PERE 7/30/02
SAIZ 11:00AM

Immigration and Housing Rents in American Cities

Abstract

Is there a local economic impact of immigration? This paper shows that immigration pushes up rents and housing values in destination cities. The positive association of rents and immigrant inflows is pervasive in city cross-sections and in time series for all metropolitan areas. Evidence from a major change in the U.S immigration cap supports a causal interpretation. I also use instrumental variables based on changes in the characteristics of source countries (*push* factors) and on a "shift-share" of national levels of immigration into metropolitan areas. The results suggest that an immigration inflow equal to 1% of the city population increases rents and housing values by about 1.5%, with rents increasing more in the short-run and housing prices increasing more in the longer run. Housing supply is sensitive to the price signals.

Keywords: Immigration, housing rents

JEL: J61, R23, R31

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Thanks to David Cutler and Ed Glaeser for guidance. Thanks to Pablo Casas-Arce, Tara Watson and participants in the Harvard Labor Workshop and Public Economics Seminar for comments. They could not avoid the shortcomings in this version of the paper, which are only attributable to the author. I gratefully acknowledge financial support from the Harvard Program in Inequality and Social Policy and the Lincoln Institute for Land Policy.

1. Introduction

Immigration continues to be one of the most important factors in the demographic evolution of the United States. By 2050, it will account for as much as two thirds of population growth (NRC, 1997). And its effects will be particularly salient in certain areas, as immigrants tend to settle in a few "gateway cities." In 1990, 73 percent of all foreign-born persons (as opposed to 36 percent of the native population) lived in California, New York, Florida, Texas, New Jersey or Illinois (Passel and Zimmerman, 2001). Major American metropolitan areas, such as New York, Los Angeles, Miami and San Francisco, have seen levels of immigration equal to more than 13% of their initial population, in only sixteen years (1983-1998).[1] What is the local impact of such immigration inflows in American cities? To answer this question, labor economists have focused on wage impacts,[2] and have found only small effects. In this paper I argue for the importance of the housing market.

Immigrants will represent a new "baby boom" (Mankiw and Weil, 1989) for the American housing markets of the 21st century. From 1980 till 1998, foreign-born renter households increased their share of total renter-occupied housing from 15% to 28% in the Northeastern and Western states. Immigrant households have already accounted for a third of total household growth since 1995 (JCHS, 2000, 2001). Immigration determines housing demand to an even greater extent in those metropolitan areas where the foreign born tend to settle.

This paper uses annual data on immigration inflows, housing rents, prices, and new construction at the metropolitan area level. This evidence suggests that part of the distributive impact of immigration on local economies may come through changes in rents and housing prices. Immigration inflows equal to 1% of a city's population are associated with increases in housing rents and prices of about 1.5%. Unexpected immigration shocks are associated with even greater impacts in the short run. The positive correlation between the share of the foreign-born population and rents is strong in the cross-section data. To avoid omitted variable bias, I use longitudinal data and find that cities with major inflows of immigrants experienced higher *rent growth* during the period 1983-1997. I include state fixed effects to account for different regional trends that could be spuriously correlated with the immigrants' geographic patterns of settlement. I further use annual

[1] In Table A.1 I show these major "immigrant cities."

[2] Studies on wage impacts represent the bulk of the research on immigration in economics. It is only fair, though, to acknowledge studies on fiscal impacts (e.g. Borjas and Hilton, 1996), natural resources (Simon, 1999, Chapter 9), college admissions for minorities (Hoxby, 1998), native self-employment (Fairlie and Meyer, 2000), unemployment (Gross, 1999; Gang and Rivera-Batiz, 1999) and the impact of foreign teaching fellows, like this author, on the academic performance of US undergraduates (Borjas, 2000).

differences in immigration inflows by city, and find that rents accelerate when immigration inflows into a metropolitan area accelerate. To avoid the possible endogeneity of immigration with respect to other omitted factors that generate rent growth, I identify sources of exogenous variation in the immigration inflows. For example, immigrant cities (cities with high immigration inflows in previous periods) experienced higher rent growth in the aftermath of the 1990 Immigration Act, which increased the legal immigration cap by 30%. I also use instruments based on general changes in the national levels of immigration, on changes in the characteristics of the countries that send immigrants, and on the distribution of immigrants in earlier periods. Using these quasi-experiments, I show that the association between immigration and rent growth is not driven by local contemporaneous shocks that could be correlated with immigration; the results support a causal interpretation.

The findings in this paper contrast sharply with the results from the labor literature on immigration (Borjas, 1994a; Friedberg and Hunt, 1995). Studies that use historical data find a negative local association between immigration and wages in periods previous to WWI (Goldin, 1994; Ferrie, 1996a). But remarkably, there is not much evidence of such a relationship holding in the contemporaneous United States' metropolitan areas. Even unexpected immigration shocks that rapidly expand the local labor supply do not seem to decrease wages (Card, 1990). There are at least three possible explanations for this surprising result. Natives may be choosing to leave when immigrants arrive, rather than face increased competition in the labor market (Filer, 1992); immigrants may be moving into cities with positive shocks in productivity and wage growth; or the local labor supply may be more elastic than economists have thought (Card and Krueger, 1995). The evidence in this work supplies the literature with a new piece in the puzzle of the local impact of immigration. It shows a potential way in which immigrants can have a local distributive impact. Furthermore, it suggests another major mechanism by which immigration can affect the migration decisions of natives.

The rest of the paper is organized as follows. Section 2 describes some stylized facts about the housing conditions of immigrants. It also describes the scant previous research about the impact of immigration on housing markets, and the empirical challenges of such exercise. Section 3 reviews some ideas that are relevant to the economics of immigration and housing prices. I lay out a simple model that studies the response of the housing market in the short run and the long run. The model also contemplates mobility by natives. Section 4 describes the data sources. I have obtained data on rents, housing prices, immigration, income and employment for most of the U.S' metropolitan areas

during the period 1983-1997. Section 5 introduces the methodology and results of the paper. I use dynamic panel data estimation (GMM), and estimation of models in first and second differences. I introduce the results from a "natural experiment": the immigration act of 1990. I also present results from the specifications with instrumental variables, and the response of the supply of new housing. Section 6 concludes the paper.

2. The empirics of immigration and housing

Few papers have addressed the topic of immigration and the housing market. A number of studies describe the housing condition of immigrants. We know that immigrants tend to live in rental housing (JCHS, 2000, Burnley, Murphy and Fagan, 1997) and in housing units of lower quality, especially during the period just after they arrive (Thave, 1999; Friedman, Rosenbamum and Schill, 1998). We also know that immigrants tend to consume less with respect to housing services: crowding[3] is more frequent in immigrants' households (Baer, Myers, and Choi, 1996). Over time, immigrants tend to resemble natives more in terms of crowding, home ownership and suburbanization patterns (Callis, 1997; Myers, 1999; Myers and Lee, 1999, Myers and Park, 1999).

Much less is known about the impact of immigrants in destination cities. Muller and Espenhade (1985) report that rental housing experienced major price increases in Los Angeles, compared to other American metropolitan areas, during the period 1967-83. Los Angeles was one of the most important "gateway" cities for immigration in that period. The authors go on to explain this finding: "because most immigrants live in rental units, the rental housing market would experience substantial pressure from the rising immigrant-induced demand." The evidence points to housing markets as a possible way to find the local effects of immigration.

Burnley, Murphy and Fagan (1997) report that immigration is one of the important correlates of short and long term inflation of housing prices in Sidney, the main immigrant city in Australia. Ley and Tuchener (1999) find a similar time-series correlation between housing prices and immigration in Toronto and Vancouver, Canada. These studies are descriptive in nature. The authors do not control for other variables that could account for changes in housing prices, such as economic cycles.

[3] The demographic literature on crowding defines it as when a housing unit holds more than one person per room (not including kitchens, baths and the like).

Research in this area presents several challenges that need to be addressed. First of all, omitted variables that are not observed by the researcher could be driving both immigration inflows and housing costs. Immigrants may respond to other factors that cause rents to increase, such as expectations of future economic growth, improved amenities or changes in the preferences for existing amenities. In principle, this could lead the researcher to overestimate the impact of immigration on rents. Secondly, immigration may be endogenous. Immigrants may be looking for better deals: they might decide to settle in places where rents are increasing more slowly. If immigration inflows are very sensitive to housing costs, then the estimates of the relation between immigration and rents could be biased downwards. In this context, we need to look for exogenous sources of variation in the immigration inflows to ascertain causality.

In Saiz (2001), I provide evidence of a causal relationship between immigration inflows and housing rents. I use the "Mariel Boatlift" [4] as a natural experiment, following Card's (1990) study about labor market outcomes. This immigration *shock* represented an exogenous increase of 9% in the Miami renter population in one year (or about 4% of the total population). I show that rents increased by 8% more in the Miami metropolitan area than in the rest of metropolitan Florida and two other groups of comparison cities. Immigration was the most likely explanation for this differential growth in rents; but the differences-in-differences approach that Saiz (2001) uses has shortcomings that are worth mentioning. Different trends in the "treatment" and "control" groups can generate spurious results. [5] This criticism does not claim there is a systematic bias in the *diffs-in-diffs* estimates, but suggests a potential lack of power of the methodology. A second shortcoming of the differences-in-differences approach is that, even if the econometrician can establish causality, the estimates need not be generalizable. Saiz (2001) measures the impact of a very big unexpected immigration shock on a very particular housing market, at a specific point in time.

[4] About 150,000 Cuban refugees arrived in the United States between May and September 1980. They had been allowed to flee from Cuba after political turmoil in the island. A short-lived decision by the Castro government granted them a permit to leave. Many of these immigrants (some estimated 80,000) decided to settle in Miami because of the proximity of Southern Florida to Cuba and the fact that a major Cuban émigré community was already present there.

[5] Other factors may have been at play in Miami during the early 80s. These factors may have affected rents differently in that metropolitan area. Angrist and Krueger (2000) show how another failed "Mariel boatlift" in 1994 - thousand of Cubans took to the sea that year but were prevented from landing in Miami by the US Navy- could have been interpreted as having a negative effect on wages using a *diffs-in-diffs* methodology.

3. The economics of immigration and rents

Why should we be specifically interested in the impact of immigration on rents? How is immigration different from general population growth? Is it surprising to find a substantial impact of immigration on local housing markets? From a housing market perspective, several facts distinguish immigration from general population growth.

Immigrants are much more spatially concentrated than natives. This is the housing market equivalent of the difference in the skill composition of the immigrant and native populations in the labor market (Borjas, 1994b). We thus expect the effect of immigration to be stronger on specific housing markets.

A related issue is that the factors attracting immigrants to "immigrant cities" are different from the factors motivating natives to migrate. Immigrants are attracted to cities with strong immigrant and ethnic networks. Natives are, by and large, indifferent to these networks. Some of the factors that explain migration by natives are employment, wages, amenities and, critically, housing prices – they tend to look for less expensive locations. Thus it would not be surprising to find a mild correlation between changes in housing prices and changes in native population. Immigration inflows may be more independent from changes in housing supply factors that explain rent growth.

Yet it is not obvious that we should actually see a local correlation between immigration and housing rents. Consider one of the arguments in the labor literature. Natives may move out or avoid areas where immigrants settle because of the competition in the local labor market. If immigrants substituted for natives "one for one" in the labor market, then we would not see any increase in the local demand for housing. Finding a positive local effect of immigration on rents allows us to reject the strong null of "complete displacement" in the labor market.

A similar argument applies to competition in the housing market. Immigrants may be less sensitive to housing rents, because local immigrant-specific amenities and networks are more important for them. Natives, though, may be more sensitive to local rents. If this is the case, immigration inflows could spur net out-migration of natives *because of the increased housing costs* that are associated with a housing demand shock. There is no way to separate the effect of increased housing demand (immigration) from the potential decreased demand (native out-migration). Part of the local response to the *treatment* (immigration) can occur through out-migration. In this case, we need to be careful about the interpretation of the coefficient of immigration on rents. In general it will not correspond to the housing supply elasticity. Nevertheless, we should expect a positive effect of

immigration on rents if natives are not infinitely sensitive to changes in housing costs, and if they are not displaced "one for one" in the labor market.

I introduce a simple model that contemplates all these ideas. This model can be used as a roadmap to understand the local impact of immigration on housing. It is structured around the idea of spatial equilibrium with simple supply and demand schedules. The focus is on partial equilibrium: I concentrate on the effects of immigration on a city, which I will name city C. I contemplate housing supply and the mobility of natives.

Start by assuming that the preferences of native residents can be represented by the following separable utility function:

(1) $$U_{iC} = V_{iC} + \alpha \ln h + w_C - R \cdot h$$

V_{iC} is the value of local amenities in city C for individual i, h is the consumption of housing services by the individual, w_C is the going wage in city C and R stands for the housing rents (the annual cost of a dwelling). The model abstracts from income effects in housing consumption.

