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The Regional Impact of Economic Shocks: Why Immigration is Different from Import Competition

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Abstract

Prior literature has documented large and persistent employment effects in regions exposed to import competition, but non-lasting effects in locations receiving large immigrant waves. Import competition and immigration are comparable to the extent that imports are thought of as the labor embedded in imported goods. We explain this puzzle by arguing that a fundamental difference between trade and immigration is that whereas immigrants systematically enter metropolitan areas with high housing prices, import competition affects all kinds of local labor markets. We argue that when the share of expenditures on housing is decreasing in income, internal migration is more responsive to local shocks in high-price locations. We provide evidence that, irrespective of the local shock, internal migration is indeed more responsive in high than in low housing price locations. Hence, conflicting findings in the literature reflect differences between the average local labor markets receiving each shock, rather than systematic differences in how local labor markets absorb those different shocks.

JEL Codes: J23, J61, F16, F22, R12, R31

Key Words: Trade shocks, immigration, internal migration, housing supply.

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1 Introduction

Over the last couple of decades, immigration has increased substantially in many developed countries. For example, in the United States the share of immigrants rose between 1980 and 2010 from under 5 percent of the population to around 15 percent. Many European countries including Germany, France, Spain, Sweden, and Norway, have experienced similar increases, over what has often been shorter periods of time. Within these countries of destination, immigrants have concentrated in particular locations. In the United States, cities such as Miami, New York, Los Angeles, and San Francisco have immigrant shares above 30 percent, but there are many other metropolitan areas with immigrant shares below 5 percent. Despite this uneven distribution of immigrants across locations, it does not seem to be the case that cities experiencing larger immigrant flows have seen lower (native) wage or employment growth over ten-year horizons, even when immigrants' endogenous location choices are taken into account (Altonji and Card, 1991; Card, 2001, 2009).

The evidence on the effect of immigration across locations is in sharp contrast to the evidence on the labor market effects of trade shocks. In a seminal paper, Autor, Dorn and Hanson (2013) show that import competition from China disproportionately affected some locations or commuting zones. By comparing affected to non-affected locations across Census years, Autor et al. (2013) show that trade with China had a very substantial and *permanent* impact on employment and other labor market outcomes. Hence, like immigration, trade shocks are unevenly distributed across locations within the United States, but unlike immigrant shocks, they seem to lead to long-lasting consequences for the labor market.

As pointed out in Borjas et al. (1996) and Borjas et al. (1997), comparing locations exposed or non-exposed to immigration or trade shocks makes sense to the extent that there are no spillovers between treated and control units. The most obvious of these spillovers is labor relocation. If local labor demands are downward sloping and workers in exposed locations move toward non-exposed ones, potential labor market effects dissipate across locations (Topel, 1986). Most of the literature defends the strategy of comparing labor market outcomes across locations based on the evidence that internal migration in the United States seems to be rather unresponsive to local shocks. Using data for the United States, Autor et al. (2013) show that commuting zones more exposed to import competition from China do not seem to have lost population relative to less exposed ones, and Card and DiNardo (2000) argue that (native) population has not declined in high-immigrant locations.[1]

From a theoretical perspective, it is not clear why trade and immigration shocks *should* lead to different outcomes. As is usually shown in standard trade models, one way to think about import competition is to analyze the factor content embedded in imports. Given the abundance of labor in China relative to the United States, the factor content of Chinese exports to the United States is predominantly labor. Hence, when imports are intermediate inputs that substitute labor, or when they are final goods that substitute locally

[1] Greenland et al. (2019) challenge the evidence in Autor et al. (2013) by arguing that the internal migration response takes time to materialize. They do not explore, however, the heterogeneity in this response across metropolitan areas studied in this paper. Similarly, Amior (2020) challenges the evidence on the lack of internal migration response to international immigrant shocks, but also fails to recognize the underlying heterogeneity driving the seemingly conflicting results in the immigration literature.

produced labor-intensive manufactured goods, import competition can be thought of as a shock to the factor embedded in these imports – in this case labor. That can be represented as a negative labor demand shock that leads to declines in wages and employment rates. In turn, immigrant shocks can be thought of as labor supply shocks which, according to standard models, reduce (native) wages and (potentially) employment rates (as long as labor supply curves are not perfectly inelastic). In both cases, exposure to the shock is predicted to lead to wage and employment rate declines, as long as there are no absorption mechanisms that help mitigate such local effects. Hence, it is unclear why the empirical literature documenting the effects of exposure to trade and immigrant shocks finds such different effects on local labor markets.

In this paper, we argue that the reason why immigrant shocks dissipate rapidly, while trade shocks do not, is related to two facts. First, international immigrants disproportionately settle in expensive locations, as we document extensively in Albert and Monras (2019), while import competition from China is uncorrelated with local price levels. Second, population is less reactive to local shocks in low-price than in high-price locations. We rationalize that with a novel spatial equilibrium model with non-homothetic preferences for housing. Providing support for those claims is the main contribution of this paper.

To build this argument we begin by showing several pieces of empirical evidence. First, we document the labor market effects of immigration using the standard networks instrument and a new instrumental variable strategy based on Albert and Monras (2019). With these two instruments, which allow us to test for over-identifying restrictions, we revisit the evidence of the effect of immigration on the labor market by relating changes in outcomes of interest, such as wages, with predicted flows of immigrants across metropolitan areas. We confirm previous results in the literature. While the OLS regressions show a positive correlation between immigrant inflows and changes in local labor market variables, the IV estimates show a small (negative) effect which is often statistically indistinguishable from zero. Overall, we confirm previous findings which suggest that immigrant driven labor supply shocks are fully absorbed across locations within a decade (Monras, 2020).

Next, we document the (native) internal migration response to immigrant shocks. Using our new instrument and the standard networks instrument, we show that for each immigrant entering a city, it experiences an average net loss of around one native. That finding is in contrast to previous literature, see Card and DiNardo (2000) and Peri and Sparber (2011). We explain the difference between our results and the previous literature, by showing that native reallocation comes exclusively from housing constrained, populous cities. Hence, when previous studies used unweighted cross-city regressions to document native reallocation, non-significant point estimates were obtained that masked the important heterogeneity prevalent in the data. This is important since immigrants concentrate in expensive cities with low housing supply elasticities and large population levels.

Hence, on the one hand, immigrant shocks do not seem to have a large impact on (native) wages or employment across local labor markets but they do have a large effect on internal migration. In contrast, as documented in Autor et al. (2013), import competition seems to have large effects on labor market outcomes and internal migration seems to be unresponsive. In this paper, we show that there is also a substantial degree of heterogeneity in the internal migration response to import competition shocks as a function of the housing supply elasticity. While, on average, population seems to be unresponsive to the China shock, working age population declines in housing constrained metropolitan areas that were exposed to import competition from China. Estimates suggest that while a per-worker increase of $1,000 in import exposure over a decade does not affect the size of the working age population on average, a metropolitan area with a housing supply elasticity below one loses more than two workers. Interestingly, we see the mirror heterogeneity in labor market outcomes. In cities with constrained housing markets, where population responses are large, we document small labor market effects of import competition. The negative labor market consequences of import competition concentrate exclusively in housing unconstrained locations, where working population does not seem to react to local shocks by relocating.

In our paper's last piece of empirical evidence, we show that the main difference between import competition and immigrant shocks is that the latter are concentrated in housing constrained metropolitan areas, whereas import competition is uncorrelated with the housing supply elasticity. Hence, this paper highlights that internal migration responds to local shocks only in expensive locations and that the *nature* of the shock shapes the seemingly different results obtained in prior studies.

