The Effect of Low-skilled Immigration on US Prices: Evidence from CPI Data

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Abstract

While an extensive literature examines the impact of low-skilled immigration on US native wages, there has been almost no research on the parallel question of how immigration affects the price of goods and services. A standard small open economy model suggests that low-skilled immigration should reduce the relative price of non-traded goods by decreasing the wages of low-skilled workers. Treating US cities as small open economies and using confidential price data on goods and services to estimate reduced-form price effects, I find that, at current immigration levels, a 10 percent increase in the share of low-skilled immigrants in the labor force decreases the price of immigrant-intensive services, such as housekeeping and gardening, by 1.3 percent and of other non-traded goods by 0.2 percent. Structural estimates suggest that 50-80 percent of the effect on prices can be explained by lower wages. However, wage effects are significantly larger for low-skilled immigrants than for low-skilled natives because the two are imperfect substitutes. Overall, the results imply that the low-skilled immigration wave of the 1990s increased the purchasing power of high-skilled natives living in the 25 largest cities by 0.65 percent but decreased the purchasing power of native high school dropouts by 2.66 percent.

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1 Introduction

Most research to date on the impact of low-skilled immigration on the US economy has focused on native wage levels. The net effect of immigration on natives' purchasing power, however, depends not only on wage but also on price effects. If immigration bids down the price of low-skilled labor, this will reduce the price of unskilled-intensive goods and services, thereby raising the welfare of consumers of these goods. This paper uses confidential microdata from the Consumer Price Index to estimate the causal effect of low-skilled immigration on prices. Then, using a unified conceptual framework, combines wage and price effects with consumption patterns of native skill groups to determine the net benefits and distributional impacts that low-skilled immigration has had on the native economy.

The paper exploits the large variation across cities and through time in the relative size of the low-skilled immigrant population to identify the impact of immigration on prices. The use of cross-city variation allows for the identification of the full price effects of immigration as long as natives do not respond to the impact of immigration on a local market by moving their labor or capital to other cities. Most studies that have looked at this issue find no displacement effects due to immigration[1], and the results of this paper also support this finding.[2] To ameliorate the bias that arises from endogenous location choices of immigrants, I use as instrument for the recent distribution of the immigrant population, the historical distribution of Mexicans, Cubans, and Italians, major sources of low-skilled immigrants to the US.

As initial evidence of the impact of low-skilled immigration on prices, I present reduced-form price equations for non-traded services in which the regressor of interest is the share of immigrant high school dropouts in the labor force. The price data, obtained through a confidentiality agreement with the Bureau of Labor Statistics (BLS), is made of price indexes at the city level for all components of the Consumer Price Index (CPI). The instrumental variable estimates

[1] See Card (2001), Card and DiNardo (2000), Federman *et al.* (2005), and Card and Lewis (2005).

[2] The exception is Borjas, Freeman, and Katz (1997) who find a correlation of negative 1 between native net migration and immigration by state.

suggest that low-skilled immigration lowers the prices of immigrant-intensive services such as gardening, housekeeping, babysitting, and dry cleaning. At current immigration levels, a 10 percent increase in the proportion of low-skilled immigrants in the labor force reduces prices of immigrant-intensive services by 1.3 percent.

The reduced-form estimates show that there is a causal effect of low-skilled immigration on the prices of low-skilled-intensive services, but do not illuminate how that effect occurs. In the second part of the paper, I construct a simple, small-open-economy model with a non-traded sector where low-skilled immigration lowers the relative price of non-traded goods and services by decreasing the wages of low-skilled immigrants and low-skilled natives. I use the model's implications to empirically estimate the magnitude of the effect of a low-skilled immigration shock on wages and prices. I find that, at current US immigration levels, a 10 percent increase in the share of low-skilled immigrants in the labor force reduces the wages of other low-skilled immigrants by 8.0 percent and of low-skilled natives by 0.6 percent, and that these decreases in wages account for 50-80 percent of the decrease in prices of non-traded goods.

The focus on local conditions limits the set of goods and services whose prices can be analyzed to those considered non-tradeable at the city level. Consistent with the theoretical framework, in which US cities are considered small open economies, I find that the local concentration of low-skilled immigrants has little impact on the prices of traded goods.

The final section of the paper combines data on consumption patterns from the Consumer Expenditure Survey (CEX) with the price-and-wage effects obtained from the structural model to estimate how natives' purchasing power was changed by the immigration wave of the 1990s. I find that price effects were larger for high-skilled natives, rather than for low-skilled natives, because they devoted a larger share of their budget to non-traded goods, and within non-traded goods they consumed relatively more immigrant-intensive services. Overall, I find that the low-skilled immigration of the 1990s increased the purchasing power of high-skilled workers living in the 25 largest cities by an average of 0.65 percent and decreased the purchasing power of native high school dropouts by an average of 2.66 percent. I conclude that, through lower prices, low-

skilled immigration brings positive net benefits to the US economy as a whole, but generates a redistribution of wealth.

To my knowledge, only one other study, Khananusapkul (2004), has empirically explored the effect of low-skilled immigration on the prices of immigrant-intensive services. Using a comparable empirical methodology, the author finds that a single percentage point increase in the proportion of low-skilled female immigrants in a metropolitan area raises the proportion of private household workers by 6 percentage points and lowers their wages by 3 percent. Back-of-the-envelope calculations suggest that her results are not very different from mine.[3] However, my paper is significantly more comprehensive because it estimates price effects for many non-traded goods (rather than for a single service), estimates wage effects, and calculates changes in the purchasing power of natives.

On the other hand, a vast literature has looked at the wage effects of immigration. My estimates of the impact of low-skilled immigration on natives' wages are in line with what most other cross-city studies have found:[4] the effect of immigration on the labor market outcomes of natives is small. A few hypotheses have been proposed to explain this finding. Borjas (2003) argues that if labor and capital adjust to immigration by moving across cities, then the relevant unit of analysis is the entire country, and cross-city comparisons will fail to find significant effects. However, as mentioned above, most of the available evidence suggests that there are no displacement effects of immigration on native labor, and no study yet has focused on capital adjustments to immigration. Lewis (2005), on the other hand, claims that local economies are the relevant unit of observation, but that the technologies of local firms – rather than the wages that they offer – respond to changes in local skill mix associated with immigration. The hypothesis that cities adapt to immigration by shifting industry composition is rejected by Card

[3] A single percentage point increase in the proportion of low-skilled female immigrants in the population of a city corresponds to a roughly 40 percent increase in their number. If 40 percent of total low-skilled immigrants are women, then the 40 percent increase in the number of low-skilled female immigrants raises the number of low-skilled immigrants by 16 percent. Assuming that wages of household workers account for 70 percent of the price of housekeeping services, then Khananusapkul's results imply that a 10 percent increase in the number of low-skilled immigrants decreases the prices of this service by close to 1.4 percent.

[4] See Altonji and Card (1991),Card (1990), Card (2005), and Card and Lewis (2005).

and Lewis (2005).

My structural estimates suggest an alternative explanation: low-skilled natives and low-skilled immigrants are far from being perfect substitutes (I estimate an elasticity of substitution of 1.32); therefore, a low-skilled immigration shock should affect mostly the wages of other low-skilled immigrants and have little effect on the wages of low-skilled natives. Because the literature on the own-wage effects of low-skilled immigrants is scant[5], I provide several consistency checks on my estimates. In particular, I show that low-skilled immigration has a much larger negative effect on the wages of native Hispanics with low English proficiency than on the wages of other low-skilled native groups.

The rest of the paper is organized as follows. In the following section, I describe the data and the descriptive statistics, and discuss industry variation in the use of low-skilled immigrant labor. The reduced-form estimates are reported and discussed in Section 3. A simple theoretical framework to interpret the results from Section 3 is presented in Section 4. In Section 5 I describe the structural approach and discuss the main results of the paper. Purchasing power calculations are reported in Section 6, and Section 7 concludes.

2 Data

Immigration Data

This paper uses the 1980, 1990, and 2000 Public Use Microdata Samples (PUMS) of the Decennial Census to measure the concentration of low-skilled immigrants among cities. Low-skilled workers are defined as those who have not completed high school. An immigrant is defined as someone who reports being a naturalized citizen or not being a citizen. This analysis is restricted to people age 16-64 who report being in the labor force.

Table 1 shows the evolution of the share of low-skilled immigrants in the labor force for the 25 largest cities in the US. Two facts should be emphasized. First, there is substantial variation

[5] Card (1990) and Borjas (2003) are the only two studies that estimate the effect of low-skilled immigration on the wages of other immigrants; the former finds no significant negative effect of an immigration shock on the labor outcomes of earlier immigrants, and the latter a sizeable, but not statistically significant, negative effect.

across cities in the concentration of low-skilled immigrants. Immigrants are heavily concentrated in large cities, such as Los Angeles, New York, and Miami. In Los Angeles, for example, one out of six workers is a high school dropout immigrant. In other smaller cities, low-skilled immigrants are a negligible share of the labor force. In Cincinnati, for example, in 2000 there were fewer than 5 low-skilled immigrant workers per 1000 participants in the labor force. Second, during the 1990s, new waves of low-skilled immigrants chose to locate in new cities. So despite the large flows of new immigrants to the country, Los Angeles, New York, and Miami didn't see an increase in the share of high school dropout immigrants in their labor forces. Cities like Denver, Dallas, Washington DC, and especially Atlanta, experienced a significant increase in the concentration of low-skilled immigrants, though.

Price Data

Under a confidentiality agreement with the Bureau of Labor Statistics (BLS), I was granted access to the CPI research dataset (RDB). This dataset is comprised of the store-level data used to construct the CPI. It also includes estimates of price indexes at lower levels of geography and product classification that are not available to the public. The RDB covers only the years 1986-2002, which restricts most of my empirical analysis to price changes between 1990 and 2000.