The optimal consumption of housing in this setup is given by $h = \frac{\alpha}{R}$.

The preferences for the city's amenities are distributed uniformly. We can order individuals according to their preferences for the city's amenities: $\{0,...,i\}$. Assume that the preferences for each individual can be represented thus: $V_{iC} = A - a \cdot i$.

All residents in the city prefer staying to emigrating. The utility level they obtain outside the city is $\bar{u}$. Using this option value of leaving the city, and the optimal housing consumption, we have:

(2) $$U_{iC} = A - a \cdot i + \alpha \ln \frac{\alpha}{R} + w_C - \alpha \geq \bar{u} \ , \ \forall i \in C$$

The marginal native will be indifferent between staying at C and leaving. Let N_C be the number of native residents in city C. Then:

(3) $$U_{N_C} = A - a \cdot N_C + \alpha \ln \alpha - \alpha - \alpha \ln R + w_C = \bar{u}$$

From this equation we derive the native demand for housing in C:

(4) $$\ln R = \Omega - \frac{a}{\alpha} \cdot N_C$$

, where $\Omega = \frac{1}{\alpha} \cdot \left(A - \bar{u} + w_c + \alpha \ln \alpha - \alpha\right)$.

It is clear that immigrants, especially new immigrants, are attracted to cities by different factors than those that motivate native migration. Consider the 20 major metropolitan areas by the levels of immigration in the period 1983-1998 (Table A.1). Two thirds of all metropolitan immigrants (immigrants in metropolitan areas) moved into metropolitan areas that represented less than one third of the United States' metropolitan population. More than half of the new immigrants settled in only ten Metropolitan Statistical Areas (MSA), which contained only 20% of the metropolitan population. About 20% of Americans lived in non-metropolitan areas in 1980. Only 4.34% of immigrants admitted during the 83-98 period reported planning to settle outside metropolitan areas.

Immigrants are attracted to particular cities because of the existence of previous immigrant communities. Local public goods (such as social networks, schools, language usage, existence of restaurants and specialized shops) increase the amenity value of such cities from their point of view. The existence of such immigrant-specific amenities in some cities is a well-established fact in the literature (NRC, 1997, Portes and Rumbaut, 1996, Rumbaut, 1997). Zhou (1998) reports that "over two thirds of the legal immigrants admitted to the United States since the 1970s are family-sponsored immigrants. Even among employer-sponsored migrants, the role of networking is crucial. Family, kin, and friendship networks also tend to expand exponentially serving as a conduit to additional and thus potentially self-perpetuating migration." Table A.2 illustrates this point. It shows the correlation between changes in non-immigrant population, total immigration and several other variables between 1983 and 1998. Immigration to an MSA is very strongly and positively correlated with the previous density of the foreign born population (with a remarkable correlation coefficient of 0.89). Other population growth is only weakly correlated with the immigrant stock. This clearly points to the existence of differential amenities for the native and foreign-born population.

I model this amenity differential by assuming the following utility for all immigrants at city C: $U_{IC} = A_{IC} + \alpha \ln h + w_C - R \cdot h$, where $A_{IC} \geq A$ is an amenity premium for immigrants in "immigrant cities." For the purposes of this work, the only distinction between immigrants and native is a preference for specific "immigrant" cities. I treat the supply of immigration into city C as exogenous to the initial spatial equilibrium. My empirical specifications try to make this assumption as accurate as possible.

The optimal consumption of housing services for immigrants will be identical to the consumption of natives. Let total population $N = N_C + N_I$, where N_I is the foreign-born

population in *C*. The total demand for housing services ($N \cdot h$) equals total supply (H) in equilibrium:

$$H = (N_C + N_I) \cdot h = (N_C + N_I) \cdot \frac{\alpha}{R} \tag{5}$$

or in logarithms:

$$\ln H = \ln(N_C + N_I) + \ln \alpha - \ln R \tag{6}$$

Let's first analyze the short run effects of an unexpected immigration shock. The supply of housing space and native population cannot change (because of arbitrarily high adjustment costs in the short run). Differentiating equation (5) with respect to the number of immigrants, we obtain the short run impact of unexpected immigration:

$$\frac{dR/dN_I}{R} = \frac{1}{N} \quad \text{or} \quad \frac{dR}{R} = \frac{dN_I}{N} \tag{7}$$

So the percentage change in rents depends on the "immigration impact" (number of immigrants over population). All of the adjustment in the short run comes through changes in the demand for space of residents.[6]

For expected immigration shocks, or for the long run effects of unexpected shocks, we have to consider both the adjustment of the housing supply and the response of native population. I use a variant of the model proposed by Di Pasquale and Wheaton (1994) to describe the long run equilibrium in the housing market. In this setup, expected immigration inflows can be represented as the developers' knowledge of the steady state number of immigrants in the city (N_C). The comparative statics of interest involve changes in the steady state rents and housing supply, given the steady state number of immigrants. In the steady state new construction is equal to depreciation (the depreciation rate times the stock of housing):

$$C = \delta \cdot H \tag{8}$$

Supply of new construction depends on the price of housing. The elasticity of supply is assumed constant:

$$\ln C = \beta_0 + \beta_1 \cdot \ln P \tag{9}$$

Finally, housing prices (*P*) capitalize housing rents at the current interest rate (*i*):

$$R = i \cdot P \tag{10}$$

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[6] This effect can be interpreted as reduction in vacancy rates, increased crowding or conversion of other spaces to residential usage.

Taking logarithms of equations (7) and (9) and combining the three equations, we obtain the long-run supply for housing services:

(11) $$\ln H = \gamma + \beta_1 \cdot \ln R$$

Where $\gamma = (\beta_0 - \beta_1 \cdot \ln i - \ln \delta)$.

Housing demand (6) equals housing supply (10) in the steady state:

(7)-(11) $$\gamma + \beta_1 \ln R = \ln(N_C + N_I) + \ln \alpha - \ln R$$

Differentiating with respect to N_I and rearranging, we can obtain:

(12) $$\frac{d \ln R}{dN_I} = \frac{1}{(1+\beta_1)\cdot N} + \frac{1}{(1+\beta_1)\cdot N} \cdot \frac{dN_C}{d \ln R} \cdot \frac{d \ln R}{dN_I}$$

From (4) we know that $\frac{dN_C}{d \ln R} = -\frac{\alpha}{a}$

Introducing this expression in (12) and simplifying we obtain:

(13) $$\frac{d \ln R}{dN_I} = \frac{\partial R / \partial N_I}{R} = \frac{a}{(1+\beta_1)\cdot N \cdot a + \alpha}$$

The impact of expected immigration inflows (or the long run effect of unexpected shocks) is smaller than the short run impact of unexpected shocks. Both new supply of space and out-migration of natives account for this result. At the same time, even in the long run, immigration is expected to have an impact on rents and prices in receiving cities as long as there are natives with a positive consumer surplus derived from living in city C.

It is interesting to note that if wages were affected by immigration ($\frac{dw_c}{dN_I} < 0$) and if natives were displaced by immigrants "one for one" in the labor market ($\frac{dN_C}{dN_I} = -1$), one should not expect to see any effect of immigration on rents.

Furthermore, note that general population growth need not be associated with increasing rents. Native population is endogenous to the rent level. Positive shifts in the housing supply that cause reductions in β_0 in the model (e.g. reduced regulations) are associated with bigger populations and smaller housing rents.

It is also interesting to note that sources of variation that use "surprises" or unexpected immigration shocks are actually measuring the impact under fixed supply and reduced mobility by

natives (equation (6)). Thus there are two different "treatment effects" of immigration on the local housing market: short run and long run impacts.

4. Data

In order to assess the impact of immigration inflows on housing markets I have assembled data on rents, housing prices, immigration, income, employment and initial characteristics of the US metropolitan areas during the period 1983-1997. In this section I describe and summarize the data that I use in the empirical part. A more detailed explanation of how variables are constructed can be found in the data Appendix.

The main data source for the immigration inflows is the Immigration and Naturalization Service (INS) "Immigrants Admitted to the United States". I use these yearly databases to construct yearly immigration inflows from 1979 to 1997. The datasets contain information on all legal immigrants in the United States. The main variables for this work are the nationality of the immigrant and the zip code of intended residence. I match zip codes to 1993 Metropolitan Statistical Areas using the Census MABLE Geo-correlation Engine.

The INS provides data about illegal immigrant apprehensions and estimates of the net flows of illegal immigrants in several issues of the "Statistical Yearbook of the Immigration and Naturalization Service." Unfortunately, the estimates of the illegal net inflows are not disaggregated at the metropolitan area level. Moreover, the estimates of illegal immigration are imprecise, and do not change much from year to year. Because many of the results in this paper use time series variation in immigration, and because all results are at the metropolitan level, the empirical specification uses the legal immigrant inflows. Nevertheless, I will be able to provide a lower bound to my estimates, taking into account total levels of estimated illegal immigration over longer periods.

Annual data for rents in MSAs are from the Department of Housing and Urban Development (HUD) Fair Market Rent series (FMR). Fair market rents for a fiscal year[7] are determined before October of the previous calendar year. I use the year in which FMR are calculated to define my rent variable. I then match these yearly data on rents to the immigration data for the period 1983-1997. The rents correspond to units in the 45th percentile of the rent distribution.[8] Data on housing prices

[7] The 2002 fiscal year, for example, spans from October 2001 to the end of September 2002.

[8] From 1996 on, HUD changed the definition of FMR to the rent for a unit in the 40th percentile. HUD provides data for both the 45th and the 40th percentile in 1995. I use the ratio of rents in both percentiles and the evolution of rents in the 45th percentile from 1995 to extrapolate the evolution of rents in the 40th percentile.

comes from the Freddie Mac/Fannie Mae (FM) repeated sales index. I also use microdata from the 1985 and 1995 American Housing Surveys.

Data on the evolution of population, income and employment at the MSA level are from the BEA Regional Information System (REIS). Other data on the characteristics of the central cities are obtained from the County and City Data Book (1998). Malpezzi (1996) is another data source for MSA characteristics. The stock of housing units older than 30 years and the stock of immigrants in 1980 come from the 1980 Census, County Data. I also use micro-data on the foreign born and rents from the IPUMS 1980 and 1990 1% metropolitan samples. I obtain the longitudinal data on housing permits from the Census " Construction Reports: Series C40."

Several data are used for the countries of origin of the foreign born. My main data sources are the "World Bank Indicators" and the IMF "Financial Indicators" databases. Data about military conflicts and governance failures is from the "Internal Wars and Failures of Governance 1954-1996" database, from the Center for International Development and Conflict Management at the University of Maryland.

The main unit of observation in most of the empirical work is the MSA-year. In Table 1, I provide some descriptive statistics for the MSAs in 1990. I define the yearly immigration impact as the number of new immigrants divided by the current population. The average city (means are population-weighted) received a yearly inflow of immigrants equivalent to 0.35% of its initial population (or, roughly, 1% in three years). But the variance of the impact is considerable. The maximum impact in 1990 was 1.4% of the population, in Miami. Miami was also the city with the greatest share of foreign-born population in 1980 (35.55%). Overall, about 8% of the urban population was foreign-born in 1980. The rest of the variables summarized are used as controls in most regressions. Amenities such as safety and temperature, and the initial share of population with a bachelor's degree are important determinants of population growth (Glaeser, Kolko and Saiz, 2001, Glaeser and Shapiro, 2001; Rappaport, 1999). Initial population and income per capita are also included in the regressions. A rent control dummy and the area of the central city are variables on the land and housing supply side. Changes in local income and employment are also important determinants of rent and housing values (Jud, Benjamin and Sirmans, 1996). I include these variables with one lag in the basic specifications. It is important to account for the initial rent level. Immigrants tend to settle in more expensive areas (see Table A.2) and regression to the mean in rents could bias our results. Regression to the mean in rents and housing prices is in line with

previous findings about conditional convergence of home values (Rappaport, 1999)[9]. The immigration impact is the variable of interest.

Table 2 is helpful in describing the correlates of the variable of interest. The total number of immigrants (1983-98) over population (1983) is the dependent variable. Again, the most important predictor of immigration is the stock of foreign-born in 1980. Immigration partially correlates with the central city area, the percentage of the population with a bachelor's degree, the rent control dummy (positive), and the initial population (negative).

5. Methodology and Results

5.1. Least squares results

In section 3 I established that, *ceteris paribus*, the share of immigrants in the population should be one of the determinants of rents and housing prices. In Table 3 I examine whether the theory corresponds with empirical evidence. I make use of the *between* city (BE) panel data results. The dependent variable is the log of FMR rents or the log of the FM repeated sales price index.

