

IMMIGRATION AND THE CITY

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Abstract

We study the effect of an immigrant inflow at the neighborhood level on house prices within cities. We develop a spatial equilibrium model that shows how immigration shock to a part of the city propagates to the rest of the city through changes in local amenities and local prices. On the empirical side, we rely on two different empirical strategies. First, we collect data at the neighbourhood level for a sample of main Italian cities and we analyze the impact of immigration on natives' residential choice and house price dynamics. We find that there is a negative relationship between changes in native population and changes in immigrant population across neighbourhoods; we also find some evidence that price growth is lower than the average in those neighbourhoods where immigrants settle. Second, we extend the analysis to all Italian municipalities and we investigate the impact of immigration on indicators of city price distribution. We find that immigration causes an increase in the average price. This effect, however, is driven by the upper two deciles of the price distribution: the effect on immigration on lower prices is never statistically different from zero.

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1 Introduction

Economists have recently begun studying the effect of immigration on house prices. Starting from the seminal work of Albert Saiz [?, ?] empirical analyses have shown that an inflow of immigrants has a positive effect on rental and house prices at the municipal level.

This can be considered a simple consequence of an increase in housing demand in the presence of a positively sloped supply curve. However, the average effect at the municipal level may hinder opposing forces *within* the city boundaries. Indeed, immigrant inflows may reduce the price in the neighborhood where they settle by inducing natives to move in other areas of the city. The resulting average price at the municipal level may still grow, but the effect on house price distribution may be different. Identifying this effect is particularly relevant for its positive and normative implications in terms of both urban segregation and social interactions between natives and foreigners, as well as for the study of real estate market dynamics.

In this paper, we provide both theoretical and empirical preliminary findings on the effect of an inflow of immigrants on native flight and house prices within the city.

To examine the effects of an immigration shock in a spatial equilibrium framework and to guide the empirical investigation, we develop a theoretical model à la Rosen-Roback.¹ The model clarifies how a localized immigrant shock to a neighborhood propagates to the rest of the city through changes in local amenities and local prices.

On the empirical side, we rely on two different empirical strategies. First, we investigate the causal impact of immigration on indicators of city price distribution. To address endogeneity, we adopt an IV strategy which uses historical enclaves of immigrants across municipalities to predict current settlements (Card [?]). We find that a 10 percent shock to the immigrant population increases the spread between maximum and minimum prices by 5.3 percentage point. A quantile analysis shows that the effect of immigration is

¹The models by Rosen [?] and Roback [?] are the most frequently used general equilibrium models to analyze shocks to local economies.

significantly positive only for higher deciles of the price distribution. Thus, we provide evidence that immigrant inflows lead to a relatively slower house price appreciation in poorer neighborhoods. Using this strategy, however, we cannot identify where immigrants settle, and whether there are evidence of native flight from areas affected by migration towards other areas of the city.

In order to do so, we are going to pursue a second empirical strategy. In the future development of the paper, we will focus on a smaller sample of 19 main Italian municipalities for which we are gathering data on immigrant inflows and demographic dynamics at the administrative district level (so called “quartieri”). In this paper, we develop an empirical strategy which allows us to identify the effect of an immigrant inflow at the district level on native mobility and on house prices, taking into consideration the (likely) violation of the Stable Unit-Treatment Value Assumption (SUTVA). In addition, we provide preliminary OLS estimates showing that an inflow of immigrants in a district reduces the number of native population living in it, and reduces the growth rate of prices vis-à-vis other parts of the city.

This research contributes to the literature on urban segregation and on the impact of immigration on house prices. For what regards the former, economists have mostly studied the determinants and consequences of the emergence of ghettos. See, among the others, Cutler et al. [?, ?] Bayer et al. [?, ?] Durlauf [?, ?] Card et al. [?, ?] Cutler et al. [?]. Cutler et al. [?] examine segregation in American cities. They argue that in the past segregation was a product of collective actions taken by whites to exclude blacks from their neighborhoods.

By 1990, legal barriers were replaced by “decentralized racism”: whites pay more than blacks to live in predominantly white areas. Card et al. [?] find that population flows exhibit tipping-like behavior: once the minority share in a neighborhood exceeds a “tipping point”, all whites leave. Bayer et al. [?] analyze segregation patterns in the San Francisco Bay Area and conclude that racial differences in socio-demographic characteristics explain a considerable amount of the observed segregation.

So far, the effect of immigration on house prices have been almost uniquely studied by looking at the average price at the municipal level as the variable of interest. Researches performed in several OECD countries have confirmed that there is a significant and positive effect on the expected price, though the magnitude of this effect may change.² As far as we know, Saiz and Wachter [?]s the only paper that examines the distributional impact of immigration on house prices. They focus on US metropolitan areas and use two census waves to document that housing values have grown relatively more slowly in neighborhoods characterized by immigrant settlements.

Most of the existing literature in both fields concerns the US, whereas evidence for Europe is much more limited. Moreover, almost all of the previous studies have used decennial census data, thus focusing on the long-term dynamics of segregation and house prices. We provide novel evidence of the displacement effect of immigration on natives in the Italian context, and study the effect of immigration on housing in a markedly different setting with respect to the US market. Indeed, Italy is characterized by stickier supply of housing and much less developed capital markets. The pure effect of a demand shock may then be more pronounced. In addition, we identify short/medium-term effects using yearly observations, rather than decennial data.

The rest of the paper is organized as follows. In Section ??, we develop a spatial equilibrium model to inform our empirical exercises. In Section ??, we describe the data and provide some descriptive analysis on urbanization patterns, house price dynamics and their relationship with immigrant settlements. In Section ?? we present evidence of the effect of an immigrant inflow on measures of city price dispersion. In Section ?? we introduce our second empirical exercise based on data at the neighborhood level for a subset of Italian metropolitan areas. Section ?? provides preliminary concluding remarks.

²In the US, Saiz [?]ounds that a raise in immigrant stock that equals 1% of the city population raises prices by 2%. A similar finding is obtained for New Zealand by Stillman and Mare [?] Gonzales and Ortega [?]stimate a 3% effect for Spain, Degen and Fischer [?]ind a effect 2.7% elasticity for Switzerland, De Blasio and D'Ignazio [?]stimate 0.5% effect for Italy. Akbari and Aydede [?]tudy the Canadian real estate market, and they are the only paper that fails to identify any significant effect.

2 Theoretical model

2.1 Assumptions and equilibrium in the housing market

Consider a city composed of 2 neighborhoods, $s \in \{1, 2\}$. Each individual i located in a neighborhood s maximizes her utility function:

$$U_{is} = A_s \frac{C_i^{1-\alpha} L_i^\alpha}{(1-\alpha)^{1-\alpha} \alpha^\alpha} \quad (1)$$

where A_s are the amenities in neighborhood s , C_i and L_i are the amount of, respectively, tradable good and housing consumed by i .