The paper uses price indexes at the city-industry level. The analysis is restricted to A-sized cities as defined by the BLS (Metropolitan Areas with 1980 populations greater than 1.2 million), where sufficient quotes are collected to produce reliable indexes. The number of goods and services included in the CPI that can be used in the present analysis is restricted by the ability to match them to the industry classification of the 1980 Census. The paper uses the Census data to construct a measure of the industry's low-skilled labor factor share.[6] The matching process results in a sample of 70 goods and services, 33 of them non-tradeable (See

[6] A Revision to the CPI in 1998 changed some of the geographic area samples and incorporated a new item structure. Buffalo and New Orleans, A-sized units before the revision, were excluded from this group after the revision, and Washington DC and Baltimore were merged into a single unit. For these cities, in an effort to maximize the number of observations, the present analysis assigns the index value of December 1997 to January 2000. A similar strategy was followed for items that did not have a perfect match in the new structure.

Appendix A for a list of goods and services).[7]

Industries Intensive in Low-skilled Immigrant Labor

There is much between-industry variation in the use of low-skilled immigrant labor. Agriculture is the prime example of a low-skilled-immigrant-intensive industry: 25 percent of all workers in the industry are low-skilled immigrants, 8 times the percentage in the overall labor force. On the other hand, there are industries with virtually no low-skilled immigrants: in the accounting services industry, for example, less than one out of every 1000 employees is a foreign-born high school dropout.

Table 2 shows the 15 industries with the highest share of low-skilled immigrants, low-skilled female immigrants, and low-skilled male immigrants in the year 2000. With the exception of agriculture and textiles, almost all other industries fall into the category of non-traded services: landscaping, housekeeping, laundry and dry cleaning, car wash, shoe repair, and services for buildings and dwellings. The low-skilled immigrant concentration in these services is very large. For example, whereas low-skilled immigrant women represented 1.9 percent of the total labor force in the year 2000, they represented more than 25 percent of the workers in private household occupations and 12 percent of the workers in laundry and dry cleaning services. Similarly, the immigrant men's share in gardening was 9 times larger, and their share in shoe repair 6 times larger, than their share in the total labor force.

The concentration of low-skilled immigrants in these industries is not solely an outcome of their low education level; indeed, native high school dropouts are much less likely to work in these industries. Gardening and housekeeping are one good example; whereas 60 percent of high school dropouts in the labor force in 2000 were natives, less than one third of the dropouts working in one of these two services were. The correlation between the share of high school dropouts in the total employment in an industry and the percentage of those high school dropouts that are immigrants is 0.44 and is statistically significant. This correlation suggests that low-skilled immigrants and natives are not perfect substitutes; if they were, the correlation

[7] Because of confidentiality restrictions, I cannot present detailed statistics of the price data used in this paper.

would be close to zero. Immigrants' low proficiency in English, and for some their legal status, limit their job opportunities compared to low-skilled natives. Because of this observation, I do not assume but rather empirically test for the degree of substitutability of low-skilled immigrants and natives.

3 Initial Evidence on the Effect of Low-skilled Immigration on Prices

3.1 OLS Estimates

A first approach to the study of the effect of low-skilled immigrants on prices is to look only at the prices of services that use their labor intensively. The services included in the empirical analysis of this section are those for which I have data both on prices and on the composition of employment, and whose intensity in the use of low-skilled immigrant labor was at least 10 percent in 1980.[8] These are: laundry and dry cleaning, shoe repair, babysitting, housekeeping, and other household services (includes gardening).[9] Ideally, I would have liked to have run a separate regression for each service, and to have estimated a separate effect of the immigration shock and separate city fixed effects. Because I have so few observations (25 cities and two decades), I pool all indexes in the same regression and restrict the city fixed effects and the effect of immigration to be equal across all services. I then control for industry fixed effects. The general estimating equation is:

$$LnP_{ijt} = \delta Ln(\frac{LS\ Immigrants}{Labor\ Force}_{it}) + \phi_i + \zeta_j + \psi_t + \varepsilon_{ijt}, \quad (1)$$

where i is city, j industry, and t decade. The parameter δ represents the average treatment effect of an immigration shock on the US largest cities.[10]

[8] I use the 1980 data to avoid endogeneity of technology choices. I chose 10 percent as the threshold because it is approximately double the share of low-skilled immigrants in the labor force.

[9] The 1987 CPI product classification does not have a separate item strata category for gardening services. Gardening and lawncare services are included in the item strata "Other Household Services", which also includes water softening services, moving and storage services, and coin-operated laundry.

[10] As Section 4 shows, the elasticity of prices to an immigration shock is increasing in the initial share of immigrants in the low-skilled labor force.

Table 3, Column 1 reports the OLS estimation of equation (1). The coefficient for the immigration variable is positive, very close to zero, and not statistically significant. However, as has been emphasized in the immigration literature[11], the cross-sectional correlation between immigrant inflows and economic outcomes is likely to be biased upwards; immigrants choose their location based, at least in part, on the economic opportunities that cities offer. Given that the economic growth of cities usually is accompanied by higher prices and inflation, a positive correlation between immigration concentration and prices may be observed in the data, even if there is no causal relation between the two.

The results are generally invariant to the inclusion of controls for economic trends that potentially attract immigrant flows. For example, the coefficients of Columns 2 and 3 of Table 3, which include region-specific time trends and the log of population although smaller are still positive. However, the inclusion of the log of the level of employment[12] (Column 4) changes the sign of the immigration concentration coefficient, supporting the hypothesis that OLS coefficients are biased upward because immigrant flows are correlated with unobserved economic conditions. The coefficient is close to being significant at 10 percent, and its magnitude could imply that an increase of 10 percent in the share of low-skilled immigrants in the labor force the prices of low-skilled immigrant intensive services by 0.4 percent.

This regression is, however, potentially flawed since employment is likely to be endogenous. To address the problem of omitted variables, as well as the possibility of feedback between employment growth and immigration, I use the IV strategy described below.

3.2 Instrument

The instrument exploits the tendency of immigrants to settle in a city with a large enclave of immigrants from the same country. Immigrant networks are an important consideration in the location choices of prospective immigrants because these networks facilitate the job search process and the assimilation to the new culture (Munshi, 2003). The instrument uses the 1970

[11] See Altonji and Card (1991) and Borjas (2001).

[12] I thank David Card and Ethan Lewis for sharing their data on city-employment.

distribution of immigrants from a given country across US cities to allocate the new waves of immigrants from that country.

The instrument is likely to predict new arrivals if: (1) there is a large enough number of immigrants from a country in 1970 to influence the location choices of future immigrants, and (2) there is a steady and homogeneous wave of immigrants after 1970. Therefore, I include in the instrument the countries that were in the top 5 sending countries in 1970, and which continued to be important senders of immigrants in the decades that followed. As can be seen in Table 4, only Mexico, Cuba, and Italy satisfy these conditions.[13] Many European countries and Canada, important contributors to the low-skilled immigrant population in 1970, were replaced by Latin American and Asian countries starting in 1980.

Formally, the instrument for the log of the number of low-skilled immigrants in city i and decade t can be written as,[14]

$$Ln\left(\frac{Mexicans_{i,1970}}{Mexicans_{1970}} * LSMexicans_t + \frac{Cubans_{i,1970}}{Cubans_{1970}} * LSCubans_t + \frac{Italians_{i,1970}}{Italians_{1970}} * LSItalians_t\right),$$

where $\frac{Mexicans_{i,1970}}{Mexicans_{1970}}$ represents the percentage of all Mexicans included in the 1970 Census who were living in city i, and $LSMexicans_t$ stands for the *total* flow of low-skilled Mexican immigrants to the US between 1971 and decade t. Similar notation is used for Cubans and Italians. I use all Mexicans, Cubans, and Italians in the US –and not only low-skilled workers–to construct the initial distributions. This maximizes the number of cities included in the analysis.

As can seen in Table 5, the instrument is a good predictor of low-skilled immigrant shares.[15] The magnitudes of the coefficients suggest that, at current US immigration levels, an increase of 10 percent in the predicted number of low-skilled Mexicans, Cubans, and Italians increases the share of low-skilled immigrants in the labor force by between 4 and 7 percent.[16]

[13] Appendix C, Table C1 reports the first stage for instruments that include alternative sets of countries.

[14] I use a logarithmic functional form because the price equation derived from the theoretical model (Section 4.3) is expressed in logs. Appendix C, Table C2 presents alternative specifications for the first stage as a check on the robustness of the instrument.

[15] In Table 6, I include estimations with and without data for 1980 because some of the empirical exercises in the paper are restricted to the period 1990-2000 and others to the period 1980-2000.

[16] In estimations not shown here, I find that a 10 percent increase in the predicted number of Mexicans, Cubans,

Most of the econometric specifications in the paper include city and region*decade fixed effects. Therefore, the instrument will help in identifying the causal effect of immigration concentration on prices as long as the unobserved factors that determined that more immigrants decided to locate in city i vs. city $i\prime$ (both cities in the same region) in 1970, are not correlated with changes in the relative economic opportunities offered by the two cities during the 1990s. Given that cities i and $i\prime$ should be in the same region, the identification assumption is not violated, for example, by sunbelt cities growing faster than cities in other regions (for several decades) and at the same time being important immigrant cities. The identification assumption will be violated, however, if, for example, what determined that more immigrants settled in city i vs. city $i\prime$ was a shock to the demand for immigrant-intensive services in city i (or any other type of shock) that although temporary, took a very long time (20 years) to vanish.[17]

Some specifications in Section 5.1.3 include city*decade fixed effect (they exploit inter-industry variation in the use of immigrant labor). The identification assumption in these cases would be violated only if the unobserved factors that determined that more immigrants decided to locate in city i vs. in city $i\prime$, also influenced the changes in relative prices of two industries within city i in the 1990s.