The *between* estimates correspond to the regression of the average log rent for each city across time on the average of the explanatory variables. The *between* estimates thus deprive the data of its time series dimension. Column (1) shows the results corresponding to this exercise. The share of foreign born in a city is associated with higher rents,[10] once we control for income, employment, other amenities and initial population (which captures some of the omitted attraction variables). The coefficient suggests that an increase in immigration equal to 1% of the population is associated with an increase in rents of approximately 1.5%. Omitted variables that explain higher rents, such as amenities that are specific to an MSA, and which could be correlated with immigration levels in an MSA, are a potential threat to the interpretation of these *between* results.

A panel Fixed Effects specification could address this potential problem. The data generation process posited in most of the empirical work in this paper is:

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[9] There are other theoretical reasons to include initial rents in the regression. Rents reflect the initial level of amenities. Changes in the valuation of unobserved amenities (Glaeser, Kolko and Saiz, 2001) generate a correlation between initial rents and rent changes. Finally, the classical Alonso-Muths-Mill model also predicts regression to the mean in rents. Bigger cities tend to have higher distances from the edge to the center, and higher rents. At the same time, population growth in these cities results in smaller *rent changes*, because a big increase in the area of the radial city is achieved with a small increase in the radius.

[10] I do not undertake the between regressions for housing prices. The variable is an index number (with base 100 for the years 1986 and 1987) and comparisons between cities are meaningless.

$$(1) \qquad \ln(r_{it}) = \beta \cdot (\mathrm{Im}/pop)_{it-1} + \alpha \cdot X_i \cdot t + \mu \cdot Z_{it-1} + \phi_t + \rho_i + \varepsilon_{it}$$

Where $\ln(r_{it})$ is the logarithm of rents (log price index), and (Im/pop) is the share of immigrants in the population. X is a vector of predetermined MSA characteristics, and I allow for different trends in the evolution of rents contingent on these characteristics. Z is a vector of other dynamic variables (lagged income and employment rates), ϕ_t is a year fixed effect and ρ_i is a city-specific fixed effect that captures time-invariant factors accounting for rents in the city. ε is a random perturbation under the Gauss-Markov assumptions. The subscripts i and t stand for the city and year, respectively. I use one lag for the immigration impact, income per capita and employment rate variables, in order to allow one period for the markets to adjust (one year for housing values to capitalize increased demand). It is unlikely that rents respond contemporaneously to changes in the dynamic variables. It is well know that rents - as other prices- are somewhat "sticky" in the short run (Genesove, 1999), while annual revisions are usual. I will later test for the adequacy of such lag structure.

A straightforward Fixed Effects estimation of the above model does not take into account the dynamic panel nature of the data. Both rents (empirically) and the stock of immigrants (by construction) are trended series. Integration and spurious regression are common concerns in dynamic panel data estimators (Baltagi and Kao, 2000).

One approach to avoiding spurious regression consists of changing the model to include lagged rents (prices) as an explanatory variable. This type of model may have a theoretical appeal in other contexts, such as in the convergence literature (Islam, 1995). Here I use it as a somewhat "ad hoc" test of the robustness of the qualitative results to spurious regression. The model is:

$$(2) \qquad \ln(r_{it}) = \lambda \ln(r_{it-1}) + \beta \cdot (\mathrm{Im}/pop)_{it-1} + \alpha \cdot X_i \cdot t + \mu \cdot Z_{it-1} + \phi_t + \rho_i + \varepsilon_{it}$$

Notice that I am controlling away any influence of $(\mathrm{Im}/pop)_{it-1}$ on $\ln(r_{it})$ through induced changes in $\ln(r_{it-1})$. The econometric problem in this specification is that the lagged dependent variable is correlated with the error term vector. I estimate the equation using the Arellano and Bond (1991) estimator, based on the General Method of Moments (GMM). This GMM procedure uses lagged values of the dependent variable, the exogenous variables (the initial characteristics of the city) and the predetermined variables (lagged values of immigration, income and employment rates)

as instruments for $\ln(r_{it-1})$. The cumulative immigration impact is calculated by adding the current annual number of immigrants to the stock of the foreign-born the year before, and dividing this magnitude by population. The initial number of the foreign born in the MSA is obtained from the 1980 Census. This variable can be interpreted as the "potential supply" of immigrants, and is the treatment variable of interest in this specification.[11]

The results of the GMM estimation appear in Table 4. Both rents and housing prices are affected by immigration. A z-test cannot reject 2nd order autocorrelation in the rent specification, and the Sargan test rejects the overidentifying restrictions.[12] Results indicate a positive association of immigration inflows and rents but it is not clear that the model is well specified.

A second and preferred approach to deal with the spurious correlation problem consists of taking first differences for all the variables in the model. Levin and Lin (1992) tests reject the null hypothesis that the immigrant stock per population and rents (housing prices) are integrated series. The problem with this test is that the null hypothesis requires that all of the MSA time series have a unit root. If only one of the series is stationary, the test will reject the null hypothesis of non-stationarity. Dickey-Fuller tests for separate MSA show non-stationarity for several of the MSA series. By construction, cumulative immigration is also an integrated variable. Looking at the association between changes of rents, immigration inflows, and changes in income and employment seems a good idea in this context. From the basic empirical model in (10) we obtain:

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[11] It is not possible with current data sources to know the number of immigrants for all Metropolitan areas and years with precision. But the use of the cumulative "potential supply" of immigrants has more advantages than that of being readily calculated. There are three arguments on why such "potential supply" is the treatment of interest. Fist, immigrants are no less concentrated in locations with major immigrant populations after 20 years residing in the United States (Ferrie, 1996b). This suggests a strong "stickiness" of immigration to the initial "ports of entry." Second, one may be interested in the "intention to treat" impact of immigration. Even if some of the immigrants leave, it is important to know how the housing market responded for each immigrant that *arrived* in a city, in order to derive policy implications and forecasts, with the immigration data available. Third, and more importantly, "potential immigration" is the actual potentially exogenous treatment variable of theoretical interest. Internal migration of immigrants will be caused by changes in the conditions of the cities where the immigrants settle. These changes are endogenous to initial immigration inflows. We know that the local wage effects of immigration are small. Thus, a substantial part of an eventual out-migration of the foreign-born from "immigrant cities" might be attributed to local changes in housing costs. It is clear that people who have left a city because of the high housing costs are still part of the demand of housing in that city (if the price was low enough they would have bought housing services in the city). To clarify this point, imagine a city with a completely inelastic housing supply. Assume that everyone consumes the same quantity of housing services. In this setup, any immigration inflow will be associated with a population outflow of the same magnitude. Still, the greater the number of immigrants the greater the demand for housing in the city and the higher the rents: the *number of net migrants* to the city would be the *wrong variable to use.*

[12] Results do not change much if I include the lagged independent variable in a simple fixed effects model (unreported regression available on request).

(3) $$\Delta \ln(r_{it}) = \beta \cdot (\Delta \text{Im}) / pop_{it-1} + \alpha \cdot X_i + \mu \cdot \Delta Z_{it-1} + \phi_t' + \Delta \varepsilon_{it}$$

The specification corresponds to my theoretical discussion on the determinants of rents. It has also an added empirical appeal. The dependent variable is now the annual inflow of immigrants over population.[13] This variable comes straight from the data, as differences in the "potential supply" of immigrants are simply the yearly inflows. β has a more intuitive interpretation here as the percentage change in rents corresponding to an annual inflow of immigrants equal to 1% of the city's population. The model also dispels concerns about spurious regression: plots of the data for rents, income and employment reveal stationarity in the first differences.

Table 5 shows the results of the first differences specification. I present the OLS regressions with standard errors clustered by MSA. I also show regressions using maximum likelihood estimation of a model with ARMA(2,2) perturbations to address the possible existence autocorrelation and moving averages.[14] There is evidence of both autocorrelation and moving averages in the data. It is not surprising that unobserved factors affecting rents and housing prices display such time persistence at the MSA level. In this setup, OLS is a consistent but relatively inefficient estimator. The results (columns 1,2,4 and 5) show that immigration is a significant explanatory variable for changes in rents. Results are fairly robust across specifications and suggest that rents increase by about 1.4% with an immigration impact equal to 1% of the city's population. The estimate for prices is similar in the OLS specification, but decreases somewhat when we allow for the ARMA(2,2) process. The estimates of the price effect are more imprecise. The price series displays greater volatility than the rents series, and most of the estimates of the price regressions have bigger standard errors.

Is the model with a lag in the immigration impact, income and employment correct? Because the immigration impact and its lags are very strongly correlated, models with several lags in the independent variables are very imprecisely estimated and do not add substantial new information. But, even if we decide to use only one lagged value for each dynamic variable, it is not clear which lag to choose. I use the Akaike Information Criterion (AIC) to assess the relative performance of this baseline model. The AIC is commonly used to settle on the lag specification of time-series

[13] Year to year changes in population are too small to change the denominator much between years.

[14] The covariance of the difference of the perturbation terms is different from zero for two consecutive observations: $\text{cov}(\varepsilon_t - \varepsilon t_{t-1}, \varepsilon_{t-1} - \varepsilon_{t-2}) = -E(\varepsilon_{t-1}^2)$. By construction, the new perturbation is a moving average of the contemporaneous and past perturbation.

models: the specification that minimizes AIC is usually chosen. I posit specifications similar to the one in Table 5, column 1, but with different lags for the dynamic variables (immigration, income and employment rate). [15] I restrict the sample to the number of observations of the specification with the greater number of lags (four), to enable the comparison of the models. The model with one lag in the dynamic dependent variables minimizes the Akaike information criterion (Appendix Table A.3).

The shortcoming in the estimates is that a major part of the variance in immigration inflows is between cities. Omitted variables that are differentially present in cities with high immigration inflows, and that might account the growth in rents in these cities (such as amenities whose valuation increases over time), are a potential threat to my interpretation of the results. One would not expect this to be an important problem if, as previous literature seems to establish, immigrant inflows are mostly determined by ethnic networks, and orthogonal to changing amenities. A first solution to the potential problem is to control for omitted variables that are common to all MSAs in a state. These may be, for instance, geographical advantages, regional demographics and state-specific shocks that are not captured in the income and employment variables. Columns (3) and (6) show the first-differences regressions including state fixed-effects. This is equivalent to allowing state specific trends in the evolution of rents and prices. The specification may over-control somewhat: part of the state trends must be accounted by the international immigration in the region. In any case, the results do not change much; differences in immigration between cities within a state seem to have an equally strong impact on rents.

To eliminate the possibility of city-specific trends that are correlated with immigration levels I make use of the model in second differences:

$$\Delta^2 \ln(r_{it}) = \beta \cdot \Delta^2 (\mathrm{Im}/pop)_{it-1} + \mu \cdot \Delta^2 Z_{it-1} + \phi_t'' + \Delta^2 \varepsilon_{it} \quad (4)$$

The model is identified through changes in the general level of new immigration into a city. Even if immigrants are generally attracted to a city because of factors that also drive the trend in rent growth, year to year changes in immigration inflows should be relatively independent of those factors. Do rents accelerate when immigration accelerates? The answer to this question is also in Table 5: yes.

At the same time that the specification in second differences prevents the omitted variables problem, the results capture the impact of unexpected immigration. Indeed, immigration inflows are

[15] Notice that the rest of variables do not change over time, and cannot be lagged.

very similar year by year for a given metropolitan area. The regression of rents on general inflows approximates the impact of expected immigration. Immigration this year is the best predictor of immigration next year. Differences in the immigration inflows by year can be interpreted as "surprises." As the model predicted, unexpected changes in immigration cause higher rent growth. The estimate is large compared to those of the other methods: an increase in immigration equal to 1% of the population induces a rent hike of 3.75%.[16] Changes in prices are not significant in this specification.

5.2. A "natural experiment": the Immigration Act of 1990

One concern is that immigrants might be attracted to a city by short-term economic factors. These factors might not be captured by income and employment rates. To be sure about the causality between immigration and rents we need an exogenous source of variation: an event that increases the level of immigration, regardless of economic conditions. I provide the analysis of one such "natural experiment" for the Miami metropolitan area in Saiz (2001). Here I will make use of the Immigration Act of 1990 (IA90) as a further source of quasi-experimental evidence. In 1990 the Congress of the United States passed the IA90, which substantially increased the immigration cap. The previous cap was set at 540,000 immigrants per year. The IA90 established a transitory period (1992-94) with a cap of 700,000 (and 675,000 after that). This represented a 30% increase in the legal immigration cap in one year. This "natural experiment" potentially affected all "immigrant" metropolitan areas in the United States.

Actual immigration levels were over the legal cap in the early 90s (Figure 1). Still, there was discontinuity in the growth of immigration in 1992, the first year when the IA90 applied. 679,081 immigrants were admitted in 1991 as opposed to 809,722 in 1992.[17] This amounted to an actual increase of 20% in only one year.