Using the tradable good as the numeraire, and assuming that income does not depend on location within the city, budget constraint is $C_i + r_s L_i = Y_i$, where r_s and Y_i represent, respectively, rents prevailing in area s and individual income.

Standard utility maximization leads to the following marshallian demands:

$$L_i^* = \frac{\alpha Y_i}{r_s} \quad (2)$$

$$C_i^* = (1 - \alpha) Y_i \quad (3)$$

There are two types of workers: natives and immigrants. The total number of natives in the city is N , a share ω of which locates in area 1. Natives are free to move across neighborhoods and their income is equal to Y . We assume that a mass m of immigrants locate in the city and concentrate in area 2. Immigrant income is equal to γY , with

$$\gamma \in (0, 1].$$

Aggregate housing demand for each area is therefore:

$$L_1^d = \omega N \frac{\alpha Y}{r_1} \quad (4)$$

$$L_2^d = [(1 - \omega) N + \gamma m] \frac{\alpha Y}{r_2} \quad (5)$$

Neighborhood s housing supply is assumed to be equal to:

$$L_s^o = \beta_s r_s \quad (6)$$

where β_s is the price elasticity of housing services. β_s is allowed to be different across locations, since neighborhoods may be characterized by different space constraints. Indeed, housing supply in a historical city center (e.g., Rome or Venice) is much more constrained than the one in sprawled peripheries.

Equilibrium prices are determined by the equations (??), (??), and (??):

$$r_1^* = \left(\omega N \frac{\alpha Y}{\beta_1} \right)^{\frac{1}{2}} \quad (7)$$

$$r_2^* = \left\{ [(1 - \omega) N + \gamma m] \frac{\alpha Y}{\beta_2} \right\}^{\frac{1}{2}} \quad (8)$$

2.2 Where do natives locate?

Natives are free to move across locations. This implies that in equilibrium the utility levels equalize across locations.

Given Cobb-Douglas preferences, indirect utilities are determined by the product between real wages and amenities. We now assume that natives' appreciation of local amenities is influenced by migration. On one hand, natives might be concerned by a deterioration of local standards of living due to an increase in crime or a crowding effect of local indivisible public goods (e.g., parks, libraries, transports). On the other hand, natives perception of local amenities in response to migration can increase due to cultural diversity and a rise in the variety of local public goods (e.g., ethnic restaurants).

We assume that amenities in neighborhood 1, unaffected by migration, are fixed and equal to A , while amenities in area 2 are a function of migration, $A(m)$, whose derivative depends on the balance between the above described forces.

The equalization between indirect utilities leads to the following equilibrium condition:

$$\frac{A}{\left(\frac{\omega N}{\beta_1}\right)^{\frac{\alpha}{2}}} = \frac{A(m)}{\left[\frac{(1-\omega)N + \gamma m}{\beta_2}\right]^{\frac{\alpha}{2}}} \quad (9)$$

Equilibrium area 1 share of natives is therefore:

$$\omega^* = \frac{N + \gamma m}{N} \phi(m) \quad (10)$$

where $\phi(m) = \frac{\frac{A \frac{\alpha}{2}}{\beta_2}}{\frac{A \frac{\alpha}{2}}{\beta_2} + \frac{A(m) \frac{\alpha}{2}}{\beta_1}} \in (0, 1)$ represents the amenities effect of migration on population location.

The term $\frac{N + \gamma m}{N}$ can be interpreted, instead, as an income effect: the crowding out of natives due to the increased demand of housing services by immigrants.

The native flight phenomenon (i.e., the relocation of native population to other neighborhoods due to immigration) can be computed as:

$$\frac{\partial \omega^*}{\partial m} = \frac{\gamma}{N} \phi(m) + \frac{N + \gamma m}{N} \phi'(m) \quad (11)$$

The first term on the right-hand side represents the change in the income effect, that is always positive. Note that the larger the immigrants' income the stronger this effect and, thus, the native flight. The second term is the amenities effect, which is positive whenever migration decreases perceived amenities in the area (i.e., if $\partial A(m)/\partial m < 0$). In other words, the price effect is emphasized (attenuated) by the amenities effect whenever immigrants decrease (increase) local amenities in area 2.

2.3 Migration and rents: local and average effects

It is now easy to assess the effect of migration on local rents. By deriving the log of (??)

and (??) by m , we obtain:

$$\frac{\partial r_1^*}{\partial m} = \frac{1}{2} \left[\frac{\gamma}{N + \gamma m} + \frac{\phi'(m)}{\phi(m)} \right] \quad (12)$$

$$\frac{\partial r_2^*}{\partial m} = \frac{1}{2} \left[\frac{\gamma}{N + \gamma m} + \frac{\phi'(m)}{1 - \phi(m)} \right] \quad (13)$$

Note that the income effect is the same in both areas, since the propagation of the migration shock from area 2 to area 1 is immediate due to the free mobility of natives. Income effect in area 1 is attenuated (emphasized) if migration increase (reduce) amenities in area 2. In other words, whenever migration generates a reduction in neighborhood 2 amenities, native workers decide to migrate and pay higher rents in area 1 to “escape” foreigners. The effect on area 2 is just the opposite. Whenever immigrants deteriorate local amenities housing costs in the area hit by migration grow less than the other areas of the city due to the native flight effect (i.e., larger residential migration from area 2 to area 1). It is now possible to compute the city-level average rents and assess the effects of an inflow of immigrants. By using (??), (??), and (??), city-level rents are equal to:

$$r^* = 2 \left[\frac{(N + \gamma m)\alpha Y}{\phi(m)\beta_1 + [1 - \phi(m)]\beta_2} \right]^{\frac{1}{2}} \quad (14)$$

By taking logs and deriving by m , we obtain the average rent elasticity to migration

(whose empirical counterpart has been estimated for the US by Saiz [?]):

$$\frac{\partial r^*}{\partial m} = \frac{1}{2} \left[\frac{\gamma}{N + \gamma m} + \frac{(\beta_2 - \beta_1)\phi'(m)}{\phi(m)\beta_1 + [1 - \phi(m)]\beta_2} \right] \quad (15)$$

As before, the first term in braces is the income effect on rents. However, at city level the spatial distribution of immigrants matters. In particular, the expression $(\beta_2 - \beta_1)\phi'$ signals

that the effects on amenities and the elasticity of housing supply play an important role. First, note that whenever housing supply is the same across neighborhoods, the second term in braces cancels out. This implies that amenities have an effect on average prices only if neighborhoods are characterized by different supply elasticities.