The fact that population is more responsive to local shocks in housing constrained locations is not obvious. In fact, in many models the opposite is true. When the share of income that is spent on housing is constant, standard spatial equilibrium models would predict that population is *more* responsive in housing unconstrained locations. To see this, we only need to realize that local population depends, in such models, on the indirect utility obtained in each location. Indirect utility has two parts: total income and local prices, which in general are (summarized by) the price of housing. When income changes, this affects (directly) indirect utility one to one. However, income in a location also affects the demand for housing. How much housing prices react to the demand for housing depends, in turn, on the housing supply elasticity. In housing unconstrained locations, the supply of housing can react strongly to changes in the demand for housing, leading to small price changes. In the indirect utility, the effect of housing prices goes in the opposite direction to the effect of income. Hence, housing price changes counteract, in part, the direct effect of income shocks on indirect utility, as identified in Glaeser and Gyourko (2005). Note that this force is stronger in places where housing prices react more, i.e., housing constrained locations. This means that, in such models, population is more responsive to local shocks in housing unconstrained locations.

We show in this paper that this result depends on the fact that previous literature mostly assumes that the share of income devoted to housing is constant.[2] When demand for housing is non-homothetic, so that the share of income spent on housing is declining in income, it is unclear whether population is more reactive

[2] A recent literature explores non-homotheticities in spatial equilibrium, see for example the work by Tsivanidis (2019); Couture, Gaubert, Handbury and Hurst (2020); Fretz, Parchet and Robert-Nicoud (2019). However, those studies do not explore the systematic differences in population responses with non-homothetic preferences for housing to local shocks as a function of housing prices. Another related paper but that does not explore the heterogeneity in migration responses along what we document in our paper is Bilal and Rossi-Hansberg (2020). In that paper, Bilal and Rossi-Hansberg (2020) investigate mobility responses as a function of the labor market opportunities in each location.

to local shocks in housing (un)constrained locations. The logic is as follows. In housing constrained locations housing prices are higher. A negative income shock in those locations affects income and housing prices as before, but how much housing prices "matter" is now a function of income. With non-homotheticities, a negative income shock implies that housing prices matter more as income falls, thereby affecting indirect utility more in high housing price locations. Hence, the counteracting force that changes in housing prices play in the homothetic case is muted by the income effects on the consumption of housing. We show theoretically that this force can make indirect utility and, hence, population decrease by more in housing constrained locations than in unconstrained ones in response to negative income shocks.

In Section 2, we briefly describe the data. In Section 3, we provide a framework that helps us compare immigrant and import competition shocks. In Section 4, we analyze empirically the effect of local shocks on internal mobility and the labor market. In Section 5, we introduce a model that rationalizes our findings. We provide our conclusions in Section 6.

2 Data

In this paper, we rely on various publicly available data sets for the United States. For information on locations and labor market outcomes, we use the US Census and the American Community Survey (ACS), both of which are available in Ruggles et al. (2016). We also use the Autor et al. (2013) data, originally sourced from US Censuses and the ACS. We use data from the World Bank to compute real exchange rates between the various countries of origin and the United States, and data from Saiz (2010) to obtain a measure of housing supply elasticities at the metropolitan area level. We provide more details in what follows.

2.1 Census and American Community Survey data

Our main data set is the Census of Population data for the years 1980, 1990, and 2000, and the American Community Survey 2009-2011, which we group to 2010. We use information on the metropolitan statistical area (MSA) of residence of surveyed individuals, the wage they received in the preceding year, their work status, and their country of birth. We only consider salary workers aged between 25 and 59 who are not in school and report positive weeks and hours worked, and we define immigrants as individuals born outside the United States. We use this sample to compute average wages and employment rates.

2.2 Data from Autor et al. (2013)

To analyze import competition from China, we use the Autor et al. (2013) data (and identification strategy), which is publicly available on the publication's website. We merge this data with housing supply elasticity estimates provided in Saiz (2010) using the geographic concordances explained on David Dorn's website. We were able to merge 135 metropolitan areas across the two data sets.

2.3 Real exchange rate data and housing supply elasticity estimates

We use variation in real exchange rates to build an instrument for immigrant shocks. For that, we use variation in the price levels of immigrants' countries of origin interacted with an exogenous determinant of local price indices (such as the housing supply elasticity) to predict location patterns of immigrants in the United States relative to natives at the country-of-origin-metropolitan-area level. To measure price levels at origin, we use real exchange rate data. The World Bank provides real exchange rates with respect to the United States for a large number of countries in its International Comparison Program database.[3] Such data expand the 89 countries of origin that we use in our estimation exercise.

We use estimates for housing supply elasticity provided by Saiz (2010). Those essentially reflect the share of developable land within a given radius from the city center. For that, Saiz (2010) uses various geographic impediments to development, such as rivers, hills, lakes, and oceans.

3 Framework

3.1 Exposure to local shocks

In order to study the effects of immigration or import competition on labor market outcomes we ideally want to compare "units" or "cells" of the labor market that receive immigrants or that are exposed to import competition for exogenous reasons with cells which are not. Moreover, it is preferable that such cells have some economic meaning, i.e., that they can be thought as defining a labor market that describes (reasonably) well the behavior of the economy.

Both the literature studying the effect of immigration and that studying import competition commonly use as the unit of analysis what is often labeled as a local labor market. Local labor markets are defined as metropolitan areas in the immigration literature (see for example Card (2001, 2009)). Instead, when studying import competition, most studies focus on commuting zones (following the pioneering work by Autor et al. (2013)). It is worth emphasizing that commuting zones can be divided into urban and rural ones. Urban commuting zones coincide with metropolitan areas, and, hence, with the unit of analysis most used in the immigration literature. Rural commuting zones partition the territory not attached to metropolitan areas into areas with high levels of internal commuting.

The specification used in both the immigration and import competition literatures is also almost identical. Most studies run regressions of the following type:

$$\Delta \ln y_{ct} = \alpha + \beta^{all}\text{Exposure}_{ct} + \varepsilon_{ct} \tag{3.1}$$

where y_{ct} is a variable of interest, such as employment rate or average wages, c identifies local labor markets, t decades, and 'Exposure' is defined as either immigrant flow per (native) worker or the value of

[3] The exact title of the series is "Price level ratio of PPP conversion factor (GDP) to market exchange rate."

imports per worker. The 'Exposure' variable seeks to measure how important the immigrant shock or the import competition shock is in location c at time t.

To compare the results obtained in the immigration and import competition literatures it is important to think about what this variable 'Exposure' captures. As we make more explicit below, an import competition shock may be captured by a shift in the local demand for labor, while an immigrant shock may be thought of as an increase in the labor supply curve (potentially in combination with an increase in the demand for labor curve if at least a fraction of new immigrants' consumption takes place locally).

As long as labor demand and labor supply curves are *not* perfectly elastic, both a positive labor supply shock and a negative labor demand shock lead to a decline in wages. We show that in Figure 1.

Figure 1 goes around here

In Panel A of Figure 1 we show how we can think about an immigrant shock. Suppose I immigrants enter the local economy and shift the labor supply curve to the right. If the labor demand curve is not perfectly elastic, wages will drop from point A to point B. A drop in wages tends to decrease the indirect utility of living in that local labor market, likely leading to an internal migration response, in the figure depicted by ΔN. If this internal migration response was larger than the immigrant shock, the economy would recover a level of wages that would be higher than before the shock, thereby, in many settings, making the local economy more attractive than before the shock. Hence, in principle we should expect an internal migration response that is no larger than the immigrant inflow. How much wages recover depends, in this setting, on this endogenous labor supply response, as shown with point C.

A similar story applies to import competition shocks. As long as the labor supply curve is not perfectly elastic, a decrease in the local demand for labor will move equilibrium wages from point A to point B, in panel B of Figure 1. Depending on the internal migration response, the drop in wages is larger or smaller. In the figure, wages after internal migration takes places recover to point C.

