)	(0.010)	(639.489)***
Houisng Unit Fixed Effects	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Education dummies	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
Number of Housing Units	27044	26782	26736	26741	26701	26728	26721	26737	26728	26736	27044	27025	27044	26834	27281

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 4
Gravity Pull Instrument

	Change in Log Average Value				
	(1)	(2)	(3)	(4)	(5)
Change in Foreign Population/Population	**-0.346** (0.081)***	**-0.581** (0.131)***	**-0.202** (0.148)***	**-0.186** (0.050)***	**-0.184** (0.053)***
Share Foreign-Born at T-10			-0.092 (0.014)***	-0.093 (0.013)***	-0.092 (0.013)***
Gravity Pull+					-0.139 (0.393)
Other variables in Table 1, Column 2	*no*	*yes*	*yes*	*yes*	yes
MSA-Year Fixed Effects	*yes*	*yes*	*yes*	*yes*	*yes*
Instruments	*Gravity Pull*	*Gravity Pull*	*Gravity Pull*	*Gravity Pull, Gravity Pull * MSA Immigration, Gravity Pull* Share Foreign Born at T-10*	*Gravity Pull, Gravity Pull * MSA Immigration, Gravity Pull* Share Foreign Born at T-10*
F-test of excluded variables	75.75	30.34	22.12	364.07	335.81
N	34833	34833	34833	34833	34833

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
+ As defined in text and divided by 1,000,0000

TABLE 5
Immigrant Inflows and Native Mobility (Within MSA)

	Change in Native Population/ Population at T-10		(Change Non-Hispanic White Population)/ (Population at T-10)	
	(1)	**(2)**	**(3)**	**(4)**
Change in foreign born/Population at T-10	**1.244** (0.108)***	**-0.137** (0.043)***	**0.772** (0.105)***	**-0.675** (0.045)***
Other variables in Table 5, Column 5	*yes*	*yes*	*yes*	yes
Instruments	*None*	*Gravity Pull, Gravity Pull * MSA Immigration, Gravity Pull* Share Foreign Born at T-10*	*None*	*Gravity Pull, Gravity Pull * MSA Immigration, Gravity Pull* Share Foreign Born at T-10*
N	36847	36847	36847	36847

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
+ As defined in text and divided by 1,000,0000

TABLE 6

Where does the price-immigration link matter?

	Change in Log Value		
	(1)	**(2)**	**(3)**
Change in Foreign Population/Population	**-0.057**	**2.001**	**1.876**
	(0.033)*	(0.268)***	(0.269)***
Change in Foreign Population/Population * Share Non-Hispanic white at T-10	**-0.29**		**-0.189**
	(0.050)***		(0.050)***
Change in Foreign Population/Population * Log Average House Value at T-10		**-0.195**	**-0.174**
		(0.023)***	(0.024)***
MSA-Year Fixed Effects	*yes*	*yes*	*yes*
Change in Housing Quality	*yes*	*yes*	*yes*
Housing Quality at T-10	*yes*	*yes*	*yes*
Other variables in Table 1	*yes*	*yes*⫫	*yes*⫫
Observations	34833	34835	34835
R-squared	0.85	0.85	0.85

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

⫫ In equations 2 and 3, we substitute log of income at T-10 by log of housing values at T-10. The correlation between these variables is 0.9

TABLE 7
Immigrant Density and Rents (Within City)

	Non-Rent-Control Cities	
	Change in Log Rents	
	(1)	**(2)**
Change in Foreign Population/Population	**-0.071**	**0.053**
	(0.016)***	(0.039)
Change in Foreign Population/Population * Share Non-Hispanic white at T-10		**-0.214**
		(0.059)***
MSA-Year Fixed Effects	*yes*	*yes*
Change in Housing Quality	*yes*	*yes*
Housing Quality at T-10	*yes*	*yes*
Other variables in Table 1	*yes*	*yes* $^{\perp\!\!\!\perp}$
Observations	21282	21282
R-squared	0.85	0.85

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 8
Channels (Correlations)

	Change in Log Value			
	(1)	**(2)**	**(3)**	**(4)**
Change in Foreign Population/Population	**-0.24**	**-0.227**	**-0.043**	**0.125**
	(0.015)***	(0.016)***	(0.015)***	(0.017)***
Change in Share High School Drop Outs			-0.037	0
			(0.019)**	(0.019)
Change in Share with Bachelor's Degree			0.489	0.443
			(0.019)***	(0.019)***
Change in Log Family Income			0.34	0.321
			(0.008)***	(0.008)***
Change in the Share Non-Hispanic White				0.215
				(0.011)***
MSA-Year Fixed Effects	*yes*	*no*	*yes*	*yes*
School District-Year Fixed Effects	*no*	*yes*	*no*	*no*
Other Variables in Table1, Column 2	*yes*	*yes*	*yes*	*yes*
Observations	34833	34813	34828	34828
R-squared	0.85	0.89	0.87	0.88