We can then distinguish four cases:

- i. $\beta_2 > \beta_1$ and $\phi'(m) > 0$. In this case immigrants reduce amenities and area 2 is characterized by a larger elasticity in the housing supply (i.e., immigrants settle in the periphery). In this case, natives leave area 2 and move to the area characterized by a more rigid supply curve, thus increasing local and average prices.
- ii. $\beta_2 < \beta_1$ and $\phi'(m) > 0$. In this case immigrants reduce amenities and area 2 is characterized by a smaller elasticity in the housing supply (i.e., immigrants settle in the historical city centers). In this case, natives leave area 2 and move to the area characterized by a less rigid supply curve, thus attenuating the income effect.
- iii. $\beta_2 > \beta_1$ and $\phi'(m) < 0$. In this case immigrants increase amenities and area 2 is characterized by a larger elasticity of the housing supply (periphery). Natives leave area 1 and move to an area characterized by a less rigid supply curve, attenuating the income effect.
- iv. $\beta_2 < \beta_1$ and $\phi'(m) < 0$. Immigrants increase amenities and area 2 has a smaller elasticity of housing supply (city center). Native-flight from area 1, then emphasizes the income effect.

3 Data and descriptive analysis

Data on house prices are obtained from the Italian Land Registry Office (“Agenzia del Territorio” - AdT). The AdT has divided each Italian municipality into microzones (neighborhoods that are homogeneous in socioeconomic terms). For each microzone, AdT

collects information on house prices by type of house (villas and cottages, mansions, economic houses, typical houses), and the state of the building (poor, normal, excellent).

We focus on economic houses (the most widespread housing typology) in a normal state (because of the very limited number of observations available for poor or excellent houses).

Because most municipalities are composed of very few microzones, in order to obtain stronger measures of variability we aggregate observations at the local labor system level. There are 640 local labor systems for which we have information on house prices from 2003 to 2009.³

Figure ?? reports trends in several price indicators, averaged at the local labor system level, over the period 2003-2009. The left figure shows that the average house price has increased sharply in the last seven years, with the notable exception of 2009: in that year the crisis has lowered the average house price back to its 2007 level. At the same time, the ratio between the maximum and the minimum price within the city (middle figure) has lowered markedly. Finally, the coefficient of variation of prices (measured at the municipal level) reported a similar downward trend, which somehow reverts in 2009.

Data on immigrants and natives at the local labor system level is provided by the Italian National Statistical Office. Note that here we consider solely official immigrants.⁴

We now provide some descriptive results for the phenomena we are studying. Figure ?? shows the correlation between the change in immigrant population at the municipal level and the corresponding change in native population. The linear fit shows that there is a slightly positive correlation between the two variables. The regression coefficient, however, is rather small (0.004) and not significant at any conventional level.

A simple descriptive analysis confirms that immigration dynamics are strongly correlated

³The average municipal population in Italy is 7,690 inhabitants. Aggregating observations at the local labor system level yields an average size of 84,305 inhabitants per zone: a dimension more similar to standard U.S. metropolitan areas.

⁴Note, however, that the presence of unofficial immigrants would not bias our empirical estimate if they are proportional to official immigrants and the constant of proportionality is the result of a municipality-per-year fixed effect (for which we are able to control) and a stochastic term. See Bianchi et al. [?] or a discussion and some empirical evidence on this issue.

with house prices. Indeed, Figure ?? shows immigration has grown more in municipalities where beginning-of-the-period price was lower. On the other side, however, the municipalities in which immigration has grown more have been characterized by a stronger increase in house prices over the 2003-2009 period (Figure ??). Finally, immigration is only weakly correlated with a decrease in the coefficient of variation of prices within the local labor system (Figure ??).

All these correlations, however, are likely to be largely spurious, due to the presence of omitted variables (e.g., the business cycle) affecting both immigration and house prices, as well as because of reverse causality (immigrants may be pulled by housing opportunities). To deal with both issues, in the next Section we develop an instrumental variable approach.

4 The effect of immigration on house price distribution

We start estimating the following model for the price indicator PI_{it} measured in local labor system i and year t :

$$PI_{it} = \alpha + \beta M_{it} + \lambda_t + a_i + \varepsilon_{it} \tag{16}$$

where M_{it} is the log of the number of immigrants, λ_t is a year fixed-effect, and a_i is a local labor system fixed effect.

Table ?? reports results from the OLS estimate of ?. The first column shows that an increase in 1% in the stock of immigrants raises the mean price by around 0.13%. This positive mean effect has been identified by the preceding literature in most OECD countries, including Italy (De Blasio and D'Ignazio [?]). As the subsequent columns show, however, this effect is not uniform over the price distribution. The effect is somehow more pronounced for the maximum price (which increases by 0.137% for a 1% raise in immigrant

stock) than for the minimum price (which increases by 0.12%). The difference between the maximum and minimum prices, then, increases significantly. The increase in the coefficient of variance related to an increase in the immigrant stock, however, fails to be significantly different from zero at any conventional level.

The OLS results, however, may suffer from the afore-mentioned endogeneity and reverse causality issues. To address these problems, we use an IV strategy that exploits historical enclaves and current total aggregate stocks in Italy to predict current stocks of immigrants at the municipal level. Following Card [?, ?] for each municipality i the expected value of

M_t is given by:

$$\hat{M}_{it} = \beta_0 + \beta_1 \sum_n Sh_{i,1991}^n \times M_t^n + \lambda_t + LLM_i \quad (17)$$

where $Sh_{i,1991}^n$ is the share of immigrants of nationality n that was in municipality i in 1991, and M_t^n is the total stock of immigrants from origin country n present in Italy in year t .⁵

Results, reported in Table ??, are somehow in line with the OLS estimates: an inflow of immigrants increases both the maximum and the average prices. The point estimate for the minimum price, however, is smaller and fails to be statistically different from zero. To assess the impact on the overall price distribution, we calculate the effect for each quartile of the price distribution. The estimated coefficients, together with those of minimum and maximum prices, are plotted in Figure ?. As it can be seen the effect is significantly different from zero only for the upper deciles (from the eight onward) of the price distribution.

Assume rank-invariance (Chernozoukov and Hansen [?]⁶), then these findings show that immigrant inflows lead to a relatively slower housing price appreciation in poorer neighborhoods, thus widening the price distribution of wealth within the city.

⁵Due to data availability, we have to aggregate nationalities by geographical areas of origin: Western Europe, Eastern Europe, North Africa, other countries from Africa, Asia, North America, South America, and Oceania.

⁶That is, that the inflow of immigrants does not changes the ranking between quantiles of the price distribution.

Based on these results, however, it is not possible to discriminate between the four different cases highlighted by the theoretical model in Section ???. Indeed, a stronger increase in the right part of the price distribution may be obtained if:

- migrants settle in poor neighborhoods, but natives fly to richer ones;
- migrants settle in rich neighborhoods, and natives do not fly away;
- migrants settle uniformly over the municipality, but price elasticity of richer areas is lower.