In principle, the overall levels of immigration in the United States might be contingent on immigration caps, and thus exogenous to economic conditions. Even so, admitted immigrants are free to decide where to settle. If immigrants in 1992 were attracted to areas with positive shocks

[16] Most of the year-to-year change is at the national level. The results are not driven by spurious correlation between time trends in immigration levels and population or time trends in changes in rents. Unreported regressions including 3rd order polynomials in time trends, population, 2nd differences in population polynomials and 2 lags in population and level of immigration polynomials yield, substantively, the same results. Unreported regressions have also used an ARMA(3,3) process for the disturbances. Results are unchanged. I have also experimented with further lags in the impact variable: the specification with differences in one lag minimizes the Akaike information criterion.

[17] I am using here the number of legal immigrants who reported settling in metropolitan areas by calendar year.

that affected rents, then the actual changes in immigration levels in a city would not be exogenous (even if the total number of immigrants in the country was). To overcome this problem I use a "shift-share" prediction of the number of immigrants by MSA in the period as an instrument for the actual immigration to each city. The first step consists in obtaining the total number of immigrants to all metropolitan areas except the city we are interested in. I then use the share of immigrants that intended to reside in that city in 1983 to obtain my prediction. The formula I use is:

$$(5) \qquad \overline{N\,\mathrm{Im}_{kt}} = \frac{Sh_{k,1983}}{(1-Sh_{k,1983})} \cdot \left(N\,\mathrm{Im}_t \cdot [1-Sh_{k,t}]\right)$$

$\overline{N\,\mathrm{Im}_{kt}}$ is the predicted number of new immigrants in city k in year t, $N\,\mathrm{Im}_t$ is the total number of new immigrants in the United States in year t, and $Sh_{k,t}$ is the share of immigrants that move into city k in year t. The prediction is exogenous to contemporaneous shocks in local housing markets and, at the same time, captures the expected increase in immigration in each city that is caused by the increased national cap.

My dependent variable is the change in the logarithm of rents (prices). I use the observations for 1991 and 1992 (before the impact of the IA90 could be effective) and 1993 and 1994 (when the effect of the IA90 should be noticed), in order to allow the same adjustment period as in my previous estimates. The empirical model that I estimate is:

$$(6) \qquad \Delta \ln(r_{it}) = \psi \cdot \left(N\,\mathrm{Im}_{91}/Pop_{91}\right) + \delta \cdot \left(N\,\mathrm{Im}_{t-1}/Pop_{it-1}\right) \cdot AFTER + \alpha X_i + \mu \cdot \Delta Z_{it-1} + \phi_t + \xi_{it}$$

Where *AFTER* is a dummy variable that takes value 1 for observations in 1993 and 1994 (after the change). The share of the foreign-born in 1991 should control for omitted city-specific variables that explain general trends in rents and are correlated with baseline levels of immigration. Time fixed effects, in this context, are equivalent to introducing an *AFTER* dummy into the estimation. I instrument $N\,\mathrm{Im}_{t-1}$ with the prediction obtained from equation (5). The parameter δ is the parameter of interest, and captures the impact of a marginal immigrant who arrives after the law is applied, controlling for the baseline immigration levels into the city.

Table 6 shows the results of the specification in (6). As expected, cities with high immigration inflows experienced faster rent growth than other cities after the IA90. The effect on housing rents is significant. Immigration inflows seem to push up rents, whereas their effect on housing prices in

the short run appears ambiguous. The point estimates for the effect on rents are similar to the results from the second differences specification, which I interpreted as the impact of "unexpected" immigration shocks. An immigration "shock" equal to 1% of the population increased rents by 2.59%. It is interesting to compare this magnitude to the one from the "Mariel boatlift" quasi-experiment in Saiz (2001). In that occasion, an immigration impact of 4% generated a differential rent hike of 8 to 11%. This corresponds to an estimate of δ in the range of 2 to 2.75%, which is remarkably close to the estimates in this paper. Again, the estimates can be interpreted as the short run impact of unexpected[18] immigration inflows: changes in supply and, possibly, the response from natives dilute this effect somewhat in the longer run.

Figure 2 makes the case graphically. The evolution of nominal income in "immigrant cities"[19] and other areas was similar during this period, but these cities experienced somewhat higher rent growth. In 1993, exactly one year after the increased immigration cap, the rent differential between "immigrant cities" and other cities increased very sharply. Note that this differential started to increase in 1991 and 1992, corresponding precisely with an increase in the immigration levels in the U.S in 1990 and 1991. Overall, the graph shows the very strong correlation between immigration and rents in "immigrant cities."

A potential criticism of this "natural experiment" is that legal and illegal immigration inflows may be substitutes. Immigrants may try to enter the United States. If they fail to obtain a visa, then they may consider entering illegally. A bigger cap on legal immigration could potentially be compensated by reduced illegal immigration. In this case, the results in Table 6 would reflect only spurious correlation. This is unlikely a priori. The immigration cap affects people from all source countries, whereas illegal immigration comes from only a few countries. Furthermore, the evidence does not support the substitution hypothesis for this period. Table A.3 and Picture 3 show the evolution of illegal alien apprehensions from 1986-1997. Apprehensions closely follow illegal immigration (Hanson and Spilimbergo, 1999). In 1992 apprehensions showed a small increase from the previous period, whereas enforcement did not (see Hanson and Spilimbergo, 1999, Figure 2b). This suggests very modest growth in the illegal immigration flow during the period of interest. It may further suggest that changes in immigration caps can generally be considered good "natural experiments" for the effects of immigration.

[18] It is unlikely that developers forecasted the change in the immigration inflows, even if the information about the change in the immigration cap was available in advance.

5.3. Instrumental Variables Estimates

In this section I develop an instrumental variables' strategy to deal with the endogeneity problem. The evidence I obtain will be generalizable to regular (expected) immigration flows, and will not be dependent on major "quasi-experimental" changes or immigration "shocks."

I make use of two kinds of instrumental variables. The first approach consists in estimating annual immigration inflows by country and year. To do so, I use variables that are exogenous to changes in city-specific amenities. Once I have predicted immigration inflows by country and year I calculate the share of immigration by country into each MSA in 1983. I apply this share to predict the number of immigrants from each country into that city for the period 1984-1998. Finally, I consolidate these flows to obtain the total predicted immigration by city-year. This instrument takes the form:

$$\overline{\overline{N\mathrm{Im}_{\bullet,k,t}}} = \sum_{i=1}^{M} \cdot Sh_{i,k,1983} \cdot \overline{\overline{N\mathrm{Im}_{i,\bullet,t}}} \tag{7}$$

$\overline{\overline{N\mathrm{Im}_{\bullet,k,t}}}$ is the predicted number of new immigrants in city k at time t, $Sh_{i,k,1983}$ is the share of immigrants from country i who settled in city k in 1983, and $\overline{\overline{N\mathrm{Im}_{i,\bullet,t}}}$ is the predicted number of new immigrants from country i and time t in the United States. M is the total number of countries that sent immigrants to the U.S.

Appendix Table A.4 presents the results of the auxiliary regressions. The dependent variable is the logarithm of immigrants from each country in a given year. The explanatory variables should be exogenous to city specific amenities that can explain rents. The first specification uses the panel random effects estimator. I include two lags in the logarithm of the sending country's income per capita. Income per capita is negatively related to the number of immigrants sent to the Unites States. As expected, the log of a country's population is also a significant determinant of the number of immigrants from that country. Real exchange rates have been shown to be an important determinant for Mexican immigration (Hanson and Spilimbergo, 1999). I measure the exchange rate as the unit of foreign items that one can buy by selling an item produced in the U.S, priced at U.S prices and given the current exchange rate and prices in the sending country. The results confirm the economic

[19] I define "immigrant cities' as those cities in the upper 10% of the distribution according to the share of foreign-born in 1980. These are, roughly, cities with a share of the foreign born greater than 10%.

conventional wisdom. The greater the real purchasing power of the dollar in a country, the greater the expected immigration from that country. Military conflicts, collapse of state institutions and transition out of a communist regime are also positive determinants of emigration to the United States. The random effects specification, finally, includes the variable with the biggest explanatory power: the level of immigration by country in 1979. Geographical settlement patterns demonstrate a strong time correlation. In addition, the overall level of immigration by country is persistent. This can be partially explained by immigration laws: American authorities favor immigration from some countries. These preferences may be driven partially by American foreign policy. Information, history, ethnic networks and the policies of sending countries may also be important determinants of the country-specific levels of emigration to the United States.

The random effects specification yields my first estimates of immigration by country and year. I do not use the estimated random effects in the prediction. The estimated random effects may be correlated with factors that made it attractive to immigrate into the cities where immigrants of that nationality clustered during the 1984-98 period. The random effects estimate of immigration is thus a linear combination of only the exogenous variables in Table A.4.

The second column in Table A.4 undertakes the fixed effects estimation. The focus here is on year-to-year changes in immigration by nationality. All the variables are significant and take the expected sign. The estimates of immigration by year and country use the fixed effects. As cautioned before, this may be problematic for the general attraction of cities that cater to immigrants from specific countries. I will use these estimates only to predict the differences in yearly inflows (second differences specification): taking first differences in the estimated immigration inflows will get rid of the country specific fixed effects. Once I have obtained the predictions by country, I apply the share of immigrants from that country that decided to settle in each city in 1983. From this I obtain predictions of the number of immigrants by nationality and metropolitan area. Adding these inflows by MSA, I obtain a prediction of immigrants per MSA and year.

The second instrumental variable approach focuses on year-to-year changes in immigration inflows. There are good reasons to believe that the overall number of legal immigrants in the United States stems from political and administrative decisions.[20] I make use of this variation to construct a

[20]In recent years, administrative backlogs have been an important determinant of the level of immigrants into the United States. The INS estimated that legal immigration during the fiscal years 95-98 period would have been 450,000-550,000 higher in the absence of the backlog. In 1994 the U.S State Department had 3.6 million people registered in a "waiting list" for family reunification visas: the supply of immigrants is virtually infinite and the total number of immigrants admitted depend on administrative and legal decisions.

"shift-share" prediction of the inflows by city and year. The formula is the same as the one detailed in equation (5). Total immigration levels in the U.S are translated into expected immigration by city using 1983 shares.

This prediction is completely independent of the number of immigrants in the city of interest. It is a good instrument for the number of immigrants into a city and year. By construction, it is independent of city specific shocks. It relies on the following identification assumption: shocks that may attract immigrants and simultaneously explain changes in rents are not correlated between "high immigration" cities, once we control for year effects, income and employment. This is a reasonable assumption, because the main criticism to a causal interpretation of the least squares results hinges on the possible existence of *city-specific* shocks.

Table A.5 portrays the first stage of the 2SLS estimation. The first two columns examine the first stage for the first differences equation. The dependent variable here is the annual inflow of immigrants into a city, and the main explanatory variable is the predicted inflow of immigrants. Both the instrument based on the national level shift-share and the instrument based on sending country characteristics (RE estimation) work very well. T-statistics for the instruments are around 20. Most of the variation in these inflows is between cities. Thus, I can predict general immigration levels well. The next two columns in Table A.5 show the first stage for the second differences regression. The dependent variable here is the annual change in immigration inflows over population. The independent variables are obtained from the annual changes of the predictions. The shift-share on national levels shows itself to be a much better predictor for the differences in annual levels than the predictor based on sending countries (Fixed Effects estimation). To see this, compare the values of the F-tests for the two predictions (39 vs. 15). This inefficiency will be reflected in the precision of the IV estimates.

Table 7 presents the basic results using instrumental variables. The results are robust and do not change much from the least squares specifications. If anything, the results tend to be stronger than those in the OLS specification. In columns (1) and (2) I use the shift-share of the total number of immigrants admitted in the United States as an instrument. Columns (3) and (4) present the results with the instruments derived from predicting immigration by country. Columns (5) through (8) repeat the exercise using the year-to-year changes in the predicted levels of immigration by city. Again, the estimates using second differences are much bigger than those using first differences and cumulative levels. Remarkably, the regression based on year-to-year differences in the characteristics of the sending countries also suggests a positive impact of immigration on rents. The coefficient is

big, and so is the estimated standard error. I cannot reject that the actual coefficient is equal to the OLS estimate.

5.4. Long-run regressions

This section addresses the long-run impact of immigration on rents and prices. I assess the robustness of the estimates from the dynamic model, and use instrumental variables estimates. Tables 8 and 9 present the results for rents and prices respectively. The left-hand-side variable is the change in the log of rents (prices) from 1985 to 1998. The right-hand-side variables are the "potential supply" of immigrants (i.e. the total cumulative number of immigrants who reported settling in the city during the period 84-97), the changes in the log of income per capita and employment rate during that period, and the variables that describe the initial conditions. The advantage of this regression is that it allows for a simple specification of the initial variables' effects on rents. In particular, it allows me to assess how much the impact of immigration is confounded by other variables. I am also able to introduce a new explanatory variable: the change of construction costs between 1980 and 1990. Furthermore, the specification attempts to answer an important policy question: what is the impact of immigration in the long run? If the impact of immigration is nonlinear, or the impact of immigration on rents takes a long adjustment period (i.e. immigration and rents being cointegrated[21]), the estimates from our previous specifications may be quantitatively far from the actual long run effect. An additional advantage of the specification using "long" changes in rents and cumulative immigration is that we do not rely in the reported timing of immigration, and are thus not sensitive to non-classical measurement error in the yearly inflows.