3.3 Instrumental Variables Estimates

Columns 1 and 2 of Table 6 present the IV estimates of equation (1). The results suggest that an increase of 10 percent in the share of low-skilled immigrants in the labor force of a city reduces the prices of services that intensively use immigrant labor by 1.3 percent. For example, the low-skilled immigration shock experienced by the average city during the 1990s should have reduced the prices of these services by 2.4 percent. Notice that the IV estimates confirm that the OLS estimates are upward biased; even after controlling for the log of employment, the OLS

and Italians increases between 5.5 percent and 9.4 percent the actual share of low-skilled immigrants from Mexico, Cuba, and Italy in the labor force.

[17] If the demand shock was permanent, such that it changed the preferences of city i forever, the identification assumption will not be violated, but the coefficient of the second stage should be interpreted as a city-average treatment effect (average in terms of tastes).

estimate is half as large as the IV estimate.

I also estimate equation (1) for two other groups of goods and services: non-traded goods with higher than average intensity in the use of low-skilled immigrants; and all non-traded goods. Columns 3 to 6 of Table 6 present the results. As expected, the less intensive in low-skilled immigrants the industries included in the sample are, the smaller is the effect.

4 Theoretical Framework

Up to this point, I have not imposed any economic structure on the estimation of the price effects of low-skilled immigration. The estimated coefficients from the previous section demonstrate that low-skilled immigration has an effect on the prices of low-skilled immigrant intensive services, but these same coefficients are mute about the channels through which the effect takes place. In other words, they do not represent any structural parameter. The second part of the paper adopts a semi-structural approach. In this section I develop a simple model in which wages are the main mechanism through which the impact on prices occurs; the next section empirically implements the predictions of the model and compares the structural estimates with the reduced form estimates.

I use a simple Heckscher-Ohlin framework in which the presence of a non-traded sector in the model breaks the "factor price insensitivity" result of a two-traded-sectors model (Leamer (1995)). I consider US cities to be small open economies.

4.1 Setup

Consider a small open economy that produces two goods, one traded (T) and one non-traded (NT). There are three factors of production: high-skilled native labor (H), low-skilled native labor (L), and low-skilled immigrant labor (I). The total supply of factors is represented by $\overline{H}, \overline{L}$, and $\overline{I}$ respectively. For simplicity, I assume that only high-skilled native labor participates in the production of the traded good:[18]

[18] The results hold under a more general specification as long as the traded good is relatively less intensive in low-skilled labor.

$$T = H_T. \tag{2}$$

The non-traded good production function is a nested CES:

$$NT = H_{NT}^{\alpha}\left[(\beta L_{NT}^{\rho} + (1-\beta)I_{NT}^{\rho})^{\frac{1}{\rho}}\right]^{1-\alpha}, \tag{3}$$

where $0 < \rho \leqslant 1$ and $0 < \alpha < 1$. This specification implies that the elasticity of substitution between the low-skilled labor aggregate and high-skilled labor is equal to 1, and that the elasticity of substitution between L and I is $\sigma = \frac{1}{1-\rho}$. This specification allows for perfect substitution between immigrant and native low-skilled labor ($\sigma = \infty$), for a Cobb-Douglas specification between the two factors ($\sigma = 1$), and for perfect complementarity between them ($\sigma = 0$).

To keep the analysis simple, I have excluded capital from the production functions. Doing so is equivalent to keeping the supply of capital perfectly elastic, a reasonable assumption for local markets.

The economy admits a representative consumer with a Cobb-Douglas type utility:

$$U = T^{\gamma}\left(NT\right)^{1-\gamma} \tag{4}$$

Note that the assumption of homotheticity of the utility function implies no income effects and no role for differences in preferences between natives and immigrants.

I assume that all markets are competitive. The economy takes the price of the tradeable good P_T which is normalized to one, as given.

4.2 Equilibrium

The maximization of utility leads consumers to spend a fraction γ of their income in the consumption of the traded good and $(1-\gamma)$ in the consumption of the non-traded good. This condition plus market-clearing in the non-traded market imply that the following equation holds:

$$H_{NT}^{\alpha}\left[(\beta\overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho})^{\frac{1}{\rho}}\right]^{1-\alpha} = \frac{(1-\gamma)(w_H\overline{H} + w_L\overline{L} + w_I\overline{I})}{P_{NT}}, \tag{5}$$

where the left side of equation (5) represents the total supply of the non-traded good and the right side the total demand. Note that I have already incorporated the conditions $L_{NT} = \overline{L}$ and $I_{NT} = \overline{I}$.

Because all factors will be paid the value of their marginal product in competitive markets, and because the marginal product of high-skilled workers should be equal in both sectors, the following equilibrium equations result:

$$w_L = (1-\alpha)\beta P_{NT} H_{NT}^{\alpha} \overline{L}^{\rho-1} (\beta \overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho})^{\frac{1-\alpha}{\rho}-1}, \tag{6}$$

$$w_I = (1-\alpha)(1-\beta) P_{NT} H_{NT}^{\alpha} \overline{I}^{\rho-1} (\beta \overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho})^{\frac{1-\alpha}{\rho}-1}, \tag{7}$$

$$1 = \alpha P_{NT} H_{NT}^{\alpha-1} \left[(\beta \overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho})^{\frac{1}{\rho}} \right]^{1-\alpha}, \tag{8}$$

where the right sides of equations (6), (7), and (8) represent the value of the marginal product of low-skilled natives, low-skilled immigrants, and high-skilled workers respectively.

Equations (5) to (8) provide a system of four equations and four unknowns $(P_{NT}, H_{NT}, w_L, w_I)$. Solving the system, I obtain that the equilibrium relative price of non-traded goods is given by

$$P_{NT} = \frac{(1-\gamma)^{1-\alpha}}{\alpha^{\alpha}(\alpha+\gamma(1-\alpha))^{1-\alpha}} * \left(\frac{(\beta \overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho})^{\frac{1}{\rho}}}{\overline{H}} \right)^{-(1-\alpha)}. \tag{9}$$

Equation (9) shows that the relative price of the non-traded good depends positively on the consumer's preference for it, $(1-\gamma)$, and on the total supply of high-skilled labor. An increase in $\overline{H}$ will raise the relative production of the traded good (and therefore, reduce its relative price), the more so the higher is $1-\alpha$, that is, the less intensive is the non-traded good in high-skilled labor. The same logic explains why the relative price will decrease as low-skilled labor becomes more abundant.

4.3 The Effect of an Immigration Shock

To determine the effect of an immigration shock on prices, I begin by taking logs of equation (9) :

$$Ln(P_{NT}) = \vartheta - (1-\alpha)Ln\left(\frac{(\beta\overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho})^{\frac{1}{\rho}}}{\overline{H}}\right), \tag{10}$$

where $\vartheta = Ln(\frac{(1-\gamma)^{1-\alpha}}{\alpha^{\alpha}(\alpha+\gamma(1-\alpha))^{1-\alpha}})$.

Differencing (10) with respect to low-skilled immigration, I obtain the elasticity of the relative price of the non-traded good to low-skilled immigration:

$$\frac{\partial LnP_{NT}}{\partial Ln\overline{I}} = -(1-\alpha)\frac{\partial Ln\left(\frac{(\beta\overline{L}^{\rho}+(1-\beta)\overline{I}^{\rho})^{\frac{1}{\rho}}}{\overline{H}}\right)}{\partial Ln\overline{I}} < 0. \tag{11}$$

Equation (11) shows that the impact of a shock to low-skilled immigration on the relative price of the non-traded good depends on two factors: the low-skilled-labor intensity of the non-traded good (1-α) and immigration's effect on the relative amount of aggregate low-skilled labor to high-skilled labor. If displacement effects are negligible, it can be shown that:

$$\frac{\partial LnP_{NT}}{\partial Ln\overline{I}} = -(1-\alpha)\left(\frac{(1-\beta)\overline{I}^{\rho}}{\beta\overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho}}\right) < 0. \tag{12}$$

Equation (12) suggests that a higher relative productivity of low-skilled immigrants with respect to natives, ($\downarrow \beta$), also increases the magnitude of the effect of the shock. Intuitively, prices can be reduced further if the factor whose price is going down the most is also the most productive. Finally, note that the elasticity of prices with respect to a low-skilled immigration shock is increasing in the initial share of immigrants in the low-skilled labor aggregate.[19]

The negative effect of an immigration shock on the relative price of the non-traded good will hold under more general constant-returns-to-scale technologies if two conditions are satisfied: there are more factors than traded goods and the non-traded sector is more intensive in low-

[19] Equation (12) makes clear why δ in equation (1) represents the average treatment effect.

skilled immigrant labor than the traded sector. The magnitude of this effect will depend on the difference in skill-intensities between the two sectors.

5 Empirical Implementation

This section estimates the parameters of the model that determine the price effects of low-skilled immigration and discusses the implied wage effects. The results are compared to estimates in the literature.and several consistency checks are performed.

5.1 Price Effects of Low-skilled Immigration

To obtain estimates of the parameters of equation (11), I follow several steps. First, I show that the displacement effects of low-skilled immigrants on low-skilled natives are negligible. Based on this result, I estimate the elasticity of substitution between immigrants and natives, $(\frac{1}{1-\rho})$, and their relative efficiency (β). With the estimated ρ and β, I construct the low-skilled labor aggregate. Finally, I estimate the low-skilled labor factor share $(1-\alpha)$. Each step is discussed in detail in the following sections.

5.1.1 Displacement Effects

To test for the displacement effects of low-skilled immigration I use the following econometric specification:

$$Ln\overline{L}_{it} = \kappa Ln\overline{I}_{it} + \phi_i + \psi_t + \varepsilon_{ijt}. \tag{13}$$

The coefficient κ represents the average treatment effect. If there are displacement effects, κ should be negative; if displacement effects are such that for every low-skilled immigrant that moves to a city, one native moves away, $\kappa \approx -\frac{2}{3}$.[20]

My estimates, presented in Table 7, confirm what other studies have found: low-skilled immigrants do not displace low-skilled natives from the labor force. As observed in the table, $\widehat{\kappa}$

[20] This number comes from the fact that for the average US city there were aproximately 1.5 low-skilled natives per low-skilled immigrant in 2000.

is small, positive, and statistically indistinguishable from zero.