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 9

Using Immigrant "Pulls" and Interactions as Instruments for Changes in Channels

	Change in Log Average Value
Change in Share Persons Speaking Oly English	-0.038
	(0.115)
Change in Share High School Drop Outs	-0.702
	(0.208)***
Change in Share with BAchelor's Degree	0.702
	(0.257)***
Change in Log Family Income	-0.379
	(0.143)***
Change in the Share Non-Hispanic White	0.328
	(0.102)***
MSA-Year Fixed Effects	*yes*
Change in Housing Quality	*yes*
Housing Quality at T-10	*yes*
Other Variables in Table 1	*yes*
Immigrant Share Lags	*yes*
IV	*Pulls by country, interactions with lagged immigrant shares by country and number of new immigrants over population (MSA level)* [as in Table 4, column 5]

	F-test of excluded instruments in first stage by equation
Change in Share Persons Speaking Oly English	46.83
Change in Share High School Drop Outs	20.56
Change in Share with Bachelor's Degree	9.34
Change in Log Family Income	4.8
Change in the Share Non-Hispanic White	34.51

Appendix TABLE 1
Descriptive Statistics

Variable	Mean (S.D.)	Variable	Mean (S.D.)	Variable	Mean (S.D.)
Change in log value	0.478 (0.421)	Change share single attached units	0.020 (0.051)	Share single detached units at T-10	0.623 (0.268)
Change in foreign population/population	0.052 (0.072)	Change share housing units in 2 unit buildings	-0.006 (0.027)	Share single attached units at T-10	0.055 (0.088)
Change share units with no bedrooms	0.008 (0.023)	Change share housing units in 3-4 unit buildings	0.002 (0.031)	Share housing units in 2 unit buildings at T-10	0.048 (0.092)
Change share units with 1 bedroom	0.003 (0.057)	Share units with no bedrooms at T-10	0.020 (0.037)	Share housing units in 3-4 unit buildings at T-10	0.045 (0.061)
Change share units with 2 bedrooms	-0.015 (0.072)	Share units with 1 bedroom at T-10	0.148 (0.124)	Share with bachelor's degree at T-10	0.208 (0.143)
Change share units with 3 bedrooms	-0.006 (0.074)	Share units with 2 bedrooms at T-10	0.299 (0.146)	Share high school drop outs at T-10	0.269 (0.161)
Change share units with 4 bedrooms	0.004 (0.052)	Share units with 3 bedrooms at T-10	0.369 (0.157)	Log family income at T-10	10.156 (0.348)
Change share units with electric heating	0.057 (0.098)	Share units with 4 bedrooms at T-10	0.138 (0.123)	Share white at T-10	0.815 (0.228)
Change share units with oil heating	-0.029 (0.070)	Share units with electric heating at T-10	0.227 (0.246)	Share 25 or younger at T-10	0.388 (0.093)
Change share units with gas heating	-0.025 (0.105)	Share units with oil heating at T-10	0.089 (0.194)	Share 65 or older at T-10	0.112 (0.099)
Change share units with complete plumbing	0.005 (0.015)	Share units with gas heating at T-10	0.630 (0.312)	Share households family + kids at T-10	0.364 (0.150)
Change share units with complete kitchen facilities	0.006 (0.017)	Share units with complete plumbing at T-10	0.990 (0.020)	Ownership rate at T-10 (households)	0.672 (0.208)
Change share units built 10 years ago or less	-0.116 (0.208)	Share units with complete kitchen facilities at T-10	0.987 (0.020)	Vacancy rate at T-10	0.063 (0.064)
Change share units built 20 years ago or less	-0.021 (0.233)	Share units built 10 years ago or less at T-10	0.308 (0.276)	Log density at T-10	7.092 (1.570)
Change share units built 30 years ago or less	-0.011 (0.220)	Share units built 20 years ago or less at T-10	0.244 (0.166)		
Change share single detached units	-0.025 (0.100)	Share units built 30 years ago or less at T-10	0.210 (0.172)		