The results (Tables 8 and 9) are very robust across all specifications. The inclusion of the 1980-90 changes in construction cost does not change the results. The last column uses the cumulative prediction from the origin countries' random effects estimation as an instrumental variable. The IV results suggest that immigrant inflows equal to 1% of the population are associated with rent growth of about 1.5% in the long run. The point estimates for housing prices are higher, but I cannot reject that they are equivalent to those for rents.[22]

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[21] Cointegration tests in this context are not extremely informative. The time dimension is very short (13 periods), and the null hypothesis of cointegration usually involves all of the series.

[22] It is not surprising that estimates for housing prices increase much more in the long run. Housing prices are known to follow an error correction adjustment (Malpezzi, 1999): taking first differences may dissipate part of the empirical cointegrating relationship between immigration and rents.

5.5. Quality

Another issue is the quality of the housing units in the HUD sample. The Freddie Mac (FM) measure of prices is based on a repeated sales index. The same units are tracked in time, and changes in quality must be small. The Fair Market Rent measure does not have this property. If the quality of housing increased systematically in "immigrant cities" my estimates could just be reflecting the effect of quality on rents. This does not seem to be a major concern *a priori*. We know that immigrants tend to consume housing units of lower quality. Immigration could actually be associated with lower qualities, and my results could actually be biased downwards. In Table 10 I address this issue. I use microdata[23] from the American Housing Survey and control for several quality indicators. Areas where immigrants settled tended to experience higher rent growth. The quantitative results are remarkably similar (1.5% extra rent growth for 1% impact), despite the fact that the time frame is different (10 years from 1985 to 1995), and the fact that the AHS tracks a much smaller number of metropolitan areas (only 141). Results are very robust when different samples are used. The introduction of quality indicators increases the estimated coefficient to 1.7%, which suggests that immigration may actually be associated with decreases in housing quality. I cannot reject that both specifications yield the same coefficient, however.

5.6. New supply

To this point, the paper has emphasized the associations between immigration and prices. However, the effect of immigration on supply plays an important role. In principle, higher rents and prices should act as incentives for new housing construction in the areas where immigrants settle. To see and quantify this effect, I use the series of metropolitan building permits from 1983 to 1998. The dependent variable of interest (Table 11) is the log of the number of new units permits issued in a Metropolitan Area. The main dependent variable is the log of immigrants in the city. I control for a general scale effect by using the log of initial (1983) population. The results suggest that a 1% increase in immigration inflows generates an increase in new construction of 0.52%.[24] Does immigration affect the supply of lower quality housing differentially in multi-family buildings[25]? The literature on the housing conditions of immigrants suggests that they tend to settle in rental units.

[23] I restrict the sample to private metropolitan rental units for which the rent is reported.

[24] A 1% increase in the immigration inflows is associated with a 0.05% increase in prices in unreported regressions. Notice the change of dependent variable here from the immigration impact to the log of the immigration inflow. The interpretation of this late elasticity is not very useful to address the impact of comparable immigration impacts, but allows us to derive an elasticity for new housing construction of about 10%.

43% of rental units are in multi-family buildings, as opposed to 4% for owner occupied units. The results (Column 2, Table 11) suggest a slightly bigger impact on the supply of multi-family units (0.58), but the difference is small.

Housing economists have argued that the supply for housing is kinked (DiPasquale and Wheaton, 1994; Glaeser and Gyourko, 2001). In declining cities the price of housing may not be above construction costs. Even if prices do increase, the supply of housing is unlikely to increase in these cities. Figure 4 illustrates such a kinked supply schedule. It is clear that the impact of a demand shock on prices should be greater in the inelastic part of the supply schedule. This has important implications. Cities that were declining before the acceleration in the immigration inflows in the 80s, and which attracted immigrants, could be more likely to experience upward pressures on rents and prices that growing cities. The results in Table 12 confirm the kinked supply view. I interact immigration impact with two variables. The first is the average growth in employment during the 1969-1994 period. The impact of immigration is smaller in growing cities that in stagnating cities, as the theory predicts. The second variable is the percentage of housing units enumerated in the 1980 census and built before 1940. In cities with older housing stock immigration inflows tended to push rents up further. The kinked supply view is also consistent with the results for housing supply. Declining cities with older housing stocks see less of a response in quantity than growing cities.

5.7. Illegal Immigration

A shortcoming of the data this paper uses is that it does not include figures for illegal immigrants. We need to interpret the results of the paper as the treatment effect of legal immigration on rents and housing prices. This would not be problematic if illegal immigration was uncorrelated with legal immigration inflows. Unfortunately, this is an unlikely assumption. Nevertheless, there are reasons to believe that the exclusion of illegal immigrants does not affect the primary conclusions of this study. First, there is the fact that the estimated figures for net illegal immigration during the period correspond very well with the figures of emigration of legal residents. According to the INS some 220,000 foreign-born residents emigrated from the United States in the 90s. The estimated number of annual illegal aliens entering the country was 281,000 for 1988-92 and 275,000 for 1992-1996. The effects of illegal immigration and emigration of the foreign-born may cancel each other to some extent. Secondly, it is unlikely that the correlation between legal and illegal inflows is equal to one.

[25] Multi-family units are defined as housing units in buildings with more than 5 units.

Many illegal immigrants work in the agricultural sector, and they are not so concentrated in metropolitan areas.

And yet, even if we assume that the flows of emigrants and illegal immigrants do not cancel out at all, and that the correlation between legal and illegal inflows is one, my results can be used to estimate a lower bound for the impact of immigration. During the 1986-1996 period the estimated number of illegal immigrants was 1,124,000. Legal immigration in metropolitan areas was equal to 6,489,881 during the same period. Illegal immigration amounted to about one third (38.5%) of the legal immigration in metropolitan areas. The worst-case scenario for my estimates would be if the correlation of illegal immigration and legal metropolitan immigration were 1. In this case, the coefficient of legal immigration would be capturing all of the impact of illegal immigration on rents. Consider an estimated impact of 1.4% on the lower range of my estimates throughout the paper. Under this most conservative scenario, the actual impact of immigration on rents would be about three fourths (1/1.38) of my estimate: 1%.

A second way to approach the issue of the foreign born persons who are not legal immigrants is by using Census data. The census counts most foreign-born residents, irrespective of their immigrant status[26]. The other advantage of using the Census over the INS data is that it is free of measurement error in the reporting of where the foreign born person decides to settle. The main disadvantage of the census is its periodicity. I will only be able to consider the "long" changes in rents between 1980 and 1990. The other disadvantage of the census is that we do not obtain the MSA in which the immigrant first settled. Actual residence in an MSA may be endogenous to the rent level in the city. Theoretically, new immigration could have an impact on rents even if the net migration of the foreign born into the city is small.

Table 13 presents the results from a regression of the change in the log of rents on the change in the share of the foreign born in the city. Rents are calculated using the 45th percentile in the rent distribution from the Census 1% metropolitan sample. I use the same explanatory variables as in previous tables. The main results in column (1) are remarkably similar to the results obtained using the INS and FMR data for a different period. Column (2) uses the initial share of the foreign born as an instrument for changes in the foreign-born. The estimates become more imprecise but suggest again a sizeable impact of immigration on housing rents.

6. Conclusions

This paper shows that there is a local economic impact of immigration in American cities. Immigration pushes up the demand for housing in the destination areas. Rents increase in the short run and housing prices gradually catch up. The association between immigration and rents appears to be causal. Acceleration or deceleration in the immigrant's inflows within a city is associated with acceleration or decelerations in the evolution of rents.

The immigration Act of 1990, which took effect in 1992 with a 30% increase in the cap of immigration, was associated with rent hikes in "immigrant cities." Instruments based on the characteristics of sending countries, the immigration level by country of origin in 1979 and the geographical distribution of immigrants by country in 1983 yield a similar result. Areas where one would expect immigrants to settle experienced higher rent evolution, regardless of the economic shocks and different fates experienced by the cities during the 15-year period that I analyze. Instruments based on the year-to-year changes in national immigration levels and 1983 patterns of settlement are also consistent with this conclusion.

The results are very robust to the use of different data sources (HUD Fair Market Rents, American Housing Survey, Census and INS Legal Immigrant counts) and time frames.

As a simple model of the housing market predicts, immigration shocks that are unexpected have a greater short-run impact (3-4%). This impact is arbitraged away to the long-run baseline (1.5%) over time. It is important to be aware of the fact that methodologies relying on such major "shocks" for identification yield a *local average treatment effect* that may not be generalizable to regular predictable immigration inflows.

The paper also proves that immigration has increased housing values. It does not find convincing evidence of a short-run relationship between immigration and values. Nevertheless, in the longer run, the areas where immigrants settle experience a differential housing value growth. Housing supply responds to price incentives: building permits are sensitive to the level of the immigrant intake in a city.

The normative interpretation of my results should be cautious. Renters are affected negatively by higher housing costs, but homeowners are positively affected. Immigration does seem to have a local distributive impact.

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[26] There are some concerns about the undercount of illegal immigrants, but it is clear that the majority of these are accounted for by the Census.

The paper opens new questions that need further study. One of these is about the local geographical impact of immigration on rents and housing values *within metropolitan areas.* Are the neighborhoods where the immigrants settle more expensive, capitalizing the "port of entry" value of specific city quarters? Or do previous residents perceive certain immigrant communities as a negative amenity? In that case prices and rents could actually increase in those neighborhoods avoided by immigrants. These questions are very important to understand the distributive consequences of immigration through the housing market.

A second issue that needs further study is how the population growth generated by immigration affects housing values at the national level. The labor literature on immigration has demonstrated national impacts of immigration in the macro U.S. labor markets, because of the migration of native workers in response to local immigration (Borjas, Freeman and Katz, 1992).

The last question that research on this topic should address is the response of previous residents (including the foreign-born) to the pressures in the housing market described in this paper. In his review of the literature on immigration Borjas (1994) wondered, "why should it be that many other regional variations persist over time, but the impact of immigration on native workers is arbitraged away immediately?" Housing rents may be an important determinant for out-migration from "immigrant cities." Further research should examine this link.

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TABLE 1

Descriptive Statistics (1990)

	Population Weighted					Non-weighted	
Variable	Obs	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.
Rent	318	596.017	147.077	332	982	515.101	121.260
New Immigrants/Population	324	**0.004**	0.004	0.000	0.014	**0.002**	0.002
Immigrant Stock/ 1980 Population	322	**0.076**	0.065	0.005	0.356	**0.045**	0.045
Income per Capita	324	22654	3955	10357	33087	20052	3704
Employment/Population* 100	324	57.697	56.648	20.049	777.595	55.586	61.223
Mean Temperature in January	304	36.784	13.285	2.2	72.60001	34.816	13.274
Central City Area	305	131.839	155.299	2.9	1732	68.483	132.808
Population in 1983	324	2254617	2424992	64151	8491429	624328	1020125
Serious Crimes per Person	305	0.088	0.032	0	0.38379	0.077	0.033
Percentage with Bachelors Degree	305	17.321	6.492	5.5	59.5	18.006	8.054
Rent Control Dummy	309	0.222	0.416	0	1	0.055	0.228
Rent in 1983	317	405.211	63.779	238	647	359.448	60.350

Notes: Observations at the MSA, PMSA level.

TABLE 2

Correlates of Immigration

	Immigrants (1983 to 1996) per population (1983)
Immigrants/1980 Population	**0.587** (0.021)***
Average Temperature in January	0.002 (0.002)
Log Central City Area	0.005 (0.001)***
Log 1983 Population	-0.005 (0.001)***
Serious Crimes per Person	0.044 (0.024)*
Percent with Bachelor's degree	0.0003 (0.0001)***
1983 Log Income	0.005 (0.007)
Rent Control Dummy	0.014 (0.004)***
Log 1983 rent	0.004 (0.008)
Constant	-0.042 (0.052)
Observations	293
R-squared	0.840

Notes: Standard errors in parentheses

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

TABLE 3

Panel "Between Effects": Rents and Immigration Stock

	Log rent
Immigrants per Population	**1.413** (0.119)***
Log Income	0.776 (0.133)***
Employment Rate	-0.005 (0.001)***
Average Temperature in January	0.014 (0.013)
Log. Central City Area	-0.026 (0.006)***
1983 MSA Population	0.021 (0.007)***
Serious Crimes per Person	-0.048 (0.161)
Percent with Bachelor's Degree	0.005 (0.0001)***
1983 MSA Income per Capita	0.031 (0.119)
Rent Control Dummy	-0.057 (0.028)**
Constant	-1.687 (0.407)***
Observations	4097
Number of MSA†	293
R-squared	0.8

Notes: Standard errors in parentheses

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

† MSA observations with complete data for all variables

Immigrants per population are calculates using number of immigrants in 1980 and adding new immigrant inflows sequentially.