We can make the insights from Figure 1 more general by using a representative firm that combines (potentially various types of) labor and other inputs. In this case we can express wage changes as:

$$\Delta \ln w_c = \Delta \ln q_c - \Delta \ln MPL_c$$

where MPL is the marginal product of labor and q reflects prices of the final output. In this more general setting, we can explore the mechanisms that affect wages, taking into account both the direct effects of 'Exposure' to a shock and indirect effects that tend to attenuate the shock, such as the internal migration example depicted in Figure 1. It is worth stating here that, as long as our 'Exposure' measure is exogenous, running regressions like those typically run in previous papers will identify the effect of the shock on an outcome of interest, such as wages, taking into account all the potential adjustment mechanisms. To make that claim more explicit, we can assume that:

$$\ln MPL_c = \alpha_A \ln A_c + \alpha_Y \ln Y_c + \sum_k^F \gamma_k \ln L_{kc} + \sum_k^F \eta_k \ln A_{kc} - \beta \text{Exposure}_c$$

That is, the marginal product of labor depends on Hicks neutral technologies A_c, total output of the (aggregate) local economy Y_c, the amount of each factor type L_{kc}, factor biased technologies A_{kc}, and (directly) exposure to our shock of interest. Hence, when looking at the difference between two periods, with the first one experiencing zero exposure to the shock under analysis, we have that:

$$\Delta \ln w_c = \Delta \ln q_c + \alpha_A \Delta \ln A_c + \alpha_Y \Delta \ln Y_c + \sum_k^F \gamma_k \Delta \ln L_{kc} + \sum_k^F \eta_k \Delta \ln A_{kc} - \beta \text{Exposure}_c$$

Hence, wage changes are determined *directly* by the exposure to the shock and by the response of various (potentially endogenous) variables that can react to exposure to the shock. We can denote the reaction of each of these potentially endogenous variables to exposure to the shock as β^m (taking into account all the combination of parameters) and rewrite as:

$$\Delta \ln w_c = -(\beta^{labor} - \beta^{Agg.Dem.} - \beta^{tech.} - \beta^{mobility}) \text{Exposure}_c$$

Note that while the βs can in principle take any sign, we have written this equation assuming that exposure to the shock has a negative effect on wages and that other variables react to help absorb the shock. We have put the various mechanisms into four large categories. β^{labor} is the effect of exposure to the shock to wages while holding everything else fixed. $\beta^{Agg.Dem.}$ summarizes how exposure to the shock may affect local production or local aggregate demand. For example, when immigrants move into a location they also consume, and, hence, may increase local aggregate demand, which may affect local wages. $\beta^{tech.}$ captures the ways in which local technologies may adapt to local shocks. $\beta^{mobility}$ captures mobility responses. For instance, given a negative import competition shock, affected workers may leave the location, thereby reducing pressure on wages.

We can also make the mobility channel more explicit by assuming that factor mobility depends on changes in *real* wages, so that:

$$\Delta \ln N_c = \lambda(\Delta \ln w_c - \Delta \ln p_c)$$

where λ is usually referred to as the internal migration elasticity. Hence, $\beta^{mobility} = \lambda\beta^{labor} - \lambda\beta^{housing}$. In this case, the change in wages can be expressed as:

$$\Delta \ln w_c = -((1-\lambda)\beta^{labor} - \beta^{Agg.Dem.} - \beta^{tech.} + \lambda\beta^{housing}) \text{Exposure}_c \tag{3.2}$$

Expression 3.2 makes explicit the meaning of estimating equations of the type 3.1 with wages as dependent variable. Random variation in 'Exposure' to shocks causally identifies the reduced form parameter β^{all}, which is equal to the direct effect on wages of exposure to the shock and the indirect effect of the responses of many other variables which also affect the level of wages in equilibrium ($(1-\lambda)\beta^{labor} - \beta^{Agg.Dem.} - \beta^{tech.} + \lambda\beta^{housing}$).

This framework highlights the importance of looking for exogenous variation in potential shocks, either immigrant shocks or import competition shocks, and of understanding that not only one variable of interest such as wages may change, but also many other elements that determine wages in equilibrium. We return to some of this discussion in Section 5 when we introduce a model that helps us interpret our empirical results.

3.2 Instruments for immigrant and import competition shocks

Both immigrant and import competition shocks have been studied using what is known as 'shift-share' instruments. As its name indicates, shift-share instruments have two parts. The first measures the size of the shock at an aggregate level. The second apportions the overall shock to each location based on the importance that the shock is predicted to have. In what follows, we discuss two alternative strategies for immigrant shocks and briefly introduce the IV strategy used in Autor et al. (2013).

The state-of-the-art instrument for immigration is based on immigrant networks. This means that aggregate inflows of immigrants from each country of origin are allocated across locations based on the past distribution of immigrants from each of these countries of origin:

$$\widehat{\Delta\text{Imm}}_{cot}^{networks} = \Delta\text{Imm}_{ot} * \frac{\text{Imm}_{co,t-1}}{\text{Imm}_{o,t-1}}$$

This equation shows that the predicted number of immigrants from each country of origin in each location can be obtained from the aggregate inflow of immigrants from each country, denoted by ΔImm_{ot}, and the relative number of immigrants from country o that locate in c relative to all immigrants from that country at time $t-1$.

Given this predicted number of immigrants from each country in each location we can aggregate to the location level:

$$\widehat{\Delta\text{Imm}}_{ct}^{networks} = \sum_{o} \widehat{\text{Imm}}_{cot}^{networks} \tag{3.3}$$

With this, we can define the immigrant networks IV as:

$$Z_{ct}^{1} = \frac{\widehat{\Delta\text{Imm}}_{ct}^{networks}}{\text{Nat}_{c,t-1}} \tag{3.4}$$

A second instrument for immigrant shocks is developed in Albert and Monras (2019). There, we allocate aggregate immigrant inflows based on the relative distribution of immigrants to natives predicted by an interaction of the exchange rate and local housing supply elasticity. We can express this as:

$$\Delta\widehat{\text{Imm}}^{AM}_{cot} = \Delta\text{Imm}_{ot} * \widehat{\frac{\text{Imm}_{cot}}{\text{Imm}_{ot}}/\frac{\text{Nat}_{ct}}{\text{Nat}_t}} * \frac{\text{Nat}_{c,t-1}}{\text{Nat}_{t-1}} \tag{3.5}$$

where $\widehat{\frac{\text{Imm}_{cot}}{\text{Imm}_{ot}}/\frac{\text{Nat}_{ct}}{\text{Nat}_t}}$ are the predicted values of running the regression: $\ln(\frac{\text{Imm}_{cot}}{\text{Imm}_{ot}}/\frac{\text{Nat}_{ct}}{\text{Nat}_t}) = \beta$ HS elasticity$_c +$ $\gamma \ln \text{RER}_{ot} + \eta \ln \text{RER}_{ot}$ x HS elasticity$_c + [\delta_c] + \delta_t + \delta_o + \varepsilon_{cot}$. With this strategy we obtain:

$$Z^2_{ct} = \frac{\Delta\widehat{\text{Imm}}^{AM}_{ct}}{\text{Nat}_{c,t-1}} \tag{3.6}$$

where $\Delta\widehat{\text{Imm}}^{AM}_{ct} = \sum_o \widehat{\text{Imm}}^{AM}_{cot}$.

We can use these two instruments to estimate regressions of interest that can be written as:

$$\Delta y_{ct} = \beta\frac{\Delta\text{Imm}_{ct}}{\text{Nat}_{c,t-1}} + \delta_t + \delta_r + \varepsilon_{ct} \tag{3.7}$$

where δ_r denotes region fixed effects, which are important in allowing for flexible regional trends that take into account diverging regional developments and serial correlation concerns.