Appendix Table 2

Neighborhood and Home Characteristics of Immigrant Homeowners

Foreign Born Dummy (AHS) Impact on…		
Year unit was built	**3.607**	(0.389)***
Open cracks wider than dime	-0.003	(0.003)
Neighborhood has neighborhood crime	**-0.029**	(0.005)***
Windows covered with metal bars	**0.034**	(0.005)***
Windows broken	0.001	(0.003)
Holes/cracks or crumbling in foundation	0	(0.002)
Roof has holes	-0.002	(0.002)
Roof missing shingles/other roofing materials	0	(0.003)
Outside walls missing siding/bricks/etc.	0.001	(0.002)
Roof's surface sags or is uneven	-0.002	(0.002)
Outside walls slope/lean/slant/buckle	-0.001	(0.001)
Evidence of rodents in unit	**-0.043**	(0.006)***
Garage or carport with unit	0.005	(0.007)
Holes in floor	0.001	(0.001)
Neighbrohood has bad smells	-0.002	(0.003)
Total Renovation Costs per Year	**608.85**	(109.876)***
Number of people in household	**0.834**	(0.030)***
Number of bedrooms in unit	**0.107**	(0.017)***
Persons per Bedroom	**0.272**	(0.011)***
Current market value of unit	1,022.63	(2990.999)

Regressions include: MSA fixed effects and Year Fixed effects
Ownership rate of immigrants is 48% in this sample

Appendix TABLE 3
2SLS: First Stage

	Change in Foreign Population/Population			
	(1)	**(2)**	**(4)**	**(5)**
Estimated Immigrant Pull (Gravity)	3.499	1.923	2.121	2.971
	(0.389)***	(0.327)***	(0.428)***	(1.15)***
Foreign Population at T-10/Population at T-10			-0.021	0.258
			(0.009)***	(0.009)***
Estimated Immigrant Pull (Gravity) * Share Foreign Born at T-10				-17.269
				(0.78)***
Gravity Pull * (MSA Immigrants/Initial Population)				32.138
				(4.872)***
MSA-Year Fixed Effects	*yes*	*yes*	*yes*	*yes*
Other Variables in Table 1, Column 2	*no*	*yes*	*yes*	*yes*
Observations	45336	45336	45336	45336
R-squared	0.130	0.268	0.269	0.318

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix TABLE 4
Gravity Pull Instrument: Changes

	Change in Log Average Value
	(1)
Change in Foreign Population/Population	-0.408
	(0.100)*
Other variables in Table 1, Column 2	*yes*
MSA-Year Fixed Effects	*yes*
Instruments	Δ*Gravity Pull*
F-test of excluded variables	5.53
N	34833

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix TABLE 5

Past Immigrant Density as an Instrument

	(1)	(2)	(3)
Change in Foreign Population/Population	-0.283 (.046)***	-0.228 (.045)**	-0.154 (.046)**
Share Foreign-Born at T-10			-0.094 (0.012)***
Other variables in Table 1, Column 2	*yes*	*yes*	*yes*
MSA-Year Fixed Effects	*yes*	*yes*	*yes*
Instruments	*Share Foreign-Born at T-10, (Share Foreign-Born at T-10)* ^{2}	*Share Foreign-Born at T-10, (Share Foreign-Born at T-10)* ^{2,} *Share Foreign-Born at T-10 * Immigrants per Capita in MSA*	*(Share Foreign-Born at T-10)* ^{2,} *Share Foreign-Born at T-10 * Immigrants per Capita in MSA*
Sample	*All*	*All*	*All*

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix Table 6

Heterogeneous Correlations by Country

	Change in Log Value
Change Share Mexico	**-0.273**
	(0.026)***
Change Share China	**-0.278**
	(0.071)***
Change Share Philippines	**-0.597**
	(0.106)***
Change Share Dominican	**-0.825**
	(0.172)***
Change Share Cuban	**0.172**
	(0.090)*
Change Share Central America	**-0.597**
	(0.074)***
Change Share Europe	**0.1**
	(0.050)**
Change Share East Asia	**-0.25**
	(0.054)***
Change Share Caribbean	**-0.43**
	(0.058)***
Change Share South America	**-0.35**
	(0.078)***
Change Share Oceania	**0.682**
	(0.319)**
Change Share Canada	**1.475**
	(0.230)***
Change Share Midle East	**-0.193**
	(0.161)
Change Share Africa	**-0.145**
	(0.133)
Change Share South Asia	**0.039**
	(0.071)
Change Share Other Foreign Country	**0.079**
	(0.088)
MSA-Year Fixed Effects	*yes*
Change in Housing Quality	*yes*
Housing Quality at T-10	*yes*
Other Variables in Table 1	*yes*

Appendix 2: Proofs

Proof 1

In equilibrium, there is an individual with income $\chi + \underline{I}$ who is indifferent between the immigrant neighborhood and the other 3 neighborhoods in the city. All individuals with income below hers want to live in an immigrant neighborhood, and all individuals with income above hers want to live in the all-native neighborhoods.