The Table shows the cross section (MSA) regression of the means of the variables (across time)

TABLE 4

Arellano-Bond GMM Estimates

	Log Rents (1)	Log Prices (2)
Immigrants/Population T-1	**0.355**	**0.809**
	(0.131)***	(0.095)***
Log Rents/Prices at T-1	0.647	0.688
	(0.016)***	(0.008)***
Log Income T-1	0.521	-0.698
	(0.062)***	(0.031)***
Employment Rate T-1	-0.006	0.025
	(0.001)***	(0.000)***
Average Temperature * Year	-0.003	0.002
	(0.001)***	(0.0005)***
Serious Crimes per Person * Year	0.018	0.025
	(0.007)**	(0.004)***
Percent with Bachelor's Degree * Year	-0.0001	0.0001
	(0.00003)***	(0.00003)***
Log Central City Area * Year	0.001	-0.0002
	(0.0003)***	(0.0002)
1983 MSA Population * Year	-0.0004	0.001
	(0.0004)	(0.0002)**
1983 MSA Log Income per Capita * Year	-0.010	0.001
	(0.0016)***	(0.001)
Rent Control * Year	0.00003	-0.00004
	(0.000006)***	(0.000006)***
Constant	0.096	0.010
	(0.015)***	(0.013)
Year Fixed Effects	Yes	Yes
MSA Random Effects	Yes	Yes
Observations	3511	1989
Number of msa	293	153

Notes: Standard errors in parentheses

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

TABLE 5

First Differences: Immigrant Inflows and Changes in Rents

	First differences						Second Diffs	
	Change in Log Rents			Change in Log Prices			Second Diffs. Log Rents	Second Diffs Log Prices
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
New Immigrants/ Population at T-1 †	1.459	1.469	1.364	1.142	0.742	0.962	3.729	-1.353
	(0.444)***	(0.266)***	(0.302)***	(0.566)**	(0.505)	(0.503)*	(1.781)**	(1.263)
Change in Log Income at T-1 †	0.139	0.202	0.155	0.349	0.070	0.063	0.036	0.043
	(0.057)**	(0.050)***	(0.058)***	(0.096)***	(0.043)	(0.046)	(0.056)	(0.036)
Change Employment Rate at T-1 †	-0.001	-0.002	-0.001	0.021	0.007	0.007	0.003	0.006
	(0.001)	(0.001)**	(0.001)	(0.002)***	(0.001)***	(0.001)***	(0.001)**	(0.001)***
Average Temperature: January	0.001	0.002	0.005	-0.002	-0.004	0.0003	-	-
	(0.001)	(0.001)	(0.005)	(0.003)	(0.003)	(0.009)	-	-
Log Central City Area	-0.002	-0.003	-0.001	-0.006	-0.009	-0.0003	-	-
	(0.0004)***	(0.0006)***	(0.001)	(0.0008)***	(0.001)***	(0.001)	-	-
1983 MSA Population	0.002	0.002	0.001	0.002	0.006	-0.001	-	-
	(0.0005)***	(0.0006)***	(0.001)	(0.001)	(0.001)***	(0.001)	-	-
Serious Crimes per Person	0.022	0.019	0.016	-0.012	-0.041	-0.030	-	-
	(0.011)*	(0.014)	(0.015)	(0.024)	(0.029)	(0.023)	-	-
Percent with Bachelor's Degree	0.0003	0.000	0.0004	-0.00001	0.0001	0.0001	-	-
	(0.00005)***	(0.00007)***	(0.00007)***	(0.0001)	(0.0001)	(0.0001)	-	-
1983 MSA Income per Capita	0.027	0.033	0.034	-0.007	-0.007	0.033	-	-
	(0.004)***	(0.004)***	(0.005)***	(0.009)	(0.010)	(0.010)***	-	-
Rent Control Dummy	0.001	0.002	0.0004	0.006	0.010	0.006	-	-
	(0.003)	(0.003)	(0.003)	(0.003)*	(0.003)***	(0.002)**	-	-
1983 MSA Log Rent	-0.043	-0.049	-0.064	0.015	0.007	0.004	-	-
	(0.005)***	(0.005)***	(0.006)***	(0.009)*	(0.010)	(0.011)	-	-
Constant	0.042	0.058	0.104	0.029	0.030	0.001	-	-
	(0.036)	(0.090)	(0.04)***	(0.067)	(0.077)	(0.090)***	-	-
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard errors clustered by MSA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ARMA(2,2)	No	Yes	Yes	No	Yes	Yes	No	No
State Fixed Effects	No	No	Yes	No	No	Yes	No	No
Observations	3825	3825	3825	2002	2002	2002	3824	1944
R-squared	0.190	ML	ML	0.250	ML	ML	0.1	0.09

Notes: Robust standard errors in parentheses. † indicates first difference, ‡ second differences.

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

‡ Differences in the variables for the last two columns

First differences for years 85 to 97; observations with all explanatory variables complete. Second differences for the 84-97 period: all observations with dynamic variables (immigration, income, employment) complete.

ML: Estimated using maximum likelihood. "Basic" disturbances are assumed to follow the normal distribution.

Figure 1: *The Evolution of Metropolitan Immigration*

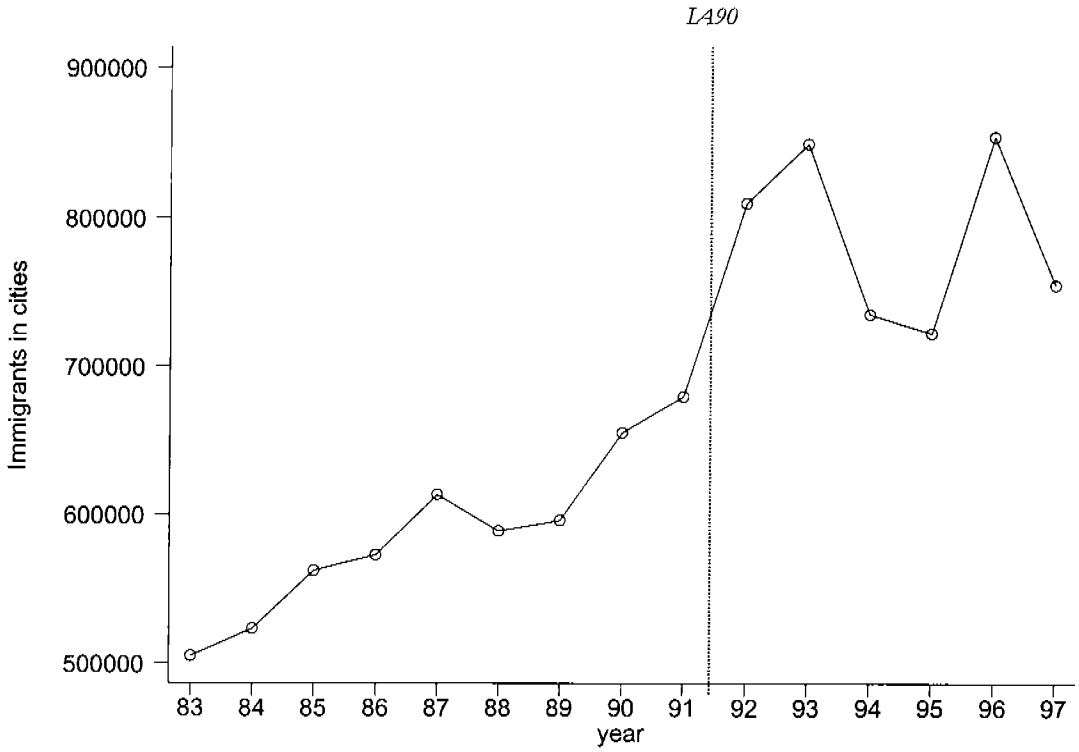


TABLE 6

Using the 1990 Immigration act (93-94 vs. 92-91)

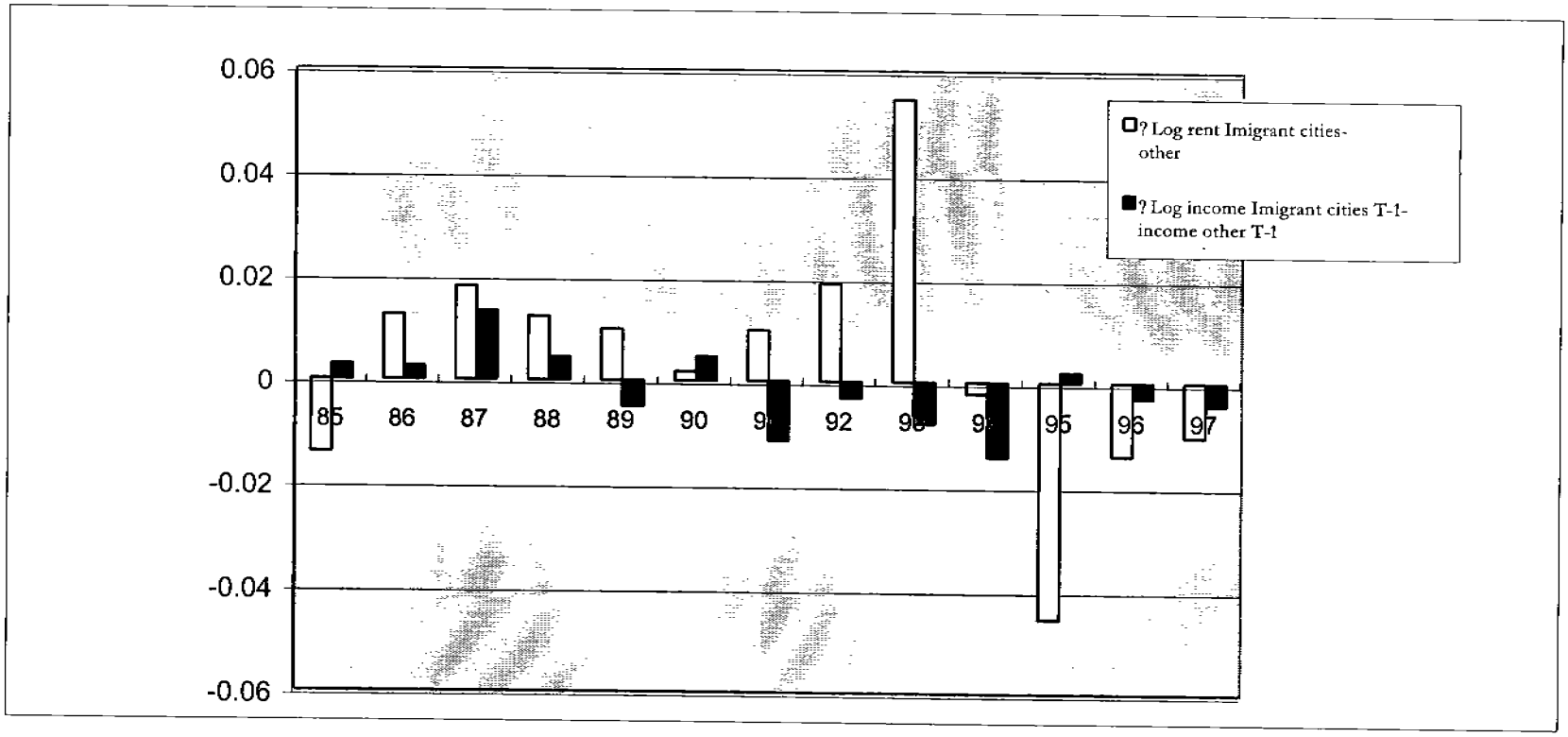
	Change Log Rent	Change Log Price
(Immigrants/Pop) at T-1* After 92	**2.987**	**-0.255**
	(1.515)**	(0.619)
(Immigrants/Pop) at T-1	1.502	1.152
	(1.224)	(1.349)
Change Log Income at T-1	0.262	0.210
	(0.111)**	(0.093)**
Change Employment Rate at T-1	0.001	0.008
	(0.002)	(0.001)***
Other Variables in Table 5	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	1274	648
Number of msa	324	154
R-squared	0.120	0.270

Notes: Standard errors in parentheses

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

The 1990 Immigration act increased the immigration cap from 540,000 to 700,000. The increased cap applied in 1992.

Figure 2: Evolution of Rents and Income in Immigrant Cities vs. Other Cities



Notes: graphs displays differences between immigrant cities and other cities with respect to ? log(rent) and ? log(income T-1). Immigrant cities are those with more than 10% share of foreign-born population in 1980 (10% of cities with higher foreign-born share).