5.1.2 Elasticity of Substitution between Low-skilled Natives and Immigrants

To arrive at an expression that can be used to estimate ρ, I start by inserting equation (9) into equation (6):

$$Lnw_L = -(1-\rho)Ln\overline{L} - Ln(\beta\overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho}) + Constant. \tag{14}$$

Differencing equation (14) with respect to $\overline{I}$, assuming $\overline{L}$ and $\overline{H}$ to be fixed, and multiplying both sides of the equation by $\overline{I}$, shows that the elasticity of the wages of low-skilled natives to low-skilled immigration is

$$\frac{\partial Lnw_L}{\partial Ln\overline{I}} = -\rho\left(\frac{(1-\beta)\overline{I}^{\rho}}{\beta\overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho}}\right) = -\rho\left(\frac{w_I\overline{I}}{w_L\overline{L} + w_I\overline{I}}\right). \tag{15}$$

Hence, if there exists an estimate of the share of immigrant labor in total low-skilled labor costs, then the coefficient from a regression of the log of the wages of natives on the log of the supply of low-skilled immigrants should provide an estimate of ρ.

To implement equation (15) empirically, I use the following econometric specification:

$$Lnw_{nit} = \theta Ln(\overline{I}_{it}) + X_n'\Lambda + W_{it}'\Sigma + \phi_i + \psi_t + \varepsilon_{ijt} \tag{16}$$

where n is a native low-skilled worker, i a city, and t a decade. X_n are individual level characteristics, namely age, age squared, and sex. W_{it} represents city time-varying variables, such as the percentage of males in the low-skilled labor force and the log of the city's population. Wage data for the estimation of equation (16) comes from the 1980, 1990, and 2000 Census. The sample is restricted to non-agricultural workers who reported a positive annual labor income, a positive number of total weeks worked last year, and a positive number of "usual hours worked per week". Top-coded incomes were multiplied by 1.5, and wages were adjusted for inflation. The dependent variable uses hourly wages, and the aggregate supply of low-skilled immigrants

is expressed in the number of hours per year.[21]

Note that the total supply of low-skilled natives in the city is not included in this estimation. Given that the low-skilled native labor supply measure is orthogonal to the instrument (as shown in Table 7), excluding it from the regression should not affect the validity of the estimation.[22]

The estimated θ, reported in Table 8, is negative and statistically significant at 10 percent under all specifications. Its magnitude suggests that a 10 percent increase in the number of low-skilled immigrants in a city reduces the wages of low-skilled natives by approximately 0.6 percent. Adding $Ln\overline{L}_{it}$ does not change the magnitude or the significance of the coefficient. The effect of an immigration shock is of similar magnitude for male and female natives.

As indicated in equation (15), to recover an estimate for the elasticity of substitution I need the city-average share of immigrant labor in the low-skilled labor wage bill. Using the 1990 Census and restricting the sample to the 25 cities included in the analysis, I find that immigrants' wages account for approximately 24 percent of all low-skilled labor costs. Therefore, the implied elasticity of substitution is 1.32 ($\widehat{\rho} = 0.24$): low-skilled natives and immigrants are imperfect substitutes in production.[23]

Using the estimated ρ and the identity $\left(\frac{(1-\beta)\overline{I}^{\rho}}{\beta\overline{L}^{\rho}+(1-\beta)\overline{I}^{\rho}}\right) = \left(\frac{w_I\overline{I}}{w_L\overline{L}+w_I\overline{I}}\right)$, I estimate the relative efficiency $\widehat{\beta}$ using Non-linear Least Squares and cross-sectional data. I obtain a relative efficiency of 0.590 (std. deviation of 0.036). That is, natives are more efficient than immigrants.

5.1.3 Price Equation

With $\widehat{\rho}$ and $\widehat{\beta}$, I construct an estimate of $\frac{(\beta\overline{L}^{\rho}+(1-\beta)\overline{I}^{\rho})^{\frac{1}{\rho}}}{\overline{H}}$, which the model suggests is the relevant factor ratio for the study of price effects. To calculate the price effects of a change in this ratio, I use the following econometric specification, based on equation (10):

[21] Workers with a wage per hour of less than two dollars were excluded from the sample.

[22] In one specification, I include $Ln\overline{L}$ as a component of W_{it} to explore how sensitive the estimated coefficients are to the introduction of this variable and treat it as exogenous.

[23] Note that this value for the elasticity of substitution is obtained under the assumption of a perfectly elastic capital supply. If this assumption does not hold, however, part of the negative effect on natives' wages should come from a dilution of the capital-labor ratio, and the implied elasticity of substitution should be smaller.

$$Ln\left(P_{NT}\right)_{ijt} = -(1-\alpha) * Ln\left(\frac{(\widehat{\beta}\widehat{\overline{L}^{\rho}} + (1-\widehat{\beta})\widehat{\overline{I}^{\rho}})^{\frac{1}{\widehat{\rho}}}}{\overline{H}}_{it}\right) + \phi_i + \psi_t + \zeta_j + \varepsilon_{ijt}, \qquad (17)$$

where $(1-\alpha)$ is the low-skilled labor share in the production of the non-traded good. I use the number of high school equivalents as a measure of the supply of high-skilled workers. This skill margin – those with a very low education level relative to those with high school and vocational training – is the one most influenced by immigration (Lewis (2005)).[24]

I begin by estimating (17) using only immigrant-intensive industries. The results suggest that the technology used to produce these immigrant-intensive goods is characterized by a factor share of low-skilled labor of 0.27 (See Table 9, Columns 2). This estimate is quite comparable to 0.29, the average observed low-skilled-labor wage bill share for these industries, which I calculate using Census data.[25]

I perform the same analysis for broader groups of non-traded goods, and expect $\widehat{(1-\alpha)}$ to decrease as I introduce goods that are less immigrant-intensive (Columns 3-6, Table 9). The estimates of $(1-\alpha)$ present a clear declining pattern; $\widehat{(1-\alpha)}$ =0.184 when the sample is restricted to non-traded goods with higher than average concentration of low-skilled immigrants and $\widehat{(1-\alpha)}$=0.031, when the sample includes all non-traded goods. When compared to the observed low-skilled-labor wage bill share (0.24 for the first sample and 0.12 for the second), the estimated $(1-\alpha)$s appear to be a little low (especially 0.031). However, because these are imprecise estimates, I cannot reject the hypothesis that the observed and estimated $(1-\alpha)$s are the same.

To obtain *industry-level* price effects, I slightly modify equation (10) to exploit variation in low-skilled labor intensity across non-traded sectors: .

$$Ln(P_{NTj}) = \vartheta_j - (1-\alpha_j)Ln\left(\frac{(\beta\overline{L}^{\rho} + (1-\beta)\overline{I}^{\rho})^{\frac{1}{\rho}}}{\overline{H}}\right),$$

[24] Results are very similar when other definitions of high-skilled labor are used. See Table 12.

[25] I construct the low-skilled labor wage bill share using data from the 1980 Census and assuming a capital share of 30 percent for all industries. The formula I use is:

$LSWageBillshare_j$=$0.7*\frac{\sum_{k \in LS} wageincome_{kj}}{\sum_k wageincome_{kj}}$ where j is industry and k is worker. Note that I am allowing wages to vary across industries (the model assumes they are fixed across industries).

where j represents a non-traded sector. Then, I use the constructed low-skilled-labor wage bill shares as proxies for $(1-\alpha_j)$, to estimate the following econometric specification:

$$Ln\left(P_{NT}\right)_{ijt} = \theta LSWageBillshare_j * Ln\left(\frac{(\widehat{\beta}\overline{L^{\rho}} + (1-\widehat{\beta})\overline{I^{\rho}})^{\frac{1}{\rho}}}{\overline{H}}_{it}\right) + (\phi_i \times \psi_t) + \zeta_j + \varepsilon_{ijt}, \quad (18)$$

where j represents a non-traded sector, and $LSWageBillshare_j$ the low-skilled-labor wage bill share of sector j.

My instrument is the predicted number of low-skilled Mexicans, Italians, and Cubans multiplied by the wage-bill share of low-skilled workers in industry j. If my constructed low-skilled-labor wage bill share was a perfect measure of $(1-\alpha)$, $\widehat{\theta} \approx 1$. However, as discussed above, it usually overestimates (1-α). Therefore, I expect $\widehat{\theta} < 1$ and interpret it as an average adjustment factor of my proxy to the true value.

Table 10 presents estimates of θ under different specifications. My preferred estimate is in Column 4, where I allow for city fixed-effects to differ by group[26] and for region-decade shocks to differ by industry. Because the goods and services included in the sample are very diverse, there is no obvious reason why the effect of city characteristics should be equal across all types of goods; for example, the city's weather might be an important determinant in the market for gardening services, but not necessarily in the market for dental services. Assuming that groups of goods whose use of low-skilled immigrant labor is similarly intensive will also experience similar effects of city characteristics on their prices, it seems that allowing for different city fixed effects provides for a more accurate model. The preferred estimate, -0.483, suggests, for example, that an increase of 10 percent in the relative endowment of low-skilled labor in a city, decreases the price for housekeeping services ($LSWageBillshare = 0.4$) by 1.93 percent and the price of the average non-traded good ($LSWageBillshare = 0.12$) by 0.58 percent. When I restrict city fixed effects to be equal across all groups of non-traded sectors (Column 1), the coefficient is statistically significant and has the expected sign, but its magnitude appears to be

[26] The groups correspond to the three samples presented in Tables 6 and 9.

too small. To see this, consider low-skilled-immigrant-intensive goods: their average low-skilled wage bill share is 0.29. When multiplied by the estimated coefficient (-0.22) this suggests an elasticity of prices of -0.07, much smaller than the -0.27 shown in Table 9.