The instrument in Autor et al. (2013) is very similar in nature to both the networks IV and the instrumental variable strategy that we develop in Albert and Monras (2019). The main measure of exposure to import competition is defined as:

$$IPW_{ct} = \sum_j \frac{L_{cjt}}{Ljt}\frac{\Delta M_{jt}}{L_{ct}}$$

Where again c refers to location and where j refers to sectors. L_{ct} is the (working-age) population at the beginning of the period and L_{cjt} is the (working-age) population in sector j. ΔM_{cjt} is the change in imports in the sector imported to each location c. To identify exogenous import competition shocks, Autor et al. (2013) use variation in imports from China to other high-income countries by sector, and they apportion the importance of import competition based on the pre-existing importance of each industry in each location. This can be expressed as:

$$IPW^Z_{ct} = \sum_j \frac{L_{cjt-1}}{Ljt-1}\frac{\Delta M^{NonUS}_{jt}}{L_{ct-1}}$$

Armed with this instrument, Autor et al. (2013) run regressions such as equation 3.7 where the exposure measure is given by IPW_{ct}, instead of $\frac{\Delta\text{Imm}_c}{\text{Nat}_{c,t-1}}$, and the instrument by IPW^Z_{ct}, instead of Z^1_{ct} or Z^2_{ct}. In the original Autor et al. (2013), the regional fixed effects are Census regions. In this paper, we show regressions where regions are defined by states.

4 Empirical evidence

4.1 Immigrant shocks

Armed with our two instrumental variable strategies, in this section we revisit (and expand) the empirical evidence on the effects of immigrant shocks on labor market outcomes, which we then contrast with import competition shocks in the following section.

The results of estimating equations of the form 3.2 are presented in Table 1, where we always include year and state fixed effects, so that identification comes from comparisons within state.

Table 1 should be around here

In line with previous literature, in Table 1 we show estimates that suggest a small effect of immigration on labor market outcomes, such as the decadal change in average wages and employment rates. It is worth mentioning that the results are also similar if we focus on particular education groups instead of average outcomes, as shown in appendix Table A.1. In panel A, we show OLS estimates which may be biased due to endogeneity concerns. Immigrant shocks, measured as the inflow of immigrants during the decade divided by the native population at the beginning of the decade, may occur in metropolitan areas that are doing disproportionately well, thereby generating a potentially spurious correlation between immigrant shocks and labor market outcomes. Indeed, OLS estimates suggest that immigrants flow to places where wages and rental prices are increasing, and where (native) population is also increasing.

Panel B of Table 1 reports IV estimates, where we combine the standard networks instrument and the new instrument based on Albert and Monras (2019). In this table we also report the p-value of the Sargan-Hansen test, which under the null hypothesis cannot reject the validity of our instruments. In Panel B, the point estimate becomes slightly negative but economically small for changes in wages, while the estimates for changes in employment rates, rental prices, and share of renters are all statistically indistinguishable from 0. Point estimates become negative and large for (native) population responses. The point estimate suggests that each (net) immigrant arrival into a location (measured as $\frac{\Delta \text{Imm}_{ct}}{\text{Nat}_{c,t-1}}$) leads to around 1 native (net) leaving the location (measured as $\frac{\Delta \text{Nat}_{c,t}}{\text{Nat}_{c,t-1}}$).

From the perspective of the framework provided above, see equation 3.2, such regressions indicate that $-((1-\lambda)\beta^{labor} - \beta^{Agg.Dem.} - \beta^{tech.} + \lambda\beta^{housing}) \approx 0$. The rental price results also indicate that $\beta^{housing} \approx 0$. If we assume that the effect of immigration on local (net) aggregate demand is close to zero, and that local technologies are not responsive to immigrant shocks, we would have that $(1-\lambda)\beta^{labor} \approx 0$, which is in line with the estimate of $\lambda \approx 1$ provided in this table. That suggests that understanding how (native) population responds to local shocks may be crucial to explaining why other labor market outcomes, such as wages, are not affected by immigration.

Panel C of Table 1 investigates whether there is some heterogeneity in these results as a function of the local housing supply elasticity. While there is not much heterogeneity for most of the variables, the population responses seem to critically depend on local housing. The results in Panel C indicate that while native population seems to be very responsive to local immigrant shocks in low housing supply elasticity cities, they are essentially unresponsive in high housing supply elasticity cities. In other words, in places where the supply of housing cannot adjust much, immigrant shocks seem to be absorbed through native internal mobility. However, in places where housing can adjust, it seems that other channels, such as the net local aggregate demand or technology adoption, are behind the absorption of immigrants into local labor markets over ten-year time horizons.

Panel D suggests that the results reported in the previous panels can be interpreted as the causal effect of immigrant shocks on variables of interest and do not seem to be driven by differential pre-trends. In this panel we estimate the effect of immigrant shocks on the one-decade lagged outcomes studied in the other panels. Throughout this table we see that (once conditioned on year and state fixed effects), we cannot reject the null hypothesis of the Sargan-Hansen test that the two instruments that we use are indeed valid.[4]

The results in this section suggest that the responsiveness of internal migration to local shocks may be quite different as a function of the local housing market. We investigate this further using import competition shocks in the following subsection.

4.2 Trade shocks

Perhaps one of the best studied regional shocks of the last 20 to 30 years is import competition from China. In a seminal paper, Autor et al. (2013) show large and persistent employment declines in commuting zones exposed to import competition from China. Their setting is analogous to the regressions we showed for immigration. Their main result is that manufacturing employment strongly declined in commuting zones specializing in producing goods that were also imported from China.

For their analysis, Autor et al. (2013) use commuting zones as the unit of geographic analysis. Commuting zones partition the United States into 722 different areas that identify local labor markets. Among those commuting zones, 135 are also metropolitan areas which we can match to the estimates of the local housing supply elasticity provided by Saiz (2010).

The strategy to study the effects of trade in the US is defended in Autor et al. (2013) based on the empirical fact that population does not seem to be very responsive to the local exposure to international trade. This is documented in great detail in the original paper. Such lack of population response is, in principle, in contradiction to the evidence for immigrant shocks shown in the previous subsection.

Table 2 shows the results for import competition shocks. Panel A replicates the original Autor et al. (2013) results, using the 722 commuting zones, and data from 1990 to 2007 (which takes the place of 2010 in

[4] In this paper, we report robust standard errors since those are the most conservative with respect to passing the Sargan-Hansen test. This abstracts from discussions of inference in shift-share instruments discussed in Adao et al. (2018).

our immigrant shocks table). We follow their exact specification, which includes several controls (Percentage of employment in manufacturing at $t-1$, Percentage of college-educated at $t-1$, Percentage of foreign-born at $t-1$, Percentage of employment among women at $t-1$, Percentage of employment in routine occupations at $t-1$, Average offshorability index at $t-1$ and Census division dummies). We obviously obtain the exact same estimates as the original paper.

Panel B of Table 2 replicates Panel A, using state fixed effects instead of Census division dummies. We make this change to be able to compare a specification that more closely resembles the one used for immigrant shocks. Using state fixed effect in a first-differenced specification is important in immigrant shock regressions to avoid having systematic difference in pre-trends potentially driving the main results. Panel B of Table 2 shows that the results of Autor et al. (2013) are unchanged by the inclusion of state fixed effects instead of Census division dummies. In both cases, we obtain persistent declines in wages and employment, and no population response.

Table 2 should be around here

Panel C of Table 2 replicates Panel B, using metropolitan areas instead of the full sample of commuting zones. This change in the underlying sample, from 722 commuting zones to 135 metropolitan areas, results in very similar employment and wage effects, but in quite different population responses. In metropolitan areas, it seems that a net departure of (working-age) population occurs from locations affected by import competition shocks.

In Panel D, we investigate the heterogeneity of those results. Similar to what we reported with immigrant shocks, this panel shows that the population response is very different across metropolitan areas. Whereas metropolitan areas with low housing supply elasticity experience a large population response, those with housing supply elasticities above 1 experience no population responses. Given that rural commuting zones probably have very elastic housing markets, these results show that the lack of population response to import competition shocks is entirely driven by local labor markets with high housing supply elasticity. These heterogeneity results also indicate that the rental prices increases that follow import competition shocks are likely driven by a change in the composition of renters. Fewer people rent in places experiencing large import competition shocks, presumably because of the decline in housing prices.

Panel D also shows that wage and employment effects are small in low housing supply elasticity metropolitan areas, which are the ones where population responds strongly. Instead, wage and employment declines are concentrated in the high housing supply elasticity type metropolitan areas. Hence, labor market effects crucially depend on the internal migration response.