To obtain clearer results, we need to directly identify an immigrant inflow localized within the city boundaries, and study its effect on both the neighborhood affected by it and the nearby areas.

5 Immigration and price dynamics at the neighborhood level

We are collecting data from 19 of the main Italian metropolitan areas.⁷ For each administrative district of each metropolitan area, we obtain yearly data on immigrant residents by nationality in the period 2002-2009. We use AdT data for house prices, and georeference them in order to impute a yearly average house price for each administrative district. Figure ?? shows, as an example, the resulting map of Rome. In each different district (identified in the figure by a specific color) we compute the house price as the simple average between prices measured in each AdT microzone.⁸

⁷The cities included in the sample are Bergamo, Bologna, Brescia, Cagliari, Genoa, Florence, Lecce, Modena, Milan, Naples, Padua, Perugia, Prato, Reggio Emilia, Rome, Turin, Udine, Venice, Verona.

⁸As a robustness check, we may compute the weighted average, with weights proportional to the area of each microzone. Notice, however, that the eventual measurement error obtained by using a simple average would ultimately bias our result toward zero.

5.1 Empirical strategy

For each district $d \in [1, \dots, D]$, belonging to municipality $c \in [1, \dots, C]$ in year $t \in [1, \dots, T]$, we postulate the existence of a set of potential house prices $P_{dct}(M)$, each of them characterised by a different value of the treatment $M \in [M_0, \dots, M_1]$. The treatment we are interested in is the stock of immigrants in the district: thus, $M_0 = 0$ and $M_1 \rightarrow \infty$.

We want to estimate the effect of a percentage change in the number of immigrants on house prices *relative to the city average*. We allow for both a district-level unobserved heterogeneity and a city-year fixed effects. The resulting model is the following:

$$\log P_{dct} = FE_{dct} + \delta \log M_{dct} + \epsilon_{dct} \quad (18)$$

where $FE_{dct} = NEIGHBOURHOOD_{dc} + (CITY_c \times YEAR_t)$ is the district and the city-year fixed effects. The parameter $\delta = E[E(\log P_{dct} - FE_{dct} | M)]$ is the average treatment effect.⁹ Both identification and inference using this simple model face several important challenges. They include:

- i. endogeneity: identification relies on the assumption that $M_{dct} \perp \epsilon_{dct} | FE_{dct}$. This is unlikely to hold, because there may be time-varying unobserved factors that affect both immigrant inflows and house price;
- ii. reverse causality: immigrants can be pulled or pushed by house price dynamics;
- iii. externalities: identification requires that the stable unit treatment value assumption (SUTVA) holds.¹⁰ This may be violated if inflows in a certain district affect the outcome in other districts. Although violation of the SUTVA represents a specific type of endogeneity, it is worthwhile to consider it separately. In addition, it has obvious

⁹Notice that in principle, if we have enough observations, we can even estimate the average dose-response function (Hirano and Imbens (2004)) $\mu(M) = E(\log P_{dct} - FE_{dct} | M)$.

¹⁰SUTVA can be stated as follows: ‘*The potential outcomes for any unit do not vary with the treatments assigned to any other units, and there are no different forms or versions of each treatment*’ (Imbens and Rubin [?]). Here we deal with the first part of it, and we simply assume that the treatment has only one form. In general, however, migrant flows can vary in their composition..

implications for robust inference because it results in intra-municipal correlation in the error terms;

- iv. other inference issues: they include possible heteroskedasticity of the error term and its potential serial correlation within district, cities, and time periods.

5.1.1 Instruments

An instrumental variable approach can deal with issues of endogeneity and reverse causality. Consider the intra-municipal application of (??):

$$\hat{M}_{dct} = F E_{dct} + \beta Z_{dct} \quad (19)$$

where $Z_{dct} = \sum_n Sh_{dc,1991}^n \times M_t^n$ is the instrument, generated by the sum of the interactions between the share of immigrants of nationality n that settled in district d in 1991 and the inflow of immigrants from country n to Italy in year t .¹¹

The exclusion restriction is based on two assumptions:

- IV1:** the exogeneity of stocks in 1991 with respect to present trends in house prices;
- IV2:** there exist no unobserved effect affecting both total immigrant inflows in Italy and changes in the intra-municipal distribution of prices.

Assumption [IV2] can be discussed more thoroughly. In principle, macroeconomic factors (such as the business cycle) may affect immigrant inflows and house price distribution. This is particularly so if trade and remittances from Italy represent a significant part of the national GDP. To partially control for this possibility, we may use flows directed to Western European countries other than Italy (Bianchi et al. [?], or consider an indicator of origin country instability instead of migrant flows (Nellas and Olivieri [?]).

If we are willing to accept both [IV1] and [IV2], then, estimating (??) using $E(M_{dct}|Z_{dct})$

¹¹Data on immigrant stocks in 1991 by areas of origin in each district have been computed from the 1991 census-tract data.

instead of M_{dct} would result in a consistent estimate of δ .

However, the externality problem is still present. Let us consider it in detail. First, the value of the instrument in district i may affect the treatment level in district j : being historically *near* to an immigrant enclave may be as much important for attracting new immigrants as being the enclave itself. Second, the treatment level in district i may affect the outcome variable in district j : being *near* to a district in which there is a large inflow may indeed affect house prices.

Dealing with rejection of the SUTVA is possible, to the extent that we identify and model the mechanism that generates interdependences between observations (Imbens and Rubin 2006). In our case, the driving force seems to be their geographical distance. Then, a straightforward way to obtain consistent estimate of δ is to control for the (exogenous) treatment level of nearby areas. There are several ways in which this is possible. Here we advocate the following model that puts a very light structure to the data and is similar to the approach of Miguel and Kremer (2004):

$$\log P_{dct} = NEIGHBORHOOD_{d,c} + (CITY_c \times YEAR_t) + \delta M_{dct} + \sum_{d=1}^D \gamma_d \tilde{M}_{ndct} + \epsilon_{nct} \quad (20)$$

where M_{ndct} is the (log) of immigrants in the area d kilometers away from the district i 's border. In order to instrument for both M_{ndct} and the vector of \tilde{M}_{ndct} 's, we consider two possibilities:

SUTVA1: estimate $Z_{nct} = M_{nc,1991} * I_t$ for each district n , and then compute \hat{M}_{ndct} by manually averaging the predicted immigrant stocks among areas that are d kilometers away from the district i 's border. This is the suggestion made by Card;

SUTVA2: instrument \tilde{M}_{ndct} with $\tilde{Z}_{ndc,1991} = M_{ndc,1991} * I_t$, that is with the average migrant stock in an area d kilometers away from district i 's border.