By multiplying the price effects from Tables 9 and 10 by $\left(\frac{w_I\overline{I}}{w_L\overline{L}+w_I\overline{I}}\right)_i$, one obtains the effect of low-skilled immigration on the prices of nontradeable goods at the current immigration level of city i.

How do these numbers compare to the reduced form estimates? Depending on the Census year used for the calculation of $\left(\frac{w_I\overline{I}}{w_L\overline{L}+w_I\overline{I}}\right)_i$, structural estimates explain between 54-78 percent of the price reduction for immigrant-intensive goods and goods with higher than average concentration of low-skilled immigrants, and 47-67 percent of the reduction in prices for the group of all non-traded goods.[27]

5.1.4 Traded Goods

If US cities behave as small open economies, then the model states that low-skilled-immigrant concentration should have no effect on the prices of traded goods. In reality, most goods, especially when considered from the point of view of the consumer, are not purely tradeable; there is always a part of the price that reflects the retailer's handling costs, and these costs are likely to be affected by local relative endowments. However, for most goods, these handling costs represent only a small share of the final price. For example, Barsky et al. (2001) estimate an upper bound for the retailing costs of grocery goods, such as cookies and soft drinks, of approximately 15 percent. Also, assuming that the effect of retailing costs on prices of goods is not systematically related to the percentage of low-skilled employees producing the good, it appears that even if the traded goods are affected by local endowments, that effect should not follow the declining pattern observed for the non-traded-goods groups in Table 9. Nor should it be captured by the interaction of the low-skilled-labor wage share bill with local relative

[27] To see how I obtain these numbers, take for example my estimate of -(1-α) for immigrant-intensive services in Table 9, Column 2: $\widehat{-(1-\alpha)} = -0.274$. When I multiply it by the city-average of $\frac{w_I\overline{I}}{w_L\overline{L}+w_I\overline{I}}_i$ (0.36 in 2000), I obtain -0.099, which represents 78 percent of the elasticity estimated in the reduced form (See Table 6, Column 2).

endowements.

Table 11 shows that the data support these predictions. Panel A presents the same estimations as Table 9 for traded goods; as observed, the coefficients are all close to zero and do not show a declining pattern as the samples become broader.

Panel B reports the estimation of the following equation, which includes both traded and non-traded goods:

$$Ln\left(P_{NT_{ijt}}\right) = \lambda * LSWBS_j * Ln\left(\frac{\widehat{AggL}}{\overline{H}}_{it}\right) + \tau * LSWBS_j * Ln\left(\frac{\widehat{AggL}}{\overline{H}}_{it}\right) * t_j + (\phi_i \times \psi_t) + (\zeta_j \times \psi_t) + \varepsilon_{ijt} \tag{19}$$

where $\widehat{AggL} = (\widehat{\beta \overline{L}^{\rho}} + (1-\widehat{\beta})\overline{I}^{\rho})^{\frac{1}{\rho}}$, $LSWBS_j$=the low-skilled-labor wage bill share in industry j, and t_j is a dummy variable for traded goods.[28]

My hypothesis implies that $\tau \simeq -\lambda$: the effect of low-skilled immigration (interacted with the low-skilled intensity of the sector) on the prices of traded goods should be close to zero. As seen in Table 11, I cannot reject this hypothesis.

I interpret these findings as evidence that treating US cities as small open economies is a reasonable assumption.

5.1.5 Robustness Checks

Table 12 presents several checks on the robustness of the price effects presented in Table 10. The second and third rows use different values for the elasticity of substitution and the relative efficiency.[29] As expected, the magnitude of the effect increases with the elasticity of substitution, but the numbers are not statistically different from the baseline estimate. The fourth row uses an alternative definition for high-skilled labor (all workers with a high school degree or higher) and the fifth excludes Los Angeles from the analysis. The magnitude and significance of the coefficient changes little under both specifications.

[28] See Appendix A for the classification of goods and services into traded and non-traded categories.

[29] The values for ρ are chosen to suggest a plausible range and the correspondent β are estimated using the same methodology described in section 5.1.2.

Given that the set of goods and services included in the analysis is determined somewhat arbitrarily (by the ability to be matched to the Census classification) and that the classification of goods into the non-traded category is open to debate, Table 12 also presents estimations where groups of goods and services are excluded. The estimated coefficient is somewhat larger in absolute value when medical services are excluded. Most coefficients are significant at the 10 percent level or better.

5.2 Implied Wage Effects for Low-skilled Natives and Immigrants

A discussion about the magnitude of the wage effects implied by the empirical analysis is key to the credibility of the structural estimates, because the model posits wages as the main mechanism through which immigrants change prices, and because the wage effects can be compared to previous estimates in the literature.

The estimation of equation (16) presented in Table 8 suggests that an increase of 10 percent in the number of low-skilled immigrants in a city reduces the wages of low-skilled natives by approximately 0.6 percent. This estimate is in line with the small effect of immigration on the labor market outcomes of natives found in most other cross-city studies.[30] My results are at variance with Borjas (2003), who finds a large and significant negative effect of immigration on natives' wages. His empirical approach is different from the one presented here, though; he uses the national level as the unit of analysis and exploits variation in immigrant shocks across experience groups.

I also can calculate the effect of a low-skilled immigration shock on the wages of other low-skilled immigrants using my estimate for the elasticity of substitution. Following steps similar to those in Section 5.1.2, I show that

$$\frac{\partial Lnw_I}{\partial Ln\overline{I}} = -(1-\rho) - \rho\left(\frac{w_I\overline{I}}{w_L\overline{L} + w_I\overline{I}}\right) \tag{20}$$

Using my estimate of ρ, I calculate that a 10 percent increase in the supply of low-skilled

[30] See Altonji and Card (1991),Card (1990), Card (2005), and Card and Lewis (2005).

immigrants reduces the wages of other low-skilled immigrants by 8 percent. The evidence in the literature on the wage effects on other immigrants is scarce and inconclusive. The only two papers that study the impact of immigration on earlier immigrants are Card (1990) and Borjas (2003); the former finds no significant negative effect of an immigration shock on the labor outcomes of earlier immigrants, and the latter a sizeable, but not statistically significant, negative effect.

Given the lack of evidence in the literature about the magnitude of the own-wage effects for low-skilled immigrants, I provide several consistency checks for my estimate. First, I note that my estimate corresponds to an own-labor demand elasticity of -1.21 –a number slightly higher than the range of the consensus estimates of the elasticity of native male labor demand[31], and in the range for the elasticity of female labor demand estimated by Acemoglu *et.al* (2004).

Second, if the calculation based on equation (20) is accurate, then I should find a similar own-labor demand elasticity by estimating a wage equation like (16) for low-skilled immigrant workers. Because wage data for low-skilled immigrants (most of whom are undocumented) is very noisy, I do not find any significant effects of an increase in the number of immigrants on their own wage (See Rows 1-3 Table 13), but I am able to provide indirect evidence on the plausibility of the calculated effect by estimating equation (16) for the native groups who are similar to low-skilled immigrants in terms of race, English proficiency, and disadvantaged minority status. My argument is that the effect of low-skilled immigration on the wages of these groups should provide a lower bound for the wage effects on other low-skilled immigrants. As observed in Table 13, the wage effects are more than four times larger for native Hispanics than for all low-skilled natives. The fact that for blacks, a similarly underprivileged minority, the wage effects are comparable to the ones for all low-skilled natives suggests that language is an important factor in the degree of substitutability between groups of low-skilled workers. To check for this hypothesis, I restrict the sample to native Hispanics who reported that they "speak English, but not well". As Table 13 shows, the wage effects of low-skilled immigration

[31] See Hammermesh (1993).

on this native group are very large: a 10 percent increase in low-skilled immigration reduces the wages of native Hispanics with low English proficiency by about 3.5 percent (4.5 percent for females). The wage effects of low-skilled immigrants on other low-skilled immigrants are expected to be even higher; the legal status of many low-skilled immigrants prevent them from competing with native Hispanics for certain jobs, even conditional on their English proficiency. I conclude, therefore, that the estimated own-labor elasticity for low-skilled immigrants calculated from (20) is reasonably supported by the wage data.

As a final check I compare the wage effect derived from equation (20) with that implied by my price estimates. The estimates from Table 10 suggest that a 10 percent increase in the share of low-skilled immigrants in the labor force decreases prices for the average non-traded good by 0.20 percent. For this number to be consistent with a 10 percent increase in the share of low-skilled immigrants reducing low-skilled native wages by 0.6 percent, and with a cost share of high school dropouts wages of 4.5 percent[32], wages for low-skilled immigrants should decrease by 8.3 percent.[33]

6 Purchasing Power Calculations

The previous sections demostrate how low-skilled immigration affects the native economy. This evidence alone is not sufficient to calculate purchasing power effects, though; data on native preferences is needed. This section combines data on consumption patterns from the Consumer Expenditure Survey (CEX) with the price and wage effects obtained in Section 5 to estimate how natives' welfare was changed by the immigration wave of the 1990s.

Natives of all skill levels benefit from low-skilled immigration through the reduction in the non-traded-goods component of the cost of living. I use the expenditure shares from the 1990 CEX to calculate changes in Laspayres index caused by the 1990s immigration shocks, and interpret these changes as the price benefits from immigration.[34] The first row of Table 14

[32] See Autor, Katz and Krueger (1998)

[33] An effect of 8.3 percent is calculated using the following formula, $0.045 * (0.5 * (0.006) + 0.5 * x) = 0.0020$ (recall that about half of all LS workers in the US largest cities are immigrants).

[34] Because Laspayres indexes do not take into account substitution effects, the estimates provide a lower bound

presents the 25-city average of the estimated change in the price index of non-traded goods by skill level.[35] Notice that to obtain more realistic estimates, I allow for variation in consumption patterns across skill groups, even though my theoretical model assumes there is none. As the table shows, college graduates experienced a larger reduction in their non-traded component of the cost of living because they tended to consume relatively more immigrant-intensive non-traded goods, whereas high school dropouts benefited slightly less. The average decrease for the 25 cities is 0.65 percent for high school dropouts, 0.68 percent for high school graduates and workers with some college, and 0.73 percent for college graduates. College graduates also benefited more from low-skilled immigration because they devoted a higher share of their total expenditures to the purchase of non-traded goods (Second row, Table 14).