Panel E of this table shows the estimates of import competition shocks on lagged outcome variables, suggesting that pre-trends are not driving the results.

4.3 Main difference between trade and immigrant shocks

As can be seen in Sections 4.1 and 4.2, the internal migration response to local shocks is similar irrespective of whether such local shocks are driven by international immigration or import competition. In both cases, local population seems to leave from locations with low housing supply elasticity that experience a local shock and seems to be non-responsive in those with high elasticity. That result is apparent when allowing for the effect of the local shock to vary with the local housing supply elasticity estimate provided by Saiz (2010).

At the same time, when not taking into account such heterogeneity, we obtain that, on average, internal migration responds to international immigration and does not respond to import competition. This suggests that international migration and import competition are affecting different parts of the territory. We show in this section that this is indeed the case. In particular, the fact that immigrants systematically locate in expensive locations, as argued in Albert and Monras (2019), together with the fact that workers have a higher tendency to leave expensive rather than cheap locations, as we argue for the first time in this paper, can explain the patterns in the data.

The systematic relationship between immigration shocks, trade shocks, and housing supply elasticity can be seen in Figure 2. In Panel A, we show that immigration shocks concentrate in metropolitan areas with housing supply elasticities below 1 (shown in the figure with the vertical dashed line). The graph on the left shows the actual immigrant shock, while the one on the right shows the shock predicted by our instrument. It is clear in both cases that large immigrant flows (in the case of the figure, flows during the 1990s) concentrate in housing constrained locations. In contrast, import competition from China does not concentrate in those expensive locations with low housing supply elasticities, as shown in Panel B, using the actual shock over the 1990s or that predicted through the IV strategy of Autor et al. (2013).

Figure 2 should be around here

The stark difference in the geographical distribution of regional shocks, as shown in Figure 2, suggests that whether shocks can quickly dissipate across space crucially depends on where they occur. In the case of immigration, immigrants' incentives to live in locations with high nominal wage and high cost of living imply that a net movement of natives away from such locations is more likely. Instead, internal migration responses to the import competition from China are, on average, much lower. Autor et al. (2013) argue that there is no internal migration response to the China shock. This is a consequence of the fact that very few expensive locations with low housing supply elasticity experienced the China shock.

5 Model

In the previous sections, we documented that the population response to negative local shocks was larger in housing constrained locations than in unconstrained ones. This empirical result is not aligned with the predictions of most spatial equilibrium models, in which indirect utility depends on income and on the price of housing. How much the price of housing matters for indirect utility depends on the share of consumption devoted to housing.

In standard models, the share of income devoted to housing is argued to be constant. However, in the data, it seems that housing expenditures, as a fraction of total income, are decreasing in income.[5] We argue in what follows that this has implications for the population response to local shocks.

Intuitively, when the share of income devoted to housing expenditures is constant, population reacts more to local income shocks in locations with a higher housing supply elasticity. Given an income shock, indirect utility moves one for one with income. Indirect utility is also affected by housing prices, but less than one for one (unless the share of income devoted to housing expenditures is equal to one) and with the opposite sign, i.e., indirect utility is positively related to income while housing prices enter with a negative sign. With an income shock, housing prices respond in the location. How much they respond depends on the housing supply elasticity. If the housing supply elasticity is high, prices do not move very substantially. If it is low, price movements are large. Hence, indirect utility changes by more with income shocks when price movements are small and do not substantially counteract the effects of the income shock on indirect utility.

If the share of income devoted to housing is decreasing in income, the results of the standard model can be reversed. This is because with a negative income shock, house prices become more important. This means that in places with relatively high housing prices (i.e., low elasticity of housing prices), a negative income shock makes housing expenses a larger fraction of income, thereby mitigating the counteracting effects of housing price movements on indirect utility. That is the idea we formalize in this model.[6]

We consider a local economy that produces one freely traded good and housing. Local labor, immigrants, and intermediate imports are used in the production of the freely traded good. For the sake of simplicity, we assume that local labor, immigrants, and imported intermediates are all perfect substitutes. The amount of

[5] In a regression of the share of income devoted to rents on wages instrumented by Bartik shocks, we obtain a negative point estimate. Non-homotheticities in housing and other sectors have also been documented in nascent literature, see Tsivanidis (2019); Couture et al. (2020); Fretz et al. (2019).

[6] There are other ways to obtain the result that native population is more responsive to immigrant shocks in housing constrained locations that do not require non-homotheticities in the utility function. In Albert and Monras (2019), we propose a framework where immigrants do not affect wages, but have incentives to locate in expensive locations. In this framework, income is not affected and immigrant shocks only affect the housing price, which crowds-out some natives from these more expensive locations. In the new model introduced in this paper, we obtain similar results in a slightly different way. In this case, we allow immigrant shocks to affect local wages of natives (and through this channel, the local demand for housing), but we abstract from the direct effects that immigrants may have in the demand for housing (based on the point that immigrant consumption of housing is likely to be small). This is why in this paper we also need non-homotheticities in the demand for housing to explain the relocation responses to immigrant shocks, while in our previous work this was unnecessary. Conceptually, the two papers are not far apart and in fact both mechanisms reinforce each other. The force that generates an advantage for immigrants to locate in expensive locations in Albert and Monras (2019) is that immigrants consume a smaller fraction of their income (but not zero) in local housing because they consume part of their income at origin. We abstract in this paper from these points to keep the model simple and parsimonious.

workers in the local economy is determined by a supply function that is increasing in income and decreasing in housing prices. The housing sector provides homes using only capital and land as inputs.[7]

5.1 Labor market

We assume the following local technology for a representative firm:

$$Y = (\gamma K_c^{\frac{\sigma-1}{\sigma}} + (1-\gamma)(N+I+M)^{\frac{\sigma-1}{\sigma}})^{\sigma/(\sigma-1)}$$

Where Y is total output, N is the local labor force, I is the number of immigrants, and M is the number of imports. Profit maximization implies that labor income is given by:

$$\ln w = \ln(1-\gamma) - \frac{1}{\sigma}\ln(N+I+M) + \frac{1}{\sigma}\ln Y \approx \ln(\frac{\sigma-1}{\sigma}) - \frac{1}{\sigma}\ln N + \frac{1}{\sigma}\ln Y - \frac{1}{\sigma}\frac{I}{N} - \frac{1}{\sigma}\frac{M}{N}$$

This expression highlights that the income of workers is affected in the same way by immigrant and import competition shocks, when those are measured as a fraction of the working population, as was the case in the empirical exercises, as long as factor K_c is not perfectly elastically supplied.

5.2 Mobility decision

We assume that (native) labor supply in a location is given by:

$$\ln N = \lambda(\ln w - \alpha(w)\ln p)$$

This expression says that more people are attracted to a location if income in the location is higher and prices are lower. It is easy to justify this labor supply equation with heterogeneous preferences for locations using a logit distribution of individual level taste shocks.

Furthermore, we assume that the share of income that goes to housing ($\alpha(w)$) is decreasing in total income. This means that at higher wages, the fraction of income spent on housing is lower.

5.3 Housing

The aggregate demand for housing is the income that workers devote to housing multiplied by the number of workers. We abstract, for simplicity, on how immigrants affect the demand for housing. We document in Albert and Monras (2019) that immigrants consume significantly less housing than similar-looking natives households, and often in different neighborhoods to those chosen by natives. However, it is worth keeping in mind that this local demand channel, ignored in the model for the sake of simplicity, may help to explain the

[7] This assumption is also for simplicity. Alternatively, we can assume that the housing sector uses as inputs the traded good and land, or labor and land. All these assumptions result in similar results.

empirical results on the effects of immigrant shocks on wages and employment in metropolitan areas with high housing supply elasticity.

We assume that the total supply of housing is a function that depends positively on housing prices. That is, when housing prices are higher, local developers have incentives to increase the housing stock, and when lower, they have incentives to decrease it.