Notice that strategy SUTVA1 relies on the assumption that rejection of the SUTVA is present only at time t . SUTVA2, instead, makes our identification robust even to the

possibility that 1991 stock in district i affects flows today in district j .

5.1.2 Inference

To perform inference on the results we should rely on heteroskedasticity-robust and cluster-robust standard errors. The cluster dimensions should in principle be two: city and time.¹² Notice, however, that two-way cluster-robust standard errors can be computed only if the number of clusters get to infinity (Thompson 2009). This represents a case in favor of the enlargement of the dataset, given that non-clustered standard errors may be biased downwardly in the presence of positive serial correlation over time or space (Bertrand et al. 2004), thus potentially inducing a type I error.

5.2 Preliminary OLS results

In this section, we provide some preliminary results for a set of 8 municipalities (Bologna, Florence, Genoa, Milan, Naples, Rome, Trieste, and Turin).

We start estimating the relationship between native and immigrant population growth at the neighborhood level. Formally, we run the following regression:

$$N_{dct} = \alpha + \beta M_{dct} + YEAR_t + NEIGHBORHOOD_{dc} + \nu_{dct} \quad (21)$$

The key explanatory variable is M , that is the log of immigrants in neighborhood d of city c in year t . We also include year dummies to take out the effects of economy wide conditions on population dynamics, and neighbourhood fixed effects to control for any time-invariant omitted variable at that level of analysis. In Table ??, we show that there is a negative relationship between immigration and native population growth. The coefficient is significant at the conventional levels. According to our estimates, the doubling of immigrant population in one neighbourhood leads to a 5 percent decrease in native population.

¹²The district cluster is nested into the city one.

As far as house price dynamics are concerned, we perform the OLS estimate of (??). Results reported in Table ?? show that a 10% increase in immigrant stock relative to the city average is correlated with a house price growth that is 0.8% lower with respect to the city average. This effect is however not statistically different from zero.

6 Conclusions

In this paper we have summarized some preliminary findings obtained so far in the study of the impact of immigration on house price distribution within Italian metropolitan areas. First, we have estimated the effect of an exogenous increase in the immigrant population on several indicators of house price distribution. We found a positive effect of immigration on the mean price, which can be mostly ascribed to the raise in the upper two deciles of the price distribution. Second, vary preliminary results from a unique dataset on residential population at the neighborhood level show that an inflow of immigrants is correlated with a within-city reallocation of natives towards areas less affected by immigrant inflows. All these findings can be (at least in part) explained by the movement of natives from the neighbourhoods affected by the immigrant inflow toward other areas of the same city. This phenomenon is consistent with the huge evidence of residential segregation of immigrants in poorer and less wealthy areas. Although highly preliminary, our results point to a direct causal effect of immigration on segregation, net of any reverse causality or endogeneity issue.

What remains unclear is what drives this effect. We can consider three different causes for it through which immigrants negatively impact on what we name local amenities in our model. First, native outflow may be driven by preference for “ethnic segregation”: natives display a *ceteris paribus* preference for living in an ethnically similar neighbourhood. Second, natives may have preferences for “socio-economic segregation”: they prefer to live near individuals of same (or higher) status. Third, immigration may have a detrimental effect on the quality of real estate. This may happen for two reasons: on the one hand,

immigrants may have less incentive to invest on the house they live in, maybe because they are likely to remain there for shorter periods with respect to natives; on the other hand, there may be a lower incentive for the municipal administration to invest in areas where the share of immigrants increase, since in Italy (as in several other countries), non-EU immigrants are deprived of political rights and, thus, have less voice in the local political agenda. We may call this possible channel “political segregation”. Although a precise identification of each channel may be very difficult, it would be extremely important for policy implications. While the presence of socio-economic discrimination may be reduced by policies aimed at improving the economic integration of immigrants, ethnic discrimination may be harder to counter. Political discrimination, in turn, may be reduced by improving the political rights of immigrant residents. Future research to disentangle these different channels is needed.

7 Tables and Figures

Table 1: OLS estimate of the effect of an immigrant inflow on house prices

	Log Mean Price	Log Max Price	Log Min Price	Log (Max-Min) Price	Coeff. of Var.
Log-Immigrants	0.129 (0.025)***	0.130 (0.028)***	0.124 (0.026)***	0.175 (0.063)***	0.071 (0.050)
Year Effects	Y	Y	Y	Y	Y
Unobs. Heterogeneity	Y	Y	Y	Y	Y
Overall R-sq.	0.310	0.410	0.155	0.129	0.067
No. of Obs.	4358	4358	4358	4358	4358
No. of FE	672	672	672	672	672

Notes: heteroskedasticity-robust standard errors clustered at the LLM level in parentheses.

Table 2: IV estimate of the effect of an immigrant inflow on house prices

	Log Mean Price	Log Max Price	Log Min Price	Log (Max-Min) Price	Coeff. of Var.
Log-Immigrants	0.272 (0.124)**	0.303 (0.128)**	0.218 (0.159)	0.531 (0.315)*	-0.036 (0.054)
Year Effects	Y	Y	Y	Y	Y
Unobs. Heterogeneity	Y	Y	Y	Y	Y
Adj. R-sq.	0.475	0.483	0.283	-0.322	-0.181
No. of Obs.	4457	4457	4454	4457	4362
No. of FE	670	670	670	670	670
F-test of excl.instr.	53.08	53.08	53.08	53.08	53.08

Notes: heteroskedasticity-robust standard errors clustered at the LLM level in parentheses.

Table 3: OLS estimate of the effect of an immigrant inflow on native population at the neighborhood level

Log-Immigrants	-0.025 (0.004)***	-0.024 (0.004)***	-0.020 (0.004)***	-0.020 (0.004)***
Year Effects	N	Y	Y	Y
City Effects	N	N	Y	Y
Neighborhood Effects	N	N	N	Y
R-sq.	0.04	0.06	0.18	0.34
No. of Obs.	833	833	833	833

Notes: heteroskedasticity-robust standard errors clustered in parentheses.

Table 4: OLS estimate of the effect of an immigrant inflow on house prices at the neighborhood level

Log-Immigrants	-0.077 (0.051)
City x Year Effects	Y
Neighborhood Effects	Y
R-sq.	0.92
No. of Obs.	553

Notes: heteroskedasticity-robust standard errors clustered in parentheses.