1. Those richer than the marginal person do not want to live in the immigrant neighborhood.

Assume $I' > \underline{I}$. We know that:

$$\left(X + \underline{I} - R_j\right)^{\varphi} = \left(X + \underline{I} - R_4\right)^{\varphi} \phi^{1-\varphi}, \ \forall j \neq 4$$

where $\left(\phi < 1\right)$

$$\left(X + \underline{I} - R_j\right)^{\varphi} < \left(X + \underline{I} - R_4\right)^{\varphi} => \left(X + \underline{I} - R_j\right) < \left(X + \underline{I} - R_4\right) => -R_j < -R_4 => R_j > R_4.$$

We want to show that $\left(X + I' - R_j\right)^{\varphi} > \left(X + I' - R_4\right)^{\varphi} \phi^{1-\varphi}$.

$\left(\dfrac{X + I' - R_j}{X + I' - R_4}\right)^{\varphi} \overset{?}{>} \phi^{1-\varphi}$. But we know $\left(\dfrac{X + \underline{I} - R_j}{X + \underline{I} - R_4}\right)^{\varphi} = \phi^{1-\varphi}$.

So $\left(\dfrac{X + I' - R_j}{X + I' - R_4}\right)^{\varphi} \overset{?}{>} \left(\dfrac{X + \underline{I} - R_j}{X + \underline{I} - R_4}\right)^{\varphi} => \left(\dfrac{X + I' - R_j}{X + I' - R_4}\right) \overset{?}{>} \left(\dfrac{X + \underline{I} - R_j}{X + \underline{I} - R_4}\right)$.

Given $X - R_j < X - R_4$, and $I' > \underline{I}$:

$$\left(\frac{I' + \left(X - R_j\right)}{I' + \left(X - R_4\right)}\right) \overset{?}{>} \left(\frac{\underline{I} + \left(X - R_j\right)}{\underline{I} + \left(X - R_4\right)}\right) =>$$

$$I' \cdot \underline{I} + (X - R_j) \cdot \underline{I} + I' \cdot (X - R_4) + (X - R_j) \cdot (X - R_4) \overset{?}{>}$$
$$I' \cdot \underline{I} + I' \cdot (X - R_j) + (X - R_4) \cdot (X - R_j) + \underline{I} \cdot (X - R_4) =>$$

$$(X - R_j) \cdot \underline{I} + (X - R_4) \cdot I' \overset{?}{>} (X - R_j) \cdot I' + (X - R_4) \cdot \underline{I} \ =>$$

$$\left\{\left(X - R_j\right) - (X - R_4)\right\} \underline{I} + \left\{\left(X - R_4\right) - (X - R_j)\right\} I' \overset{?}{>} 0 \ =>$$

$$\left\{R_4 - R_j\right\} \underline{I} + \left\{R_j - R_4\right\} I' \overset{?}{>} 0 \ =>$$

$$\underbrace{\left\{R_4 - R_j\right\}}_{\overset{\wedge}{0}} \underbrace{\left\{\underline{I} - I'\right\}}_{\overset{\wedge}{0}} \overset{?}{>} 0.$$

Q.E.D.

2. Those poorer than the marginal person do not want to live in non-immigrant areas. *Similar to 1.*

Proof 2

At $\phi = 0$,

$$I' = \frac{-\beta I - C_1 \frac{1-\varphi}{\varphi}}{(1+\frac{\beta}{3} - 1 + \beta)} = \frac{-\beta I - C_1 \frac{1-\varphi}{\varphi}}{\frac{4}{3}\beta I}.$$

Since (arbitrarily) $I = \frac{1}{4}$ => $-\frac{\frac{\beta}{4} + C_1 \frac{1-\varphi}{\varphi}}{\frac{\beta}{3}} < 0$.

At $\varphi = 1$ (no ethnic preferences),

$$I' = \frac{-\beta I}{\left(1+\frac{\beta}{3}\right) I - \left(1-\beta\right) I} = \frac{-\beta I}{\frac{4}{3}\beta I} = -\frac{3}{4}.$$