Lower prices come at a cost. As discussed in the previous section, the wages of low-skilled natives are reduced by the inflows of foreign-born high school dropouts. The trade model presented in Section 5 predicts no impact of low-skilled immigrants on the wages of high-skilled workers; the wage is always equal to one because of the constant marginal productivity of high-skilled labor in the production of the traded good, and the assumption that cities take the price of the traded good as given. In reality, though, low-skilled workers participate in the production of traded goods and, therefore, the wages of high-skilled workers are likely to be affected by shocks to the supply of low-skilled immigrants. The direction of the effect depends on whether low-skilled and high-skilled labor are q-complements or q-substitutes. Borjas (2003) finds q-complementarity between workers of different education groups; his results suggest, therefore, that an increase in immigration raises the wages of high-skilled workers. I use Borjas's estimates of factor-price elasticities across education groups and my own estimate of the impact of low-skilled immigration on the wages of low-skilled natives to calculate the wage effects (by skill level

for the reduction in non-traded component of the cost of living. I calculate the price effects using my estimate from Table 10 Column 4 and $\left(\frac{w_I \overline{I}}{w_L \overline{L} + w_I \overline{I}}\right)_i$ for 2000. Note that I am subestimating the reduction in prices because my structural estimates explain only 55-80 percent of the total price effects.

[35] Table 14 also shows population-weighted city-averages. The results are very similar.

and by city) caused by the 1990s immigration flows.[36] The third row of Table 14 report these calculations. As observed, although the cross-education wage effects are positive, they are small compared to the negative effects on high school dropouts' wages. The average decrease in the wages of low-skilled natives for the 25 cities is 2.9 percent, the average increase for high school graduates and workers with some college education is 0.29 percent, and the average increase for college graduates is 0.37 percent.

I combine the cost of living effects[37] and the wage effects to calculate the net impact of low-skilled immigration on natives' purchasing power by skill group. As observed in the third column of Table 14, low-skilled natives' purchasing power was reduced by the low-skilled immigration wave of the 1990s; their real wage decreased by an average of 2.66 percent. On the other hand, high school graduates and workers with some college, and college graduates, benefited: their purchasing power increased by 0.59 and 0.71 percent respectively. Given that low-skilled natives represent a small fraction of all native workers, the average net benefit for the native population was positive.[38]

7 Conclusion

A large body of literature analyzes the impact of immigration on the employment opportunities of native workers and the costs it imposes on taxpayers. With the exception of Borjas (1994), this literature has not addressed the gains that immigration brings to the native population. The study of the benefits from immigration is important, because the contrast between benefits and costs (not only economic, of course) inform decisions about immigration policy. This paper contributes to the immigration literature by estimating, using a unified framework, the impact of low-skilled immigration on prices, wages, and the purchasing power of natives.

[36] Borjas's estimates of cross-education groups elasticities are 0.02 for high school graduates, 0.02 for workers with some college, and 0.025 for college graduates. Borjas presents estimates for several experienced groups. I use his numbers for workers with 21-25 years of experience.

[37] I multiply the changes in the price indexes for non-traded goods by the share of non-traded goods in total expenditures.

[38] These numbers are likely to underestimate the benefits from low-skilled immigration because they don't take into account the complementarities between low-skilled labor and capital, and thus, they exclude from the calculations the gains to the owners of capital.

I find that low-skilled immigration benefits the native population by decreasing the non-traded-goods component of the cost of living. At current US immigration levels, a 10 percent increase in the average city's share of low-skilled immigrants in the labor force decreases the price of immigrant-intensive services such as housekeeping and gardening by 1.3 percent, and price of the average non-traded good (in terms of intensity in the use of low-skilled immigrants) by 0.2 percent. My structural estimates suggest that half to 80 percent of the net effect on prices are caused by a reduction in wages. The wage effects are sizeable but plausible: a 10 percent increase in the number of low-skilled immigrants in a city reduces the wages of low-skilled natives by 0.6 percent and of low-skilled immigrants by 8 percent (an own-labor demand elasticity of -1.2). My results imply that the low-skilled immigration wave of the 1990s increased the purchasing power of high-skilled workers living in the 25 largest cities by an average of 0.65 percent and decreased the purchasing power of native high school dropouts by an average of 2.66 percent. I conclude that, through lower prices, low-skilled immigration brings positive net benefits to the US economy as a whole, but generates a redistribution of wealth: it reduces the real income of low-skilled natives and increases the real income of high-skilled natives.

This paper also provides an alternative explanation as to why the literature has repeatedly found that immigration has little impact on the wages of low-skilled natives: low-skilled immigrants and low-skilled natives are far from being perfect substitutes in production. Therefore, a low-skilled immigration shock should affect the wages of other low-skilled immigrants mostly and the wages of low-skilled natives least. Although I have no direct evidence of the wage effects of immigration on other immigrants, I find that low-skilled immigration has a much larger negative effect on the wages of native Hispanics with low English proficiency than on the wages of other low-skilled native groups.

Due to the focus on city level outcomes, this paper has looked only at prices of non-traded goods and services. Low-skilled immigration is also likely to have effects on the prices of traded goods, but these will occur at an aggregate, national level. A theoretical and empirical exploration of this issue is needed in order to have a complete assessment of the effects of low-skilled

immigration.

References

[1] Acemoglu, Daron, David H. Autor and David Lyle (2004). "Women, War, and Wages: The Effect of Female Labor Supply on the Wage Structure at Midcentury". *Journal of Political Economy* 112(3): Jun 2004, p.497-551.

[2] Altonji, Joseph G., and Card, David. (1991). "The Effects of Immigration on the Labor Market Outcomes of Less-Skilled Natives." In *Immigration, Trade and Labor*, edited by John M. Abowd and Richard B. Freeman. Chicago: University of Chicago Press, 1991.

[3] Autor, David H., Lawrence F. Katz, and Alan B. Krueger (1998). "Computing Inequality: Have Computers Changed the Labor Market?" *Quarterly Journal of Economics*, 113(4) November 1998, pp. 1169-1213.

[4] Barsky, Robert, Mark Bergen, Shantanu Dutta, and Daniel Levy (2001) "What Can the Price Gap between Branded and Private Label Products Tell Us about Markups?", NBER working paper No. 8426, August 2001.

[5] Borjas, George, J. (2003). "The Labor Demand Curve Is Downward Sloping: Reexamining the Impact of Immigration on the Labor Market." *Quartely Journal of Economics* November 2003, pp. 1335-1374.

[6] Borjas, George, Richard B. Freeman and Lawrece Katz. (1996) "Searching for the Effect of Immigration on the Labor Market." *American Economic Review* 86: May 1996, p. 246-251.

[7] Borjas, George, J. (1995) "The Economic Benefits from Immigration." *Journal of Economic Perspectives* 9(2): Spring 1995, p. 3-22.

[8] Borjas, George, J. (1994) "The Economics of Immigration." *Journal of Economic Literature* 32: December 1994, p. 1667-1717.

[9] Borjas, George, Richard B. Freeman, and Kevin Lang (1991). "Undocumented Mexican-born Workers in the United States: How Many, How Permanent? *Immigration, Trade and Labor*, edited by John M. Abowd and Richard B. Freeman. Chicago: University of Chicago Press, 1991.

[10] Card, David and Ethan G. Lewis (2005) "The Diffusion of Mexican Immigrants During the 1990s: Explanations and Impacts", NBER working paper No. 11552, August 2005.

[11] Card, David (2005) "Is the New Immigration Really so Bad?", NBER working paper No. 11547, August 2005.

[12] Card, David, "Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration." *Journal of Labor Economics* 19: January 2001, pp. 22-64.

[13] Card, David and John E. DiNardo.(2000) "Do Immigrant Inflows Lead to Native Outflows?" *American Economic Review* 90: May 2000, p.360-367.

[14] Card, David. (1990) "The Impact ofthe of the Mariel Boatlift on the Miami Labor Market." Industrial and Labor Relations Review 43: Jaunuary 1990, p.245-57.

[15] Cobb-Clark, Debora and Sherrie A. Kossoudji (2002) "Coming Out of the Shadows: Learning about Legal Status and Wages from the Legalized Population" *Journal of Labor Economics*. 20(3): July 2002 p. 598-629.

[16] Leamer, Edward E. (1995). *The Heckscher-Ohlin Model in Theory and Practice*. Princeton Studies in International Finance vol 77. Princeton, NJ: International Finance Section, 1995.

[17] Lewis, Ethan G. (2005) "Immigration, Skill Mix, and the Choice of Technique". Federal Reserve Bank of Philadelphia. Unpublished Working Papers (May 2005).

[18] Federman, May N., Harrington, David E. and Kathy J. Krynski (2005) "Vietnamese Manicurists: Displacing Natives or Finding New Nails to Polish?" *Industrial and Labor Relations Review,* forthcoming.

[19] Hamermesh, Daniel S. (1993). Labor Demand. Princeton, N.J.: Princeton Univ. Press.

[20] Munshi, Kaivan (2003). "Networks In The Modern Economy: Mexican Migrants In The U.S. Labor Market," *The Quarterly Journal of Economics*, 118(2), p. 549-599.

[21] United States Department of Citizenship and Immigration Services (2003). "Estimates of the Unauthorized Immigrant Population Residing in the United States: 1990 to 2000." Unpublished Paper Dated January 2003.