Figure 1: Trends in Various House Price Indicators - 2003-2009

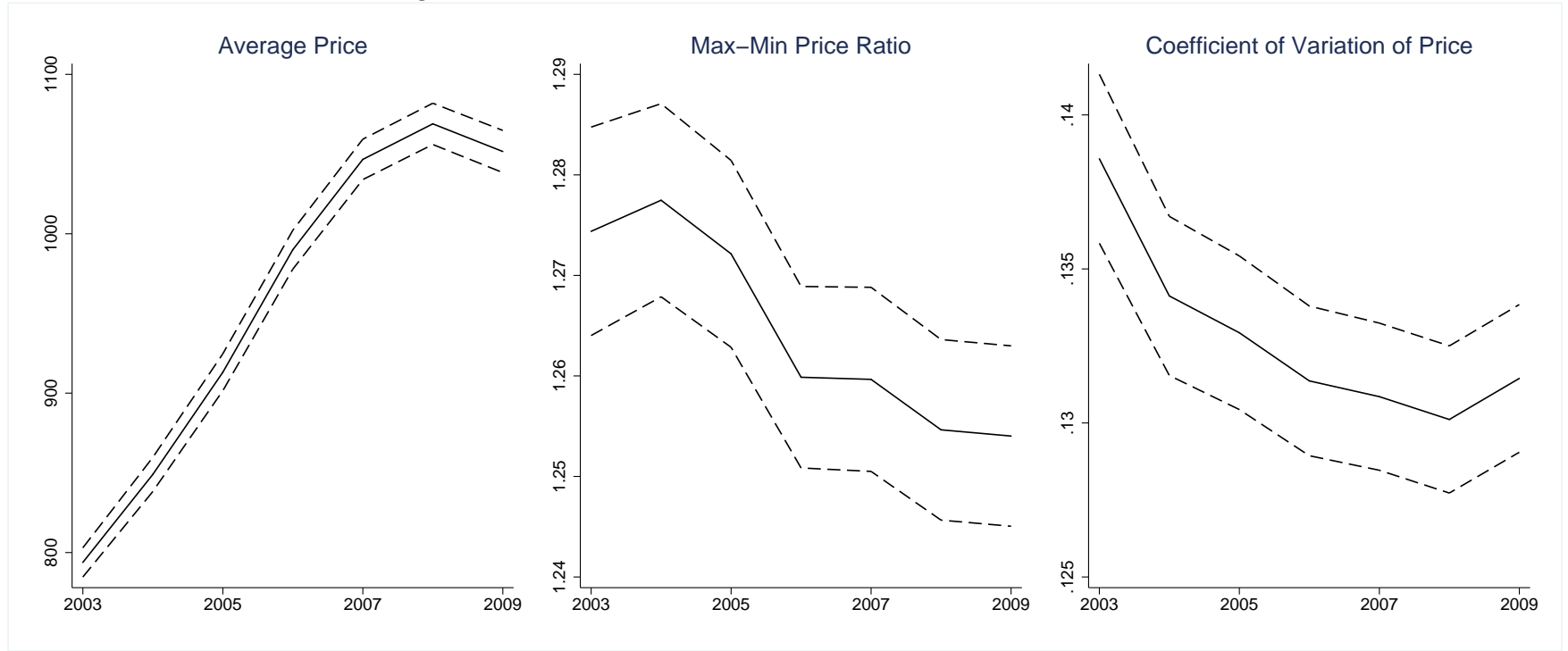


Figure 2: Correlation between changes in immigrant and native population - 2003-2009

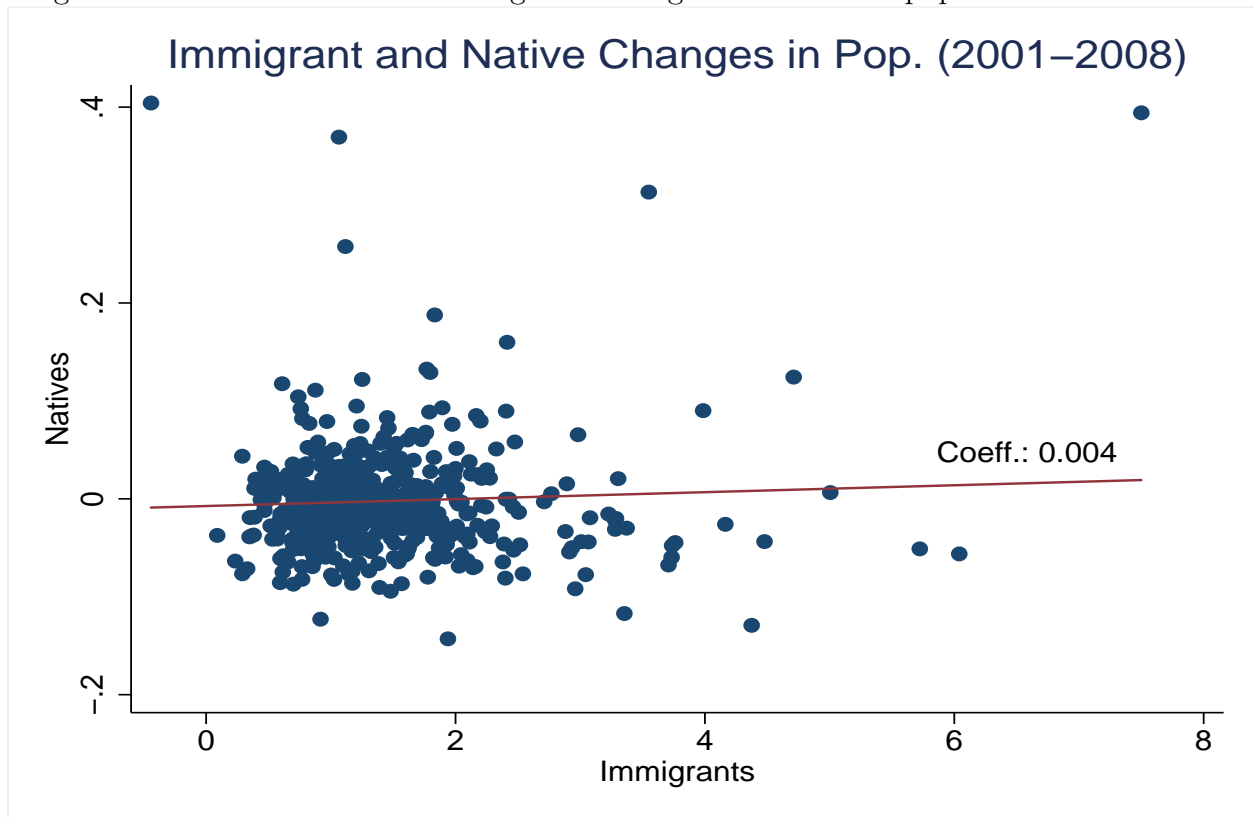


Figure 3: Correlation between changes in immigrant population (2003-2009) and house prices in 2003