Figure 3: *Apprehensions of Illegal Immigrants (1980-1997)*

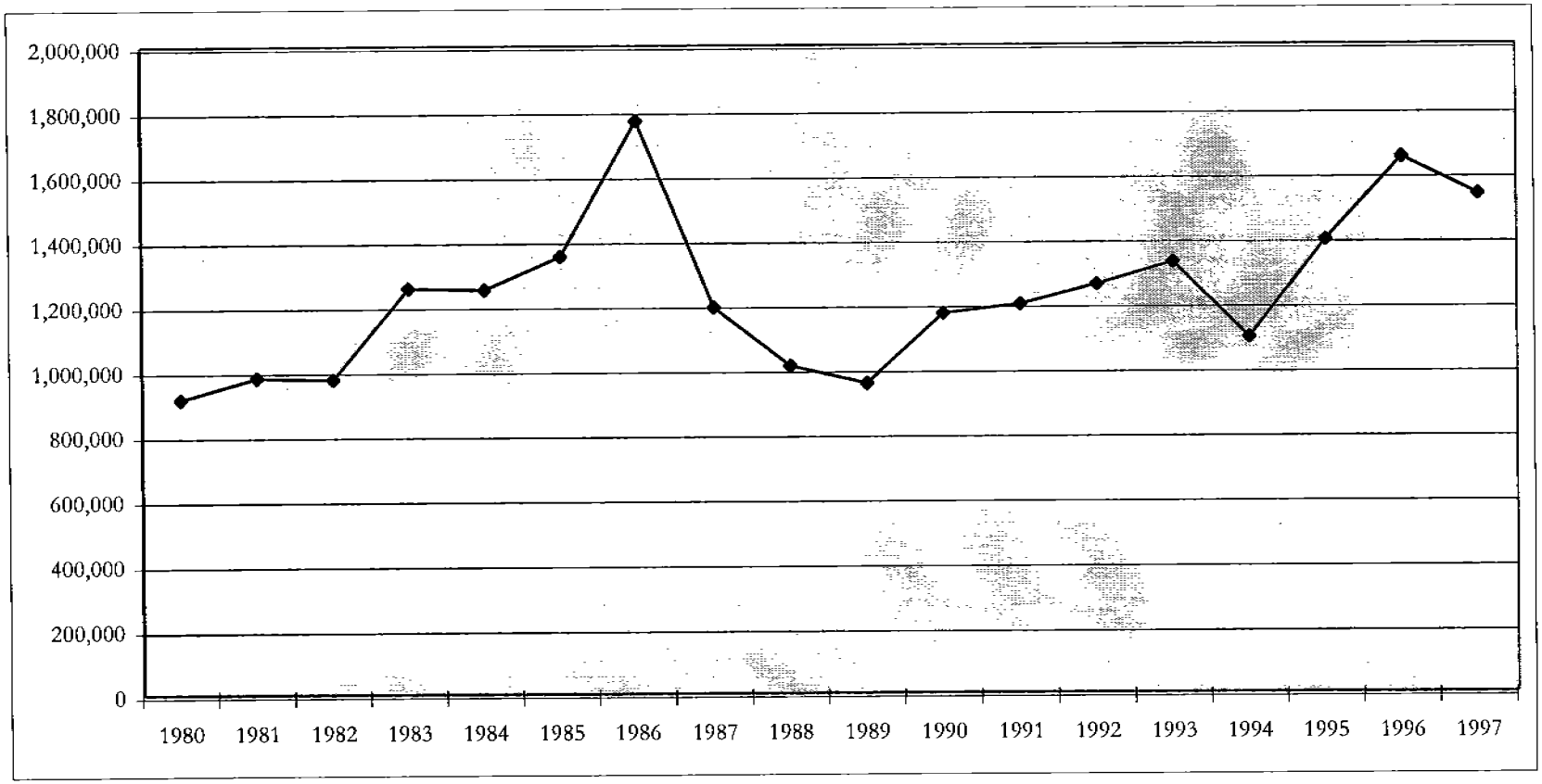


TABLE 7

Instrumental Variables Estimates

	First Differences				Second Differences			
	US Levels Instrument		Country Instrument		US Levels Instrument		Country Instrument	
	Log Rents (1)	Log prices (2)	Log rents (3)	Log prices (4)	Log rents (5)	Log prices (6)	Log rents (7)	Log prices (8)
Immigrants/Population (or Change)	**1.318**	**1.728**	**1.699**	**2.208**	**5.955**	**1.261**	**13.979**	**32.309**
	(0.396)***	(0.597)***	(0.405)***	(0.706)***	(3.363)*	(3.699)	(7.496)*	(22.396)
Change in Income (or 2nd Diffs.)	0.138	0.351	0.139	0.352	0.035	0.039	0.027	-0.005
	(0.057)**	(0.096)***	(0.057)**	(0.095)***	(0.056)	(0.036)	(0.057)	(0.052)
Change Employment Rate (or 2nd Diffs)	-0.001	0.021	-0.001	0.021	0.003	0.006	0.004	0.008
	(0.001)	(0.002)***	(0.001)	(0.002)***	(0.001)**	(0.001)***	(0.001)**	(0.001)***
Constant	-0.022	0.055	-0.018	0.076	-0.042	0.015	0.249	-0.022
	(0.034)	(0.066)	(0.034)	(0.065)	(0.006)***	(0.002)***	(0.075)***	(0.008)**
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA variables	Yes	Yes	Yes	Yes	No	No	No	No
Observations	3825	2002	3825	2002	3824	1944	3812	1932
R-squared	0.19	0.25	0.19	0.24	0.1	0.08	0.09	0.06

Notes: Robust standard errors (clustered by MSA) in parentheses

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

TABLE 8

Long Run Changes in Rents and Immigration Inflows

	Change in Log Rents (1998-1985)			
	(1)	**(2)**	**(3)**	**(4)**
Potential immigrants†/1983 population	**1.400**	**1.201**	**1.383**	**1.774**
	(0.320)***	(0.341)***	(0.264)***	(0.332)***
Change in Log Incomes	0.760	0.799	0.734	0.785
	(0.103)***	(0.101)***	(0.110)***	(0.104)***
Change in Employment Rate	-0.010	-0.011	-0.009	-0.009
	(0.002)***	(0.002)***	(0.002)***	(0.002)***
Average Temperature in January	-0.002	-0.001	-0.011	-0.005
	(0.016)	(0.024)	(0.018)	(0.015)
Log Central City Area	-0.017	-0.005	-0.019	-0.018
	(0.007)**	(0.007)	(0.006)***	(0.007)**
1983 MSA Population	0.008	0.007	0.009	0.007
	(0.007)	(0.008)	(0.008)	(0.007)
Serious Crimes per Person	0.308	0.111	0.162	0.271
	(0.130)**	(0.269)	(0.155)	(0.136)*
Percent with Bachelor's Degree	0.004	0.004	0.003	0.004
	(0.0006)***	(0.001)***	(0.0006)***	(0.0006)***
1983 Log Income	0.402	0.369	0.429	0.425
	(0.067)***	(0.064)***	(0.067)***	(0.065)***
Rent Control Dummy	-0.023	-0.009	0.003	-0.042
	(0.040)	(0.034)	(0.044)	(0.042)
1983 MSA Log Rent	-0.585	-0.539	-0.620	-0.619
	(0.052)***	(0.048)***	(0.058)***	(0.054)***
Change in Cost of Construction 80-90		0.077		
		(0.155)		
Change in Log Other Population			0.149	
			(0.052)***	
Constant	-0.527	-0.547	-0.534	-0.546
	(0.634)	(0.578)	(0.681)	(0.606)
Method	OLS	OLS	OLS	IV (country RE)
Observations	292	165	292	292
R-squared	0.5	0.58	0.52	0.5

Notes: Robust standard errors (clustered by state) in parentheses

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

† Potential immigrants defined as the sum of legal immigrants over the 1984-1997 period

TABLE 9

Long Run Changes in Prices and Immigration Inflows

	Change in log prices (1998-1985)			
	(1)	(2)	(3)	(4)
Potential immigrants†/1983 population	**2.133**	**2.004**	**2.039**	**2.769**
	(0.604)***	(0.712)***	(0.667)***	(0.581)***
Change in Log Incomes 1996-1984	0.262	0.207	0.255	0.313
	(0.177)	(0.222)	(0.190)	(0.192)
Change in Employment rate 1996-1984	0.015	0.015	0.015	0.015
	(0.006)**	(0.007)**	(0.006)**	(0.006)**
Average Temperature January	-0.093	-0.098	-0.075	-0.112
	(0.062)	(0.070)	(0.061)	(0.066)*
Log Central City Area	-0.056	-0.046	-0.055	-0.057
	(0.017)***	(0.020)**	(0.017)***	(0.018)***
1983 MSA Population	-0.003	0.000	-0.007	-0.004
	(0.019)	(0.023)	(0.018)	(0.018)
Serious Crimes per Person	0.167	0.342	0.220	0.140
	(0.457)	(0.882)	(0.438)	(0.464)
Percent with Bachelor's Degree	0.001	0.002	0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
1983 MSA Income per Capita	-0.201	-0.189	-0.219	-0.212
	(0.157)	(0.136)	(0.148)	(0.155)
Rent Control Dummy	0.015	-0.014	0.002	-0.009
	(0.056)	(0.052)	(0.055)	(0.054)
1983 MSA Log Rent	0.098	0.006	0.115	0.059
	(0.147)	(0.189)	(0.147)	(0.161)
Change in Cost of Construction 80-90		0.623		
		(0.414)		
Change in Log Other Population			-0.126	
			(0.108)	
Constant	2.057	2.178	2.130	2.418
	(1.528)	(1.264)*	(1.415)	(1.601)
Method	OLS	OLS	OLS	IV (country RE)
Observations	153	116	153	153
R-squared	0.37	0.38	0.38	0.37

Notes: Robust standard errors (clustered by state) in parentheses

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

† Potential immigrants defined as the sum of legal immigrants over the 1984-1997 period

TABLE 10

Rents and Qualities (AHS data)

	Log Rent	
	(1)	(2)
Immigration impact† * 1995	**1.537** (0.205)***	**1.708** (0.197)***
1995	-8.477 (0.554)***	-8.043 (0.510)***
MSA Income	0.419 (0.109)***	0.547 (0.103)***
MSA Employment Rate	0.443 (0.061)***	0.164 (0.058)***
Temperature * 1995	0.052 (0.019)***	0.020 (0.017)
Log Central City Area * 1995	-0.029 (0.008)***	-0.043 (0.007)***
Log 1983 Pop * 1995	0.026 (0.011)**	0.038 (0.010)***
Crime/Population 1983 * 1995	-0.490 (0.209)**	-0.711 (0.196)***
Share Bachelors * 1995	0.006 (0.001)***	0.006 (0.001)***
Log 1983 Income * 1995	0.528 (0.066)***	0.497 (0.061)***
Rent Control * 1995	0.001 (0.000)	0.001 (0.000)
Log 1985 MSA Rent * 1995	0.502 (0.058)***	0.483 (0.055)***
Cracks in Walls		-0.041 (0.015)***
Leaking Ceiling		-0.043 (0.017)**
Heat Down on Winter		0.028 (0.023)
Fuses Blew Last 3 Months		0.028 (0.012)**
Peels in Paint		-0.017 (0.016)
Rats or Mice		-0.120 (0.018)***
Number of Units in Building		0.001 (0.0003)**
Elevator Present		0.111 (0.0204)***
Number of Bedrooms		0.123 (0.006)***
Age of Building		-0.005 (0.0002)***
Constant	5.755 (0.007)***	**5.668** (0.016)***
Observations	15,781	15,781
R-squared	0.21	0.3

Notes: Robust standard errors in parentheses. Clustered by unit.