Table 1. Share of Low-skilled Immigrants in the Labor Force (%)

City	1980	1990	2000
Atlanta	0.38	0.84	3.23
Baltimore	0.76	0.44	0.67
Boston	3.53	2.71	2.62
Chicago	4.99	5.09	5.86
Cincinnati	0.44	0.23	0.34
Cleveland	1.82	0.89	0.65
Dallas	2.13	5.17	8.63
Denver	1.18	1.42	4.13
Detroit	1.76	0.93	1.35
Houston	3.96	7.03	9.21
Kansas City	0.58	0.47	1.44
Los Angeles	11.64	15.90	15.09
Miami	15.13	14.44	11.36
Milwaukee	1.07	0.84	1.54
Minneapolis	0.49	0.37	1.43
New Orleans	1.20	1.13	1.08
New York City	8.91	7.82	8.15
Philadelphia	1.39	0.91	1.06
Portland	1.03	1.53	3.27
St. Louis	0.49	0.24	0.53
San Diego	4.59	5.92	6.34
San Francisco	4.40	6.73	6.19
Seattle	1.22	1.00	1.94
Tampa	1.50	1.69	2.15
Washington, DC	1.61	2.52	3.76

Source: US Census

Table 2. Top Industries Intensive in Low-skilled Immigrant Labor (2000)

All Low-skilled Immigrants		Male LS Immigrants		Female LS Immigrants	
	%*		%		%
Labor Force	5.3	Labor Force	3.3	Labor Force	1.9
Textiles	44.8	Gardening	28.5	Textiles	27.9
Gardening	29.2	Shoe repair	19.2	Private households	25.8
Leather Products	28.4	Crop production	19.0	Leather products	16.1
Private households	27.4	Car washes	17.5	Fruit and veg. preserv.	13.1
Animal slaughtering	25.3	Textiles	16.9	Dry cleaning and laundry SS	12.0
Crop production	24.0	Animal slaughtering	16.5	Services to buildings	11.6
Fruit and veg. preserv.	21.9	Furniture manuf.	15.9	Sugar products	11.2
Car washes	20.2	Carpets manuf.	15.2	Animal slaughtering	8.8
Services to buildings	20.0	Recyclable material	12.7	Hotels	8.0
Carpets manuf.	19.8	Wood preservation	12.4	Pottery, ceramics	7.6
Furniture manuf.	19.8	Leather products	12.3	Nail salons	7.5
Sugar products	19.3	Construction	12.3	Home health care SS	6.7
Dry cleaning and laundry SS	19.3	Fishing, hunting	12.0	Plastics products manuf.	6.5
Shoe repair	19.2	Bakeries	11.9	Seafood	6.3
Bakeries	17.9	Aluminum prod.	11.8	Toys manufacturing	6.1

*% of LS Immigrants in Tot. Employment of Industry. Includes only the 25 largest cities.

Source: Census (2000)

Table 3. The Effects of LS Immigration on Prices of Immigrant-intensive Industries
OLS Estimates

	(1)	(2)	(3)	(4)
	Dependent Variable : Log(Price Index)			
Ln(LS Immigrants/LF)	0.014	0.010	0.005	-0.043
	(0.025)	(0.023)	(0.023)	(0.028)
Region*Decade FE	No	Yes	Yes	Yes
Log(Population)	No	No	Yes	Yes
Log(Employment)	No	No	No	Yes
Industry*Decade FE	Yes	Yes	Yes	Yes

Note: Services included in the reg. are: Baby-sitting, housekeeping, gardening, dry cleaning, shoe repair and barber shops. All regressions include city, industry, and decade fixed effects. Std. Errors clustered at the city*decade level are reported in parenthesis. The number of observations if 300 (25 cities and 6 industries).

Table 4. Origin of Low-skilled US Immigrants

	Top Sending Countries	%. Tot LS Immigrants	Top Sending Countries	%. Tot LS Immigrants
Rank	1970*		1980	
1	Mexico	15.19	Mexico	46.14
2	Italy	13.40	Cuba	3.69
3	Canada	9.61	Portugal	3.51
4	Germany	6.53	Italy	3.01
5	Cuba	6.43	Philippines	2.77
Rank	1990		2000	
1	Mexico	53.54	Mexico	64.01
2	El Salvador	5.22	El Salvador	4.93
3	Cuba	3.63	Guatemala	3.90
4	Italy	2.78	Vietnam	2.89
5	China	2.33	Honduras	2.45

* The numbers for 1970 represent the composition of the stock of LS immigrants, and the numbers for 1980-2000 represent the composition of the decade flows.

Source: US Census

Table 5. First Stage

Dependent Variable : Log (LS Immigrants/Labor Force)				
	(1)	(2)	(3)	(4)
Instrument*	0.565	0.675	0.384	0.443
	(0.130)	(0.183)	(0.128)	(0.197)
Region*Decade FE	No	Yes	No	Yes
Includes 1980	Yes	Yes	No	No
No. Obs.	75	75	50	50

* Instrument =Ln [$(Mex_{i,1970}/Mex_{1970})$*$LSMex_t$+$(Cub_{i,1970}/Cub_{1970})$*$LSCub_t$+$(Ital_{i,1970}/Ital_{1970})$*$LSItal_t$]

Note: OLS estimates. City and decade fixed effects are included in all the regressions.

Robust Std. Errors are reported in parenthesis.

Table 6. The Effects of Low-skilled Immigration on Prices of Non-traded Goods and Services
IV Estimates

	Dependent Variable : Log(Price Index):					
	Ind. highly intensive in the use of LS Immigrants		Ind. with higher than average concentration of LS Immigrants		All Non-Traded Goods and Services	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(LS Immigrants/LF)	-0.097	-0.126	-0.039	-0.096	0.029	-0.017
	(0.053)	(0.063)	(0.049)	(0.059)	(0.026)	(0.032)
Region*Decade FE	No	Yes	No	Yes	No	Yes
No. of Observations	300	300	500	500	1750	1750
No. of Cities	25	25	25	25	25	25
No. of Industries	6	6	10	10	35	35

Note: All regressions include city, industry, and decade fixed effects. Std. Errors clustered a the city*decade level are reported in parenthesis.

Table 7. The Displacement Effects of Low-skilled Immigration

	(1)	(2)
	OLS - Dep. Variable : Ln (Low-skilled Natives)	
Ln(LS Immigrants)	0.198	0.217
	(0.064)	(0.078)
	RF - Dep. Variable : Ln (Low-skilled Natives)	
Instrument*	0.041	0.034
	(0.079)	(0.091)
	IV - Dep. Variable : Ln (Low-skilled Natives)	
Ln(LS Immigrants)	0.071	0.048
	(0.131)	(0.124)
Region*Decade FE	No	Yes
No. Observations	75	75

Source: 1980, 1990, and 2000 Census. City and decade fixed effects are included in all specifications. Robust Std. Errors are reported in parenthesis.

* Instrument $=Ln\ [\ (Mex_{i,1970}/Mex_{1970})*LSMex_t+(Cub_{i,1970}/Cub_{1970})*LSCub_t+(Ital_{i,1970}/Ital_{1970})*LSItal_t]$

Table 8. Estimation of the Elasticity of Substitution between LS Natives and Immigrants

	(1)	(2)	(3)	(4)
	OLS - Dep. Variable : Ln (Hourly Wage) - Only Natives			
	All LS Natives		Male LS Natives	Female LS Natives
Ln(LS Immigrants)	-0.008	-0.008	-0.020	0.006
	(0.015)	(0.015)	(0.018)	(0.012)
Ln(LS Natives)	-	-0.019	-	
		(0.023)		
	IV - Dep. Variable : Ln (Hourly Wage) - Only Natives			
	All LS Natives		Male LS Natives	Female LS Natives
Ln(LS Immigrants)	-0.058	-0.058	-0.059	-0.060
	(0.034)	(0.033)	(0.035)	(0.034)
Ln(LS Natives)	-	-0.020	-	
		(0.024)		
Number of Observations	355730	355730	220555	135175
Estimated rho	0.243	0.242	0.246	0.252
Implied Elasticity of Substitution	1.32	1.32	1.33	1.34

Source: 1980, 1990, and 2000 Census. City and decade fixed effects are included in all specifications. Controls at the individual level include age, age squared, and gender. Other included controls are % males in the low-skilled native population of the city and log of the city's population. Standard Errors clustered at the city*decade level are reported in parenthesis.

Table 9. IV Estimation of the Price Effects of Changes in the LS Labor Aggregate Non-Traded Goods by Groups

	Dependent Variable : Log(Price Index):					
	Ind. highly intensive in the use of LS Immigrants		Ind. with higher than average concentration of LS Immigrants		All Non-Traded Goods and Services	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(Agg LS/HS)	-0.189	-0.274	-0.076	-0.208	0.056	-0.032
	(0.101)	(0.136)	(0.097)	(0.133)	(0.047)	(0.069)
Implied (1-α)	0.189	0.274	0.076	0.208	-0.056	0.032
Region*Decade FE	No	Yes	No	Yes	No	Yes
No. of Observations	300	300	500	500	1650	1650
No. of Industries	6	6	10	10	33	33

Notes: All regressions include city, decade, and industry*decade fixed effects. Standard Errors clustered at the city*decade level are reported in parenthesis.

Table 10. IV Estimation of the Price Effects of Changes in the LS Labor Aggregate
Non-Traded Goods - Pooled Estimation

	Dependent Variable : Log(Price Index):			
	(1)	(2)	(3)	(4)
Ln(Agg LS/HS)	0.084	0.021	0.024	-
	(0.050)	(0.078)	(0.082)	
LSWageBillShare*Ln(Agg LS/HS)	-0.226	-0.461	-0.483	-0.483
	(0.103)	(0.201)	(0.226)	(0.227)
City*Group FE	No	Yes	Yes	Yes
Industry*Decade FE	Yes	Yes	Yes	Yes
Industry*Region*Decade FE	No	No	Yes	Yes
Region*Decade FE	Yes	Yes	-	-
City*Decade FE	No	No	No	Yes

Notes: All regressions include city and decade fixed effects. 25 cities and 33 goods or services are included. Standard Errors clustered at the city*decade level reported in parenthesis.