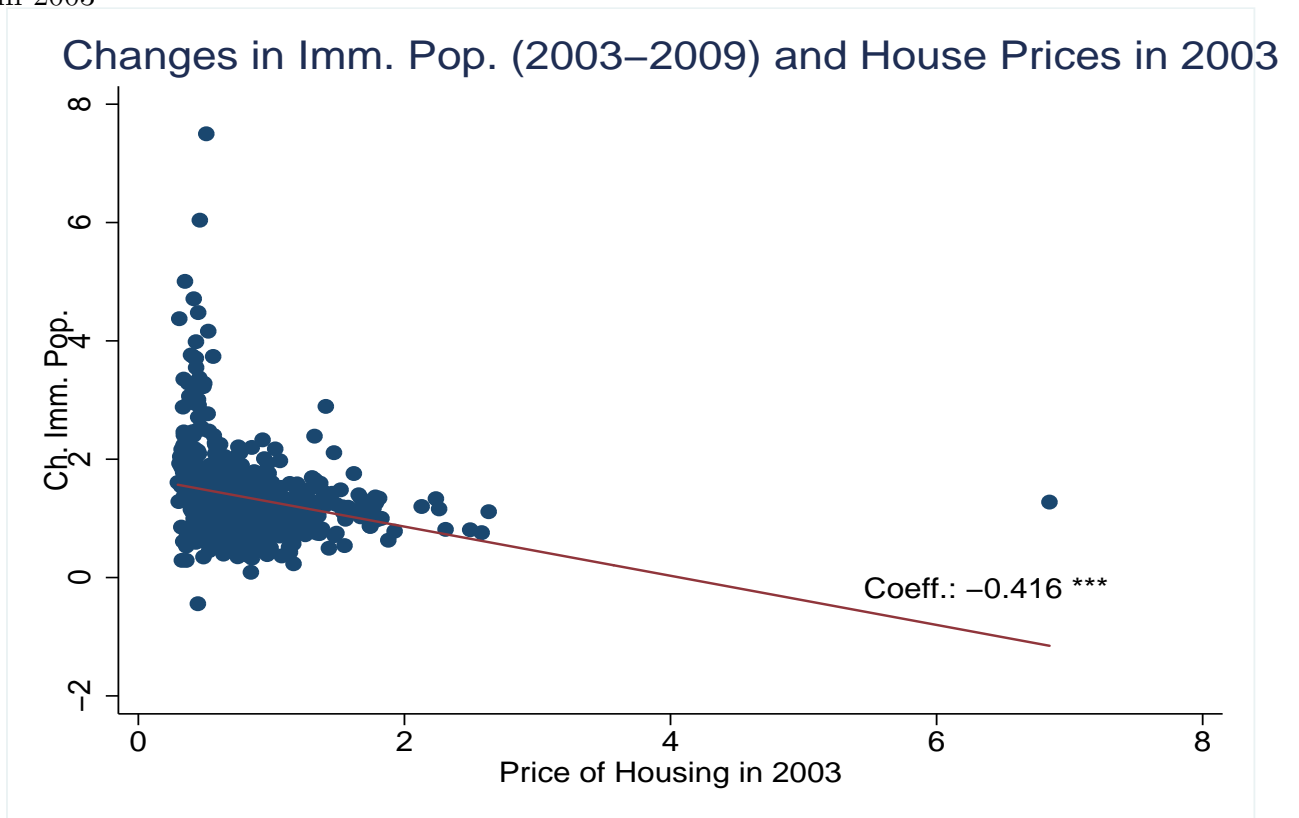


Figure 4: Correlation between changes in immigrant population and changes in house prices (2003-2009)

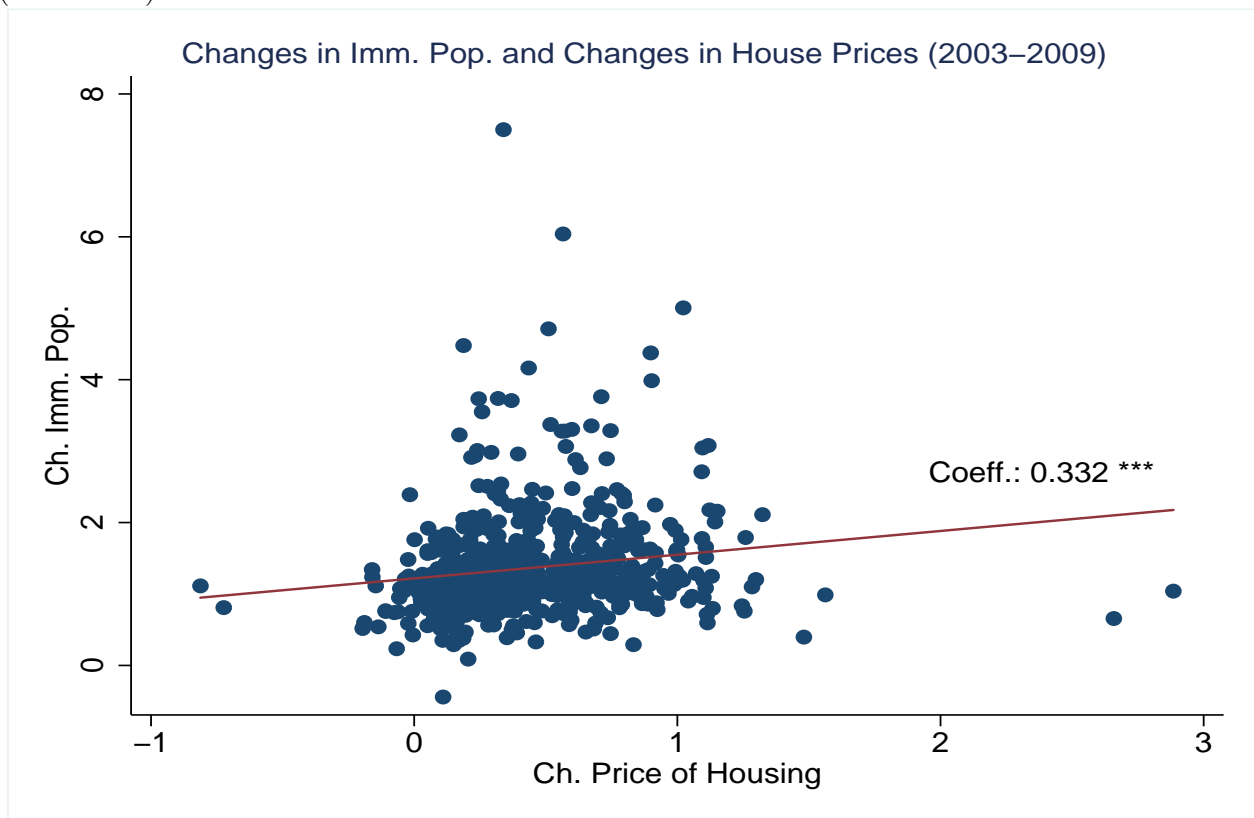


Figure 5: Correlation between changes in immigrant population and changes in the coefficient of variation of house prices (2003-2009)