Market clearing in the housing market implies:

$$\alpha(w)wN = pH(p)$$

When assuming $H(p) = p^{\varepsilon}$, this equation can be re-expressed as follows:

$$\ln N = (1+\varepsilon)\ln p - \ln\alpha(w) - \ln w$$

Importantly, ε is the housing supply elasticity.

Note that this equation shows that when income grows, the demand for housing increases, which leads to an increase in housing prices that deters further population from entering the local economy. In other words, the housing market is a congestion force in this local economy.

5.4 Equilibrium

To obtain the equilibrium in this economy we can combine the labor supply and housing market equations to obtain an expression that relates housing prices to income.[8]

$$\ln p = \frac{\ln\alpha(w)}{(1+\lambda\alpha(w)+\varepsilon)} + \frac{(1+\lambda)}{(1+\lambda\alpha(w)+\varepsilon)}\ln w$$

We can now use this expression to obtain a function that relates local population and local income:[9]

$$\ln N = -\frac{\lambda\alpha(w)}{(1+\lambda\alpha(w)+\varepsilon)}\ln(\alpha(w)w) + \frac{(1+\varepsilon)\lambda}{(1+\lambda\alpha(w)+\varepsilon)}\ln w$$

[8] From the following equation:

$$\lambda\ln w - \alpha(w)\lambda\ln p = (1+\varepsilon)\ln p - \ln\alpha(w) - \ln w$$

We obtain that:

$$(1+\alpha(w)\lambda+\varepsilon)\ln p = \ln\alpha(w) + (1+\lambda)\ln w$$

[9] From:

$$\ln N = (1+\varepsilon)\ln p - \ln\alpha(w) - \ln w$$

We have:

$$\ln N = (1+\varepsilon)(\frac{\ln\alpha(w)}{(1+\lambda\alpha(w)+\varepsilon)} + \frac{(1+\lambda)}{(1+\lambda\alpha(w)+\varepsilon)}\ln w) - \ln\alpha(w) - \ln w$$

$$\ln N = (\frac{(1+\varepsilon)}{(1+\lambda\alpha(w)+\varepsilon)} - 1)\ln\alpha(w) + (\frac{(1+\varepsilon)(1+\lambda)}{(1+\lambda\alpha(w)+\varepsilon)} - 1)\ln w$$

This expression shows that population is increasing in local income (w) and decreasing in total housing expenditures ($\alpha(w)w$). That is intuitive. More income is valued by workers, so it attracts more workers into the local economy. At the same time, that extra income may lead either to an increase or a reduction in total house expenditures. If it leads to higher housing expenditures, it lowers workers' indirect utility for the location.

To illustrate the implications of the model, it is worth considering the special case when $\alpha(w) = \alpha$. In that case, we have that:

$$\ln N = -\frac{\lambda\alpha}{(1+\lambda\alpha+\varepsilon)}\ln(\alpha w) + \frac{(1+\varepsilon)\lambda}{(1+\lambda\alpha+\varepsilon)}\ln w$$

From this expression, we can see how much population responds to a local income shock:

$$\frac{\partial \ln N}{\partial \ln w} = \frac{(1+\varepsilon)\lambda - \lambda\alpha}{(1+\lambda\alpha+\varepsilon)}$$

Note that this derivative is positive since $(1+\varepsilon) > \alpha$, due to the fact that $\varepsilon > 0$ and $1 > \alpha > 0$. $\lambda > 0$ is the internal migration elasticity to real income shocks.

Another question, more central to this paper, is whether population reacts more in high or low ε locations. For this we can compute:

$$\frac{\partial^2 \ln N}{\partial \ln w \partial(1+\varepsilon)} = \frac{\lambda\alpha(1+\lambda)}{(1+\alpha+\varepsilon)^2} > 0$$

It is clear from this expression that when preferences are homothetic, population reacts more to local shocks in places with high housing supply elasticity.

This result is not necessarily true when preferences are non-homothetic. In that case, there are two opposing forces. On the one hand, as with the homothetic case, high housing supply locations experience lower housing price responses, and, hence, the mitigating effect that house price fluctuations in response to income shocks have on real incomes is lower. On the other hand, locations with high housing supply elasticity have low housing prices. Given a negative income shock, the non-homotheticity in housing consumption implies that housing becomes more important for real income, something that matters more if housing prices are high, i.e., in housing inelastic locations. The relative strength of those two forces determines whether population is more responsive to local shocks in housing constrained or unconstrained locations.

Theorem 1. *Whether population is more responsive to income shocks in housing (in)elastic locations depends on how much housing expenditures decline with income.*

Proof. See Appendix A ☐

In sum, this model shows something that is not obvious ex-ante, i.e., that population may be more responsive to local shocks in locations with low rather than high housing supply elasticities. The model helps rationalize the evidence provided in Section 4.

6 Conclusion

In this paper, we argue that the extent to which local shocks are observed in the local labor market crucially depends on whether they occur in locations where it is relatively easy to move away. We argue that the locations from where it is easy to move away are typically high cost of living, expensive locations, and we rationalize that through a model with non-homothetic demand for housing.

Empirically, we compare internal migration responses to import competition from China (documented in previous literature) and internal migration responses to international immigrant shocks. We argue that immigrant shocks occur, systematically, in locations with a high cost of living. We show that natives relocate in response to immigrant flows: for each immigrant arrival, one native relocates. Similar patterns emerge with import competition shocks in housing constrained locations, except that, in general, trade shocks occur in places with elastic supply of housing.

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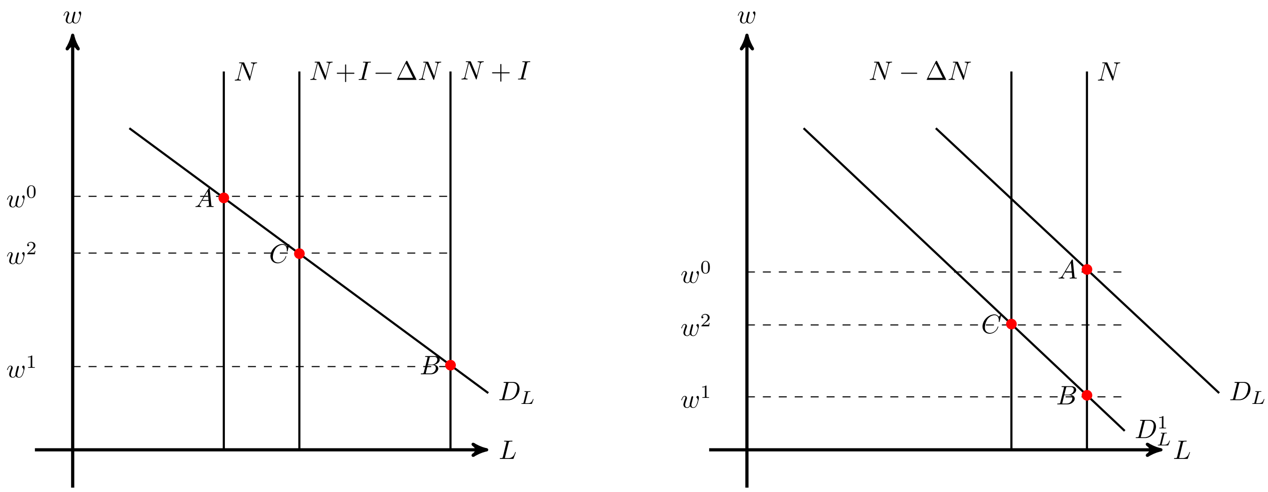
7 Figures