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

†Immigration impact defined as total number of immigrants from 1983 to 1993, divided by population in 1983

TABLE 11

Building Permits: 1984-1997

	Log New Buildings (1)	Log New Multi-units (2)
Log Number of Immigrants	**0.527**	**0.584**
	(0.074)***	(0.065)***
Change in Log Incomes	0.898	0.848
	(1.019)	(0.958)
Change in Employment rate	0.056	0.079
	(0.020)**	(0.019)***
Average Temperature in January	0.306	0.288
	(0.134)**	(0.220)
Log Central City Area	0.165	0.282
	(0.051)***	(0.052)***
Log 1983 Population	0.219	0.143
	(0.119)*	(0.115)
Serious Crimes/Population	3.834	4.933
	(1.387)***	(1.542)***
Percent with Bachelor's degree	0.005	0.014
	(0.005)	(0.005)**
1983 Log Income	-0.122	0.366
	(0.402)	(0.420)
Rent Control Dummy	-0.786	-0.559
	(0.254)***	(0.207)***
1983 MSA Log Rent	0.223	0.330
	(0.343)	(0.364)
Constant	-0.279	-7.320
	(4.536)	(4.396)
Observations	303	302
R-squared	0.860	0.790

Notes: Robust standard errors (clustered by state) in parentheses

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

Figure 4: *Kinked Supply schedules and the effect of demand shocks*

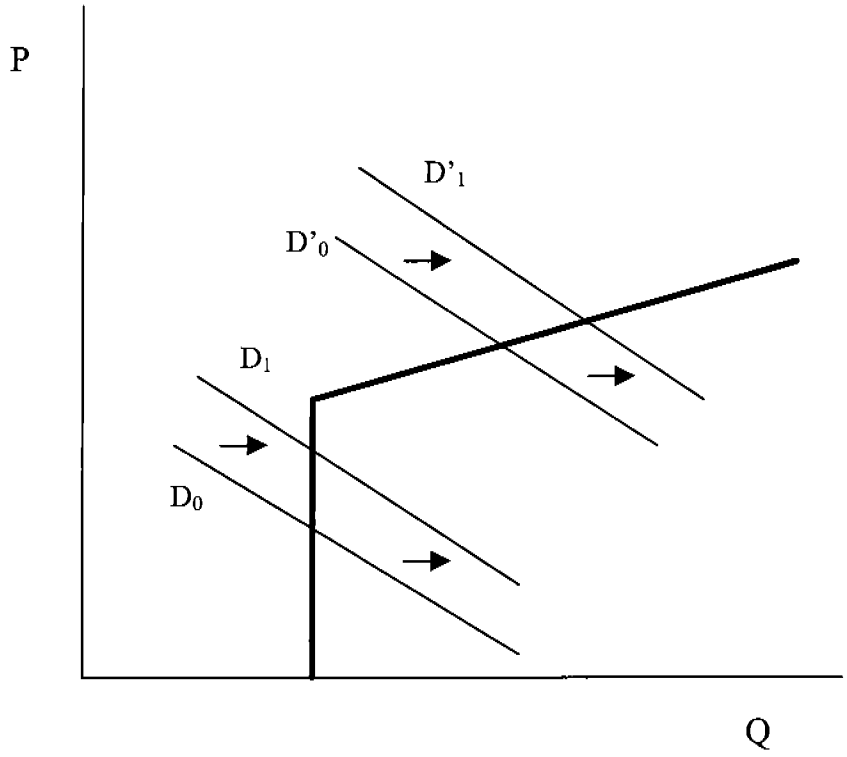


TABLE 12

Interactions with Growing/Declining Cities

	Change in Log Rents (98-85)		Log New Buildings (98-85)	
	(1)	(2)	(3)	(4)
Immigration impact† * Log(employment growth 69-94)	**-0.219** (0.098)**			
Immigration impact† * Share Old Housing		**1.128** (1.144)		
Log immigrants * Log employment growth 69-94			**0.005** (0.027)	
Log immigrants * Share Old Housing				**-0.287** (0.134)**
Immigrants per 1983 Population	0.431 (0.666)	1.136 (0.521)**		
Log New Immigrants			0.177 (0.135)	0.581 (0.082)***
Log Employment Growth Rate (69-94)	0.024 (0.010)**		0.487 (0.236)**	
Share Homes Built Before 1940		0.104 (0.098)		0.178 (1.388)
Other Variables (Table 10)	Yes	Yes	Yes	Yes
Observations	277	292	278	293
R-squared	0.5	0.51	0.9	0.83

Notes: Robust (clustered by state) standard errors in parentheses

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

† Immigration impact is the cumulative number of immigrants between 1983 and 1997 divided by initial (1983) MSA population

TABLE 13

Rents and Foreign Born Residents: Census Data (1980-1990)

	Change in Log(rent)	
	(1)	**(2)**
Change (Foreign Born/Population)	**1.474** (0.388)***	**3.397** (1.271)***
Change Log Income	1.406 (0.134)***	1.450 (0.144)***
Change Employment Rate	-0.007 (0.0033)**	-0.006 (0.004)
Average Temperature	0.023 (0.023)	-0.022 (0.037)
Log. central city area	-0.023 (0.009)**	-0.018 (0.010)*
Serious crimes per person	0.185 (0.241)	0.137 (0.256)
1983 MSA Log population	0.029 (0.011)**	0.023 (0.012)*
Percent with Bachelor's degree	0.001 (0.001)	0.002 (0.001)
1983 MSA Log income per capita	0.432 (0.082)***	0.561 (0.118)***
Rent control	0.00002 (0.00003)	0.00001 (0.00003)
1980 MSA Log rent (45 percentile)	-0.030 (0.005)***	-0.040 (0.008)***
Constant	-3.111 (0.594)***	-3.614 (0.700)***
Method	OLS	IV
Observations (MSA)	233	233
R-squared	0.184	0.1392

Standard errors in parentheses

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

Appendix TABLE A.1

Major Immigrant Cities

Rank	MSA	Population 1983	Immigrants 83-98	Impact*
1	New York	8,491,429	1,653,393	19.47%
2	Los Angeles-Long Beach	8,182,905	1,111,542	13.58%
3	Chicago	7,301,085	476,754	6.53%
4	Miami	1,776,909	455,085	25.61%
5	Washington	3,809,206	359,918	9.45%
6	San Francisco	1,570,619	268,688	17.11%
7	Anaheim-Santa Ana	2,171,929	253,008	11.65%
8	Houston	3,205,171	230,027	7.18%
9	San Jose	1,419,521	215,957	15.21%
10	Boston	5,383,370	203,951	3.79%
11	Oakland	1,908,848	196,428	10.29%
12	San Diego	2,126,091	184,192	8.66%
13	Newark	1,953,893	172,904	8.85%
14	Philadelphia	4,818,838	155,583	3.23%
15	Bergen-Passaic	1,301,487	150,603	11.57%
16	Nassau-Suffolk	2,621,547	139,701	5.33%
17	Dallas	2,432,840	134,703	5.54%
18	Seattle-Bellevue-Everett	1,778,460	124,525	7.00%
19	Detroit	4,224,650	112,249	2.66%
20	Jersey City	568,869	111,619	19.62%
	10 Biggest Immigrant Cities	43,312,144	5,228,323	12.07%
	% Metropolitan US	**21.41**	**52.21**	
	20 Biggest Immigrant Cities	67,047,667	6,710,830	10.01%
	% Metropolitan US	**33.15**	**67.02**	

Notes: All magnitudes at the PMSA or MSA level

*(Immigrants/1983 Population), total immigrants obtained as the sum of legal immigrants in fiscal years 83 through 98.

Appendix TABLE A.2

Descriptive Correlations: Immigration and Other Population Growth (1983-1996)

	New Immigrants/1983 Population	Other Population Change/ 1983 Population
New Immigrants/1983 Population	1	0.1443
Other Population Growth/ 1983 Population	0.1443	1
Foreign Born 1980/ 1980 Population	**0.8905**	0.0724
1983 Log Rent	0.478	0.1358
Change in Rents 83-98	0.1974	0.0957
Change in Rrices 83-98	-0.0152	-0.1907
Change in Log employment level 83-90	0.064	0.8493
N†	314	314

Data at the PMSA, MSA level. †N=154 for correlation with the change in housing prices.

Appendix Table A.3

Model Selection: Lags in Dynamic Variables

	Akaike Information Criterion	
	Change Log Rent	**Change Log Price**
Contemporaneous	-10052.71	-5350.46
One Lag	**-10073.85**	**-5394.39**
Two Lags	-10068.02	-5380.12
Three Lags	-10052.52	-5320.89
Four Lags	-10066.47	-5271.99

Notes: "Best" model (minimizes the Akaike criterion), in bold.
All models contain initial MSA variables, year fixed effects, and immigration impact, income and employment rate with the lag indicated in the first column.

Appendix TABLE A.4

Illegal Immigrants Apprehended

Year	Deportable Aliens Located by the INS
1980	910,361
1981	975,780
1982	970,246
1983	1,251,357
1984	1,246,981
1985	1,348,749
1986	1,767,400
1987	1,190,488
1988	1,008,145
1989	954,243
1990	1,169,939
1991	1,197,875
1992	1,258,482
1993	1,327,259
1994	1,094,717
1995	1,394,554
1996	1,649,986
1997	1,536,520

Source: Immigration and Naturalization Service Yearbook, 1997

Appendix Table A.5

Accounting for Immigration

	Log Immigrants at T	
Log Real GDP per Capita at T-1	0.117	-0.631
	(0.251)	(0.244)**
Log Real GDP per Capita at T-2	-0.377	-0.488
	(0.251)	(0.237)*
Log Population at T-1	-0.142	-4.547
	(0.309)	(1.015)**
Log Population at T-1 Squared	0.010	0.189
	(0.010)	(0.033)**
Log Real Exchange at T-2	0.010	0.207
	(0.011)	(0.057)**
Military Conflict T-1	0.158	0.181
	(0.061)**	(0.059)**
Collapse of State Insitutions T-1	0.424	0.347
	(0.106)**	(0.098)**
Transition out of Communism	1.528	1.451
	(0.140)**	(0.150)**
Year	0.568	0.466
	(0.114)**	(0.107)**
Year squared	-0.003	-0.002
	(0.001)**	(0.001)**
Log Immigration in 1979	0.946	
	(0.028)**	
Constant	-24.451	17.232
	(5.628)**	(9.323)
Method	RE	FE
Observations	2060	2079
Number of Countries	132	136
R-squared	0.8877	0.28

Notes: Standard errors in parentheses. The unit of observation is the country.

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

Appendix TABLE A.6

1st Stage: IV for Differences

	Immigrants/Population		Change Immigrants/Population	
	(1)	(2)	(3)	(4)
Prediction from US Shift-Share/Population	**0.854**	-	-	-
	(0.059)***	-	-	-
Prediction from Sending Countries/Population	-	**0.807**	-	-
	-	(0.061)***	-	-
Change (Prediction from US Shift Share/Populatio	-	-	**0.802**	-
	-	-	(0.112)***	-
Change (Prediction from Sending Countries/Popul	-	-	-	**0.511**
	-	-	-	(0.102)***
Other Relevant Variables in Table 5	Yes	Yes	Yes	Yes
Origin of Prediction	US Shift-Share	Country vars. RE	US Shift-Share	Country vars. FE
Observations	3848	3835	3888	3876
R-squared	0.85	0.84	0.18	0.09
F-statistic (H0: All parameters are zero)	75.99	65.03	30.47	14.92

Robust standard errors (clustered by MSA) in parentheses

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

Data Appendix

MSA: I follow the 1993 definition of metropolitan areas.

Fair Market Rents: are obtained directly from HUD by MSA. HUD reports rents at the 45% of the rent distribution. After 1996 rents for the 40th percentile are reported. In 1995 both the 40th and 45th percentile are reported, and I use the ratio to extrapolate 45th percentile rents from 1996 on.

Immigrants (INS): The INS provides the zip code of intended residence for all legal immigrants since 1983. I match zip codes to 1993 Metropolitan Statistical Areas using the Census MABLE Geo-correlation Engine.

MSA Population, Employment and Income per Capita: from the BEA. The data is supplied at the NECMSA (New England County MSA) for New England. In New England, I attribute the same income per capita and employment rate as the NECMSA with which the MSA has the greater overlap (the regressions are based on changes in the variables). For population I use the original MSA population (from Census data), and the population growth rate in the correspondent NECMSA to calculate population by year in New England's MSAs.

Mean Temperature in January: from the 1988 City Data Book. For MSA with more than one city I use the city with the name of the first name in the MSA denomination.

Central City Area: from the 1988 City Data Book. Correspond to 1980. For MSA with more than one city I use the city with the name of the first name in the MSA denomination.

Serious crimes per person: from the 1988 City Area Data Book. Serious crimes know to police in 1995.

Percentage with Bachelor's degree: from the 1988 City Area Data Book. Uses data from 1980 Census.

Rent Control Dummy: from Malpezzi (1986). Takes value 1 if rent control in

Construction cost data: for 1980 and 1990. In Malpezzi (1986): originally obtained from Means Light Commercial Cost Data.

Rents (American Housing Survey): gross rent (rent + utilities) for 1985 and 1995.

Quality Indicators (American Housing Survey): usually take value 1 if problem or amenity is present. I discard the observation without complete observations.

Rents (Census): from the 15 Metropolitan samples (1980 and 1990). I calculate the 45th percentile rent using sample household weights.

Foreign-born (Census): just consolidates the number of people who were born outside the U.S.

Military Conflict and Collapse of State Institutions: Internal Wars and Failures of Governance 1954-1996" database, from the Center for International Development and Conflict Management at the University of Maryland. The Database details all the episodes of civil war and major political unrest in a country and year. I create an indicators that take value one if there was a documented war or political collapse on that year.