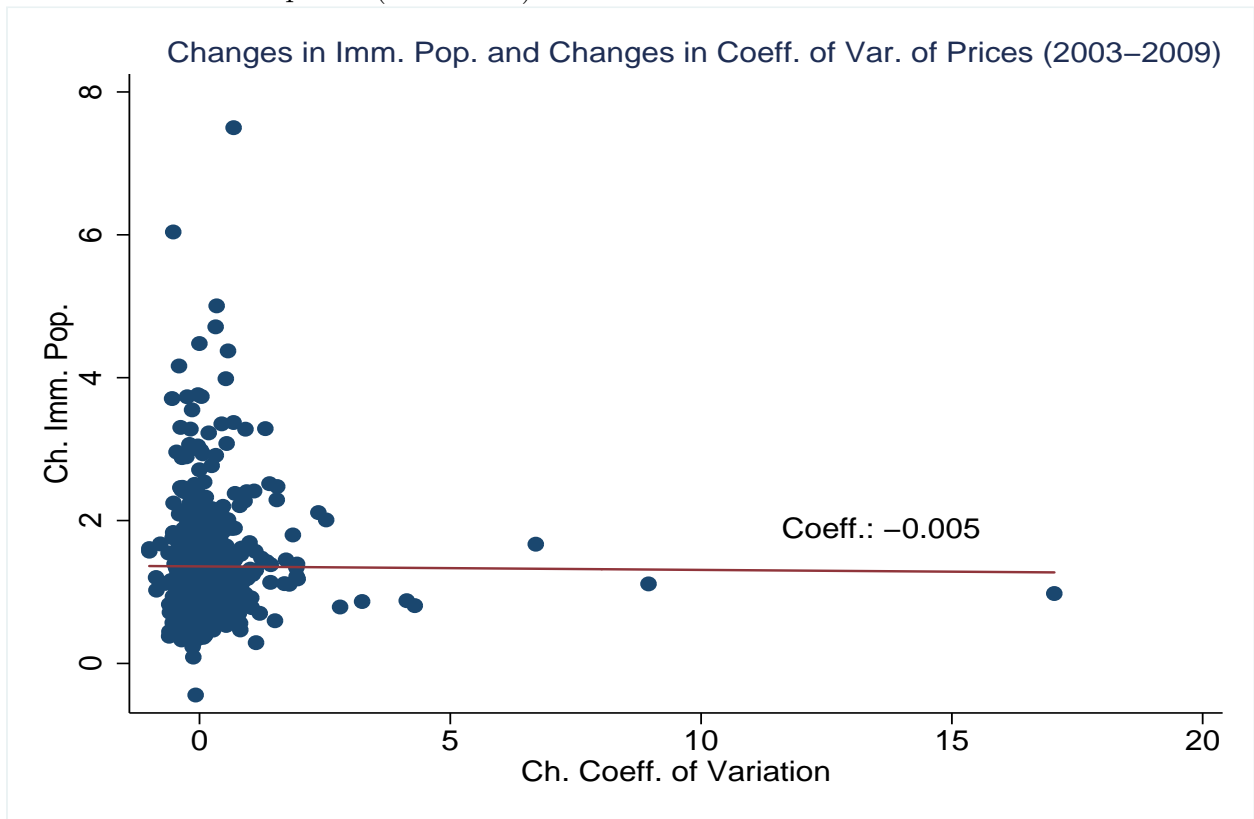


Figure 6: Estimates of the quantile treatment effect - IV estimates

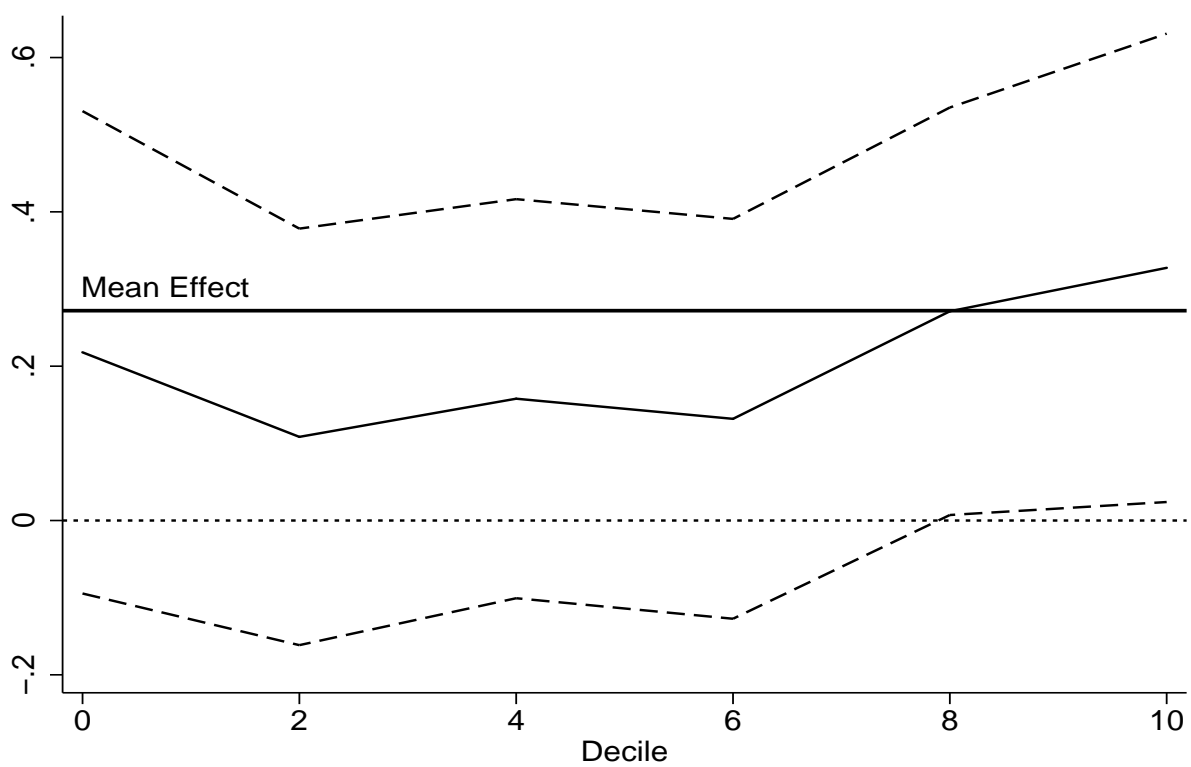


Figure 7: Map of Rome - administrative districts (colors) and AdT microzones (lines)