Figure 1: Identification framework

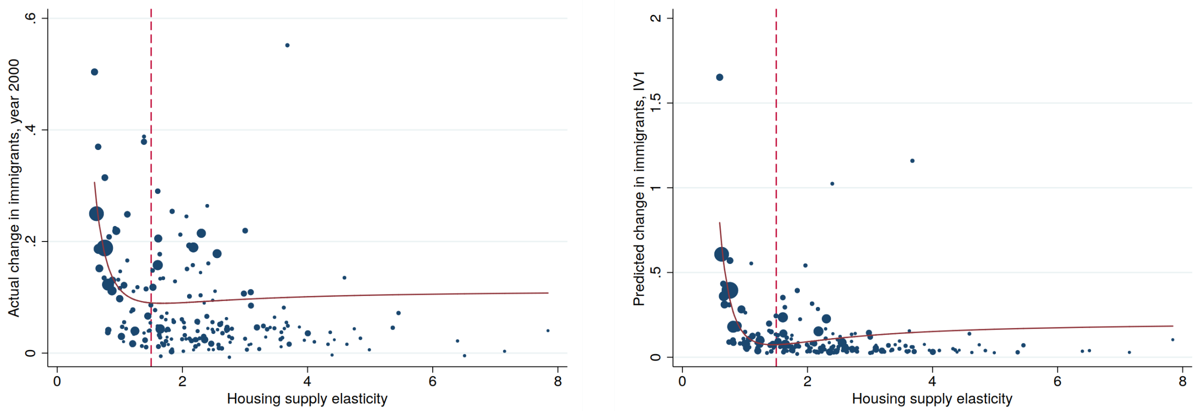


Panel A: Immigration shock   Panel B: Trade shock

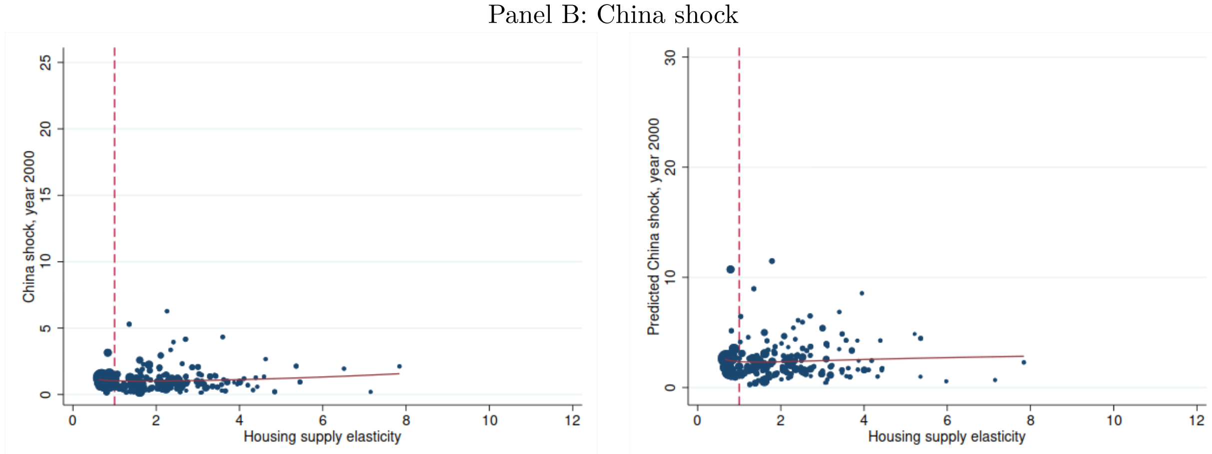
Notes: This figure represents a local labor market with a downward sloping labor demand curve. Panel A shows the effect of an immigrant shock of size I with an internal migration response of size ΔN. Panel B shows an import competition shock with an internal migration response of size ΔN.

Figure 2: Regional shocks and housing supply elasticity

Panel A: Immigrant shock



Panel B: China shock



Notes: We measure immigrant shocks as the flow of immigrants during the decade divided by the initial native population in each location, using data from the Censuses for years 1990 and 2000. We constructed the predicted immigrant shock based on the instrument described in equation 3.6. Housing supply elasticity estimates are provided by Saiz (2010). The vertical line indicates housing supply elasticities exactly equal to one. The import competition shock from China is constructed based on the Autor et al. (2013) measure of exposure to import competition from China across metropolitan areas (rural commuting zones are excluded from the graph).

8 Tables

Table 1: Immigration and labor market outcomes

	Wage (1)	Employment (2)	Rents (3)	Share renter (4)	Nat. Pop. (5)
Panel A: OLS estimates					
$\frac{\Delta \text{Imm}}{\text{Nat}}$	0.0932**	-0.0684***	0.0330**	-0.00875	0.305
	(0.0371)	(0.0218)	(0.0155)	(0.0316)	(0.373)
Panel B: IV estimates					
$\frac{\Delta \text{Imm}}{\text{Nat}}$	-0.128**	-0.0852	-0.0157	-0.0245	-1.085***
	(0.0627)	(0.0598)	(0.0270)	(0.0455)	(0.350)
p-value Sargan-Hansen test	0.384	0.448	0.431	0.668	0.178
Panel C: Heterogeneity, IV					
$\frac{\Delta \text{Imm}}{\text{Nat}}$	-0.123**	-0.0860	-0.0129	-0.0353	-1.022***
	(0.0573)	(0.0573)	(0.0235)	(0.0430)	(0.300)
$\frac{\Delta \text{Imm}}{\text{Nat}}$ x (HS elas >1)	-2.34e-05	0.0229	-0.00593	-0.0298	0.770**
	(0.0505)	(0.0441)	(0.0233)	(0.0421)	(0.303)
p-value Sargan-Hansen test	0.612	0.633	0.477	0.130	0.224
Panel D: Pre-trends, IV (N=382)					
Lagged $\frac{\Delta \text{Imm}}{\text{Nat}}$	-0.0727***	0.0559	0.0286	-0.0259	-0.166
	(0.0229)	(0.0734)	(0.0174)	(0.0232)	(0.178)

Notes: The data used in this table come from the 1980 to 2000 Censuses and the 2009-2011 ACS. The number of metropolitan areas is 191. We calculate decadal changes for the variables in each column (which are defined as 'Wage'$=\Delta \ln w_{ct}$, 'Employment' $= \Delta \ln \frac{E}{L}_{ct}$, 'Rents' $= \Delta \ln rents_{ct}$, 'Share Rents' $= \Delta$Share renting$_{ct}$, 'Nat. Pop.' $= \frac{\Delta \text{Nat}_{ct}}{\text{Nat}_{c,t-1}}$). We use 3 decades × 191 metropolitan = 573 observations in each regression. Each column - row of each panel shows a different regression. All the regressions include state and decade fixed effects. IV regressions use the networks instrument and the instrument developed in Albert and Monras (2019). Panel C reports the p-value of the Sargan-Hansen test of overidentifying restrictions. Robust standard errors are reported. * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level.

Table 2: China shock and labor market outcomes

	Wage	Employment	Rents	Share renter	Population
	(1)	(2)	(3)	(4)	(5)
Panel A: Replication ADH, IV					
IPW	-0.759***	-0.774***	.	.	-0.0502
	(0.246)	(0.171)	.	.	(0.743)
Panel B: Replication ADH, IV with State FE					
IPW	-0.866***	-0.746***	.	.	-0.213
	(0.159)	(0.108)	.	.	(0.238)
Panel C: Replication ADH, IV with only MSAs in sample					
IPW	-1.078**	-1.000***	0.0320**	-0.00176	-1.749***
	(0.452)	(0.325)	(0.0128)	(0.00695)	(0.615)
Panel D: Heterogeneity, IV					
IPW	-0.322	-0.514	0.0147	0.00740	-2.622***
	(0.481)	(0.350)	(0.0137)	(0.00742)	(0.644)
IPW x (HS elas >1)	-1.882***	-1.210***	0.0427***	-0.0226***	2.176***
	(0.428)	(0.311)	(0.0122)	(0.00662)	(0.572)
Panel E: Pre-trends, IV (N=135)					
Lagged *IPW*	-0.104	-0.0898	0.0234	0.00442	-0.261
	(0.276)	(0.122)	(0.0159)	(0.00898)	(0.592)

Notes: The data used in this come from the 1990 to 2000 Censuses and the 2007 ACS, sourced from Autor et al. (2013). The number of Commuting Zones is 722 and the metropolitan areas is 135, which are the ones we can merge with the Saiz (2010) data. We calculate decadal changes for the variables in each column (which are defined as 'Wage'$=\Delta \ln w_{ct}$, 'Employment' $= \Delta \ln \frac{E}{L}_{ct}$, 'Rents' $= \Delta \ln rents_{ct}$, , 'Share Rents' $= \Delta$Share renting$_{ct}$, , 'Population' $= \frac{\Delta \text{Pop}_{ct}}{\text{Pop}_{c,t-1}}$). We use 2 decades $\times$ 135 metropolitan = 270 observations in each regression (except when using commuting zones variation that we use 1,444 observations). Robust standard errors are reported. * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level.