Table 11. IV Estimation of the Price Effects of a Change in the LS Labor Aggregate Traded Goods

Dep. Variable: Log(Price Index)			
	Panel A. By Group - Only Traded Goods		
	Highly Intensive In LS Immigrants	Higher than avg. concent. of LS Imm.	All Traded Goods and SS
	(1)	(2)	(3)
Ln(Agg LS/HS)	0.037	-0.012	-0.004
	(0.113)	(0.079)	(0.039)
Industry*Decade FE	Yes	Yes	Yes
Region*Decade FE	Yes	Yes	Yes
No. of Observations	750	1100	1850
No. of Industries	15	22	37
	Panel B. Pooled Estimation- Traded vs. Non-Traded		
	(1)	(2)	(3)
LSWageBillShare*Ln(Agg LS/HS)	-0.244	-0.370	-0.395
	(0.140)	(0.166)	(0.179)
LSWageBillShare*Ln(Agg LS/HS)*Traded	0.213	0.411	0.497
	(0.121)	(0.354)	(0.463)
Ho: $\tau=-\lambda$ (p-value)	0.872	0.898	0.796
City*Group FE	Yes	Yes	Yes
Traded*City*Group FE	No	Yes	Yes
Industry*Decade FE	Yes	Yes	Yes
City*Decade FE	Yes	Yes	Yes
Traded*City*Decade FE	No	No	Yes
Number of Observations	3500	3500	3500

Notes: All regressions include city and decade fixed effects. Std. errors clustered at the city*decade level reported in parenthesis.

Table 12. Robustness Checks

Dep. Variable: Ln(Price Index)		
Specification	IV LSWageBillShare*Ln(Agg LS/HS)	N. Obs.
Baseline - Column (4) Table 10	-0.483 (0.225)	1650
Rho=0.5, Beta=0.56	-0.524 (0.242)	1650
Rho=1, Beta=0.53	-0.633 (0.285)	1650
Alternative Definition of High-skilled Labor*	-0.472 (0.225)	1650
Los Angeles excluded	-0.527 (0.248)	1584
Utilities excluded	-0.459 (0.279)	1350
Medical SS excluded	-0.586 (0.213)	1400
Household SS excluded	-0.476 (0.234)	1250
Education excluded	-0.493 (0.248)	1450

Standard Errors clustered at the city*decade level are reported in parenthesis.

Table 13. Wage Effects of LS Immigration on Various Groups

	IV - Dep. Variable : Ln (Hourly Wage) - Micro Data		
	Low-skilled Group	Coeff. Ln(LS Immigrants)	N. Obs.
(1)	LS Immigrants	0.037 (0.034)	210219
(2)	LS Male Immigrants	0.052 (0.045)	133729
(3)	LS Female Immigrants	0.026 (0.020)	76490
	Native Groups		
(4)	Blacks	-0.055 (0.049)	82932
(5)	Male Blacks	-0.056 (0.057)	47626
(6)	Female Blacks	-0.049 (0.040)	35036
(7)	Hispanics	-0.254 (0.111)	53059
(8)	Male Hispanics	-0.220 (0.099)	32849
(9)	Female Hispanics	-0.313 (0.140)	20210
(10)	Hispanics with Low English Proficiency	-0.339 (0.155)	4742
(11)	Male Hispanics with Low English Proficiency	-0.269 (0.146)	3097
(12)	Female Hispanics with Low English Proficiency	-0.462 (0.206)	1645

Source: 1980, 1990, and 2000 Census. City and decade fixed effects are included in all specifications. Controls at the individual level are age, age squared, and gender. Other controls are % males in the native group studied and log of the city population. Regressions for Hispanics include dummies for hispanic group (mexican, cuban, etc) and the percentage of each hispanic group in the hispanic population of the city. Standard Errors clustered at the city*decade level are repoted in parenthesis.

Table 14. Purchasing-power Effects of the LS Immigration Wave of the 1990s
Average for the 25 Largest Cities

	HS Dropouts	HS Grads & SC	College Grads
Simple City-Average			
% Change in Price Index of NT Goods	-0.65	-0.68	-0.73
Share of NT Goods in Tot. Exp. (%)	41.25	44.40	46.47
% Change in Wages	-2.93	0.29	0.37
% Change in Purchasing Power	-2.66	0.59	0.71
Population-Weighted City-Average			
% Change in Price Index of NT Goods	-0.60	-0.62	-0.67
Share of NT Goods in Tot. Exp. (%)	41.25	44.40	46.47
% Change in Wages	-2.70	0.27	0.34
% Change in Purchasing Power	-2.45	0.55	0.65

Note: Calculations use estimates from Table 10 and wage-bill shares from the 2000 Census.

Appendix A. Classification of Goods and Services

Non-Traded Goods and SS

Utilities
Electricity
Utility Natural Gas Services
Telephone SS, Local Charges
Water and Sewage Maintenance
Cable TV
Garbage and Trash Collection

Medical Servies
Hospital and other Medical Care SS
Physicians' Services
Dental Services
Eyeglasses and Eye Care
SS. By other Medical Prof.

Education
College Tuition and Fees
Elementary and High School Tuition
Child Daycare
Other Tuition and Fees

Household SS.
Food Away from Home
Baby-Sitting
Domestic Service
Other Household SS (Incl. gardening)
Appliance and Furniture Repair
Care of Invalids, Elderly at Home
Other Apparel SS (Incl. Shoe Repair)
Laundry and Dry-Cleaning

Other
Beauty Parlos
Barber Shops
Tenants' Insurance
Automobile Insurance
Automotive Repair
Automotive Maintenance and Servicing
Intracity Transportation
Admissions (Movies, etc)
Legal Fees
Cemetery Lots and Funeral Expenses

Traded Goods and SS.

Food
Cereals
Bakery Products
Beef and Veal
Pork
Other Meats
Fish and Seafood
Fresh Milk and Cream
Processed Dairy Products
Fresh Fruits
Fresh Vegetables
Processed Fruits
Processed Vegetables
Sugar and Sweets

Apparel and Textiles
Apparel
Footwear
Textile House Furnishing

Gadgets
Household Appliances
TV and Sound Equipment
Toys, Hobbies, etc.
Photographic Supplies and Eq.
Watches
Sporting Goods and Equipment

Supplies
Maintenance and Repair Commodities
Toilet Goods and Personal Care Appliances
Laundry and Cleaning Products
Household Paper Products

Other
Intrastate Telephone SS
Airline Fare
Fuel Oil
Furniture and Bedding
Tires
New Vehicles
Prescription Drugs and Medical Supplies
Nonprescription Drugs and Medical Supplies
Reading Materials
School Books and Supplies
Tobacco Products

Appendix B. Goods and Services included in Table 7

Ind. with higher than average use of LS Immigrants	*Ind. with lower than average use of LS Immigrants*
Other Apparel SS (Incl. Shoe Repair)*	Appliance and Furniture Repair
Baby-Sitting*	Garbage and Trash Collection
Domestic Service*	Care of Invalids, Elderly at Home
Other Household SS (Incl. gardening)*	Intracity Transportation
Laundry and Dry-Cleaning*	Hospital and other Medical Care SS
Barber Shops*	Admissions (Movies, etc)
Automotive Repair	Child Daycare
Food Away from Home	Cemetery Lots and Funeral Expenses
Automotive Maintenance and Servicing	SS. By other Medical Prof.
Beauty Parlors	Electricity
	Physicians' Services
* *Ind. highly intensive in the use of LS Immigrants*	Utility Natural Gas Services
	Water and Sewage Maintenance
	Other Tuition and Fees
	Elementary and High School Tuition
	Tenants' Insurance
	Automobile Insurance
	College Tuition and Fees
	Telephone SS, Local Charges
	Cable TV
	Dental Services
	Eyeglasses and Eye Care
	Legal Fees

Appendix C

Table C1. First Stage: Alternative Instruments

	Dependent Variable : Log(LS Immigrants/Labor Force)											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Inst. includes top 3 countries in 1970				Inst. includes top 5 countries in 1970				Inst. includes top 10 countries in 1970			
Log(Instrument*)	0.577	0.575	0.311	0.259	0.628	0.678	0.385	0.372	0.713	0.729	0.429	0.404
	(0.163)	(0.238)	(0.147)	(0.265)	(0.154)	(0.228)	(0.156)	(0.249)	(0.173)	(0.226)	(0.181)	(0.271)
Region*Decade FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Includes 1980	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No	No
Number of Obs.	75	75	50	50	75	75	50	50	75	75	50	50

Note: OLS estimates. City and decade fixed effects are included in all the regressions. Robust Std. Errors in parenthesis. I exclude Germany and former Yugoslavia from the ranking of countries because numbers are not comparable between 1980 and 1990.

The top 3 countries are Canada, Mexico, Italy; the top 5 countries also include Cuba and Poland; the top 10 include in addition Ireland, China, Greece, Philippines and England.

* Instrument = $\Sigma_c(Imm_{c,i,1970}/Immi_{c,1970})*LSImmi_{c,t}$

Table C2. First Stage - Alternative Functional Forms

Dependent Variable : LS Immigrants/Labor Force						
	(1)	(2)	(3)	(4)	(5)	(6)
Instrument*	0.110	0.087	0.369	0.071	0.167	0.604
	(0.041)	(0.052)	(0.139)	(0.107)	(0.090)	(0.167)
Instrument Squared	-	-	-0.732	-	-	-1.131
			(0.309)			(0.346)
Region*Decade FE	No	Yes	Yes	No	No	Yes
Includes 1980	Yes	Yes	Yes	No	No	No
Excludes Los Angeles	No	No	No	No	Yes	No
No. Obs.	75	75	75	50	48	50

Note: OLS estimates. City and decade fixed effects, and the log of the city's population are included in all the regressions.
Robust Std. Errors are reported in parenthesis.

* Instrument = $(Mex_{i,1970}/Mex_{1970})*LSMex_t+(Cub_{i,1970}/Cub_{1970})*LSCub_t+(Italians_{i,1970}/Italians_{1970})*LSItalians_t$