What follows is for online publication

A Appendix Theory

Proof of Theorem 1.

From this expression:

$$\ln N = -\frac{\lambda\alpha(w)}{(1+\lambda\alpha(w)+\varepsilon)}\ln(\alpha(w)w) + \frac{(1+\varepsilon)\lambda}{(1+\lambda\alpha(w)+\varepsilon)}\ln w$$

We have that:

$$\frac{\partial \ln N}{\partial \ln w} = -\frac{\alpha'(w)w(1+\varepsilon)}{(1+\alpha(w)+\varepsilon)^2}\ln(\alpha(w)w) - \frac{\alpha(w)}{(1+\alpha(w)+\varepsilon)}\frac{\partial \ln(\alpha(w)w)}{\partial \ln w} - \frac{(1+\varepsilon)\lambda\alpha'(w)w}{(1+\alpha(w)+\varepsilon)^2}\ln w + \frac{(1+\varepsilon)\lambda}{(1+\alpha(w)+\varepsilon)}$$

Which can be expressed as:

$$\frac{\partial \ln N}{\partial \ln w} = -\frac{\alpha'(w)w(1+\varepsilon)}{(1+\alpha(w)+\varepsilon)^2}\ln(\alpha(w)w) - \frac{\alpha(w)}{(1+\alpha(w)+\varepsilon)}\frac{\partial \ln(\alpha(w)w)}{\partial \ln w} - \frac{(1+\varepsilon)\lambda\alpha'(w)w}{(1+\alpha(w)+\varepsilon)^2}\ln w + \frac{(1+\varepsilon)\lambda}{(1+\alpha(w)+\varepsilon)}$$

From this we have that:

$$\frac{\partial \ln N}{\partial \ln w \partial \varepsilon} = -F_1() - F_2()\frac{\partial \ln(\alpha(w)w)}{\partial \ln w} - F_3() + F_4()$$

Where $F_i()$ are positive functions of parameters of the model. Hence, this expression can be either positive or negative.

More intuitively,

$$\ln N = \lambda(\ln w - \alpha(w)\ln p)$$

So:

$$\frac{\partial \ln N}{\partial \ln w} = \underbrace{\lambda}_{\text{Substitution effect}} - \underbrace{\lambda\alpha'(w)}_{\text{Income effect}} \ln p - \lambda\alpha(w) \underbrace{\frac{\partial \ln p}{\partial \ln w}}_{\text{Housing supply elasticity}}$$

Hence, the internal migration response to a local shock depends on 3 factors:

1. The substitution effect, which is always positive

2. The income effect, which is positive and particularly strong in high price locations

3. The housing supply effect, which is negative and particularly strong in high elasticity (and in equilibrium low price) locations

B Appendix Tables

Table A.1: Immigration and labor market outcomes, by skill

Panel A: Wage effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$\Delta \ln w^{nat}_{LS}$	$\Delta \ln w^{nat}_{LS}$	$\Delta \ln w^{nat}_{LS}$	$\Delta \ln w^{nat}_{LS}$	$\Delta \ln w^{nat}_{HS}$	$\Delta \ln w^{nat}_{HS}$	$\Delta \ln w^{nat}_{HS}$	$\Delta \ln w^{nat}_{HS}$
VARIABLES	OLS	OLS	IV	IV	OLS	OLS	IV	IV
$\frac{\Delta \text{Imm}}{\text{Nat}}$	0.0970*	0.0852	-0.0303	-0.0261	0.0830**	0.0765**	-0.0321	-0.0318
	(0.0539)	(0.0556)	(0.0597)	(0.0554)	(0.0349)	(0.0363)	(0.0491)	(0.0479)
$\frac{\Delta \text{Imm}}{\text{Nat}}$ x HS elasticity		0.0732		0.0636		0.0404		0.00394
		(0.0511)		(0.0625)		(0.0349)		(0.0427)
Observations	573	573	573	573	573	573	573	573
R-squared	0.618	0.621			0.581	0.582		
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes	yes	yes
F-stat First Stage			32.05	34.67			32.05	34.67

Panel B: Employment effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$\Delta \ln \frac{E}{L}^{nat}_{LS}$	$\Delta \ln \frac{E}{L}^{nat}_{LS}$	$\Delta \ln \frac{E}{L}^{nat}_{LS}$	$\Delta \ln \frac{E}{L}^{nat}_{LS}$	$\Delta \ln \frac{E}{L}^{nat}_{HS}$	$\Delta \ln \frac{E}{L}^{nat}_{HS}$	$\Delta \ln \frac{E}{L}^{nat}_{HS}$	$\Delta \ln \frac{E}{L}^{nat}_{HS}$
VARIABLES	OLS	OLS	IV	IV	OLS	OLS	IV	IV
$\frac{\Delta \text{Imm}}{\text{Nat}}$	-0.215***	-0.233***	-0.146	-0.133	-0.104***	-0.102***	-0.103***	-0.104***
	(0.0705)	(0.0803)	(0.0952)	(0.0931)	(0.0301)	(0.0310)	(0.0372)	(0.0369)
$\frac{\Delta \text{Imm}}{\text{Nat}}$ x HS elasticity		0.108		0.195**		-0.00935		-0.0169
		(0.0744)		(0.0958)		(0.0545)		(0.0830)
Observations	573	573	573	573	573	573	573	573
R-squared	0.847	0.848			0.947	0.947		
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes	yes	yes
Instrument	No	No	yes	yes	No	No	yes	yes
F-stat First Stage			32.05	34.67			32.05	34.67

Panel C: Internal migration effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$\frac{\Delta \text{Nat}_{LS}}{\text{Nat}}$	$\frac{\Delta \text{Nat}_{LS}}{\text{Nat}}$	$\frac{\Delta \text{Nat}_{LS}}{\text{Nat}}$	$\frac{\Delta \text{Nat}_{LS}}{\text{Nat}}$	$\frac{\Delta \text{Nat}_{HS}}{\text{Nat}}$	$\frac{\Delta \text{Nat}_{HS}}{\text{Nat}}$	$\frac{\Delta \text{Nat}_{HS}}{\text{Nat}}$	$\frac{\Delta \text{Nat}_{HS}}{\text{Nat}}$
VARIABLES	OLS	OLS	IV	IV	OLS	OLS	IV	IV
$\frac{\Delta \text{Imm}}{\text{Nat}}$	0.0780	-0.00928	-0.345***	-0.321***	0.121	0.0255	-0.463***	-0.447***
	(0.0938)	(0.0842)	(0.0938)	(0.0832)	(0.133)	(0.128)	(0.112)	(0.109)
$\frac{\Delta \text{Imm}}{\text{Nat}}$ x HS elasticity		0.541***		0.353***		0.590***		0.246*
		(0.124)		(0.129)		(0.141)		(0.146)
Observations	573	573	573	573	573	573	573	573
R-squared	0.490	0.540			0.545	0.588		
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes	yes	yes	yes
F-stat First Stage			32.05	34.67			32.05	34.67

Notes: Data come from the 1980 to 2000 Censuses and the 2009-2011 ACS. The number of metropolitan areas is 191. 'LS' indicates workers with at most a high school degree, while 'HS' indicates workers with at least some college education. Robust standard errors are reported. * significant at the 0.10 level; ** significant at the 0.05 level; *** significant at the 0.01 level.