Multigroup Segregation Patterns and Determinants: the Case of Immigrants in an Italian City*

(*PER SESSIONE GIOVANI ECONOMISTI*)

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Abstract

We describe segregation curves and indices measuring a-spatial residential segregation of immigrants in a single city framework. We define a common structure of information lying behind these instruments that can be summarized by a local concentration statistic. Using data on the municipality of Verona (Italy) we apply our measures to verify the behavior of immigrants and by comparing 2000 and 2005 immigrant population distributions over the city, we obtain a meaningful division of urban space. We also test on Verona census micro-data (2001) an econometric model (for different immigrant groups) that describes, through a linear relation, the mean variability of the local concentration statistic as a function of attributes specific to household, housing and urban area, within a spatial stratification framework. We find evidence on family - rather than single attribute - stereotyping, as well as the key role played by ownership polarization in an immigration attractive urban environment such as this.

Keywords: Segregation Measures, Local Sorting, Immigrants Segregation.

JEL codes: J15, R23, I31.

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1 Introduction

Residential segregation is a particular *pattern of spatial distribution* of *social groups* in a *geographical environment*. The extent of segregation can be measured in different ways, accounting for a-spatial or spatial dimensions, as pointed out by Massey and Denton (1988) and Reardon and O'Sullivan (2004). A-spatial dimensions capture, for instance, the evenness in distribution of groups in an urban area, or the probability of interaction between members of different social groups. Spatial analysis also takes into account the distance between locations. In this paper we analyze segregation patterns of different groups of immigrants in exogenously partitioned sub-areas of Verona urban space, using a-spatial measures. In the Verona municipality, immigrant urban segregation is a new, emerging phenomenon. In recent years the immigration flow has been sustained: from 2000 to 2007 the share of immigrants doubled and currently represents more than 10% of the resident population in Verona, compared to a share of nearly 5% at national level. A projection by the local office for immigration studies, CESTIM (Center for Studies on Immigration), reveals that the share will rise to 20% of the total urban population before the year 2020. This feature allows us to treat Verona as a natural experimental field for studying immigrant location choices and segregation patterns.

Race-based and immigrant residential segregation in the US have been investigated since the 50's in sociological literature, which identifies segregation as a cause of persisting racial inequality. Charles (2003) summarized two main classes of models that can be used to explain residential segregation among immigration groups, focusing on the assimilation process and the stratification phenomenon. The *Spatial Assimilation Models* posit that cultural, linguistic and social differences between immigrants and natives can be good predictors of segregation outcomes observed at the citywide level. The closer is the ability of immigrants to speak the local language and integrate in the labor market, the higher the probability to share the same urban space with the native community. Cultural differences also matter for informal insurance models, which consider segregation as the result of immigrants' cost-minimizing behavior (where costs are mainly related to specific ethnic goods or access to host country-specific information on housing and job opportunities).

Following the definition by Cutler, Glaeser and Vigdor (2008), the *Space Stratification models* analyze the effect of *centralized* or *decentralized* discrimination. The former is the consequence of individual and institutional-level actions explicitly hindering immigrants' freedom in location choice (screening of new people entering in a neighborhood by neighbors or racial laws neglecting equality in access to certain locations). The latter relates to free individual behavior in social and market interactions. For instance, natives may pay a premium to move away from a neighborhood where they observe increasing concentration of individuals belonging to different immigrant groups.[1] Two main channels drive segregation in this framework. The first channel arises from *ethnocentrism* and *stereotyping* biases on individual preferences over neighborhood social composition. Natives observe the average characteristics of groups and consequently react to the presence of immigrants in their own neighborhood according to beliefs on *group* standards. The game based on strategic interaction between rational agents may predict segregation as a stable equilibrium outcome even assuming a mild preference toward a cultural, race or ethnic melting pot (Schelling 1969 and 1971, Pancs and Vriend, 2007). If families decide to move out from a neighborhood when the presence of an immigrant group exceeds their tolerance threshold, this mechanism may induce strong segregation even under very "tolerant" preferences. The second channel driving segregation is the housing market, which - together with income and wealth heterogeneity of different immigrant groups- affects immigrant location choices. In fact, the two channels often overlap empirically. Housing prices may incorporate a premium that natives are willing to pay to prevent an excessive immigrant presence in own neighborhood or some particular dynamics that attract immigrants flows within city spatial units (Saiz and Wachter, 2006).[2]

Our main methodological contribution consists in providing a unified measurement and inference framework for assessing urban segregation patterns. We focus on a local concentration index (measuring for each urban area the relative concentration of an immigration group with respect to the remaining population) in order to capture relevant information underling segregation curves and a-spatial indices. We estimate the variability in space of this index as a function of housing features, family level characteristics and their interactions. Our aim is to explore the link between social and

[1]See Yinger (1995) for a review of the main empirical results based on audit studies.

[2]A third important factor affecting residential segregation comes from *local public finance*. In recent empirical works on US data, Hoyt and Rosenthal (1997), and Rhode and Strumpf (2003) show the importance of public goods provision in determining the sorting paths of different communities, assuming that a racial component is embedded in preferences towards public goods and relying on some sustainable Tiebout's assumptions (i.e.: people sort in space according to preferences towards quantity and quality of public goods consumption, spatial heterogeneity in public goods provision and limited movement costs). Cutler et al. (2007) find significant association between spatial dissimilarity in public transit supply and increasing segregation. Our analysis is unfortunately not related to local public finance, as in the restricted geographical environment under analysis we do not observe significant spatial differences in levels or quality of public goods provision.

economic characteristics of individuals belonging to different groups, housing characteristics in the different sub-areas, and segregation patterns. Using micro-data on immigrant distribution in the Verona municipality for 2000 and 2005, we define seven groups of immigrants sorted according to their area of origin (East Europe, North Africa, Sub Saharan Africa, Asia, Latin America, UE 2001, Others) and compute a-spatial measures of segregation: segregation curves, the dissimilarity index, the Gini index, the entropy index and the exposure index. These instruments provide a first picture of the segregation pattern. We analyze in more detail the dynamics of this pattern between 2000 and 2005, computing for each section a local concentration index based on segregation curves and study the evolution of its distribution in the two years. As a main result, we identify some areas of the city that represent an attraction pole for immigration and that are also spatially concentrated. This cluster of sections will be compared with other urban sub-areas. Our aim is to investigate how the socioeconomic characteristics of inhabitants, combined with the conditions of the housing stock, may determine the extent of urban segregation. The econometric model uses Verona census data (2001) to explain the variability of the concentration statistic across city sections. Cautiously, we prefer to interpret our results only in terms of association rather than causation, as segregation may of course determine the spatial distribution of several variables used in estimation.

The organization of the paper is the following: in Sections 2 and 3 we describe instruments and data (distribution of individuals in Verona urban area in 2000 and 2005) and report the results of their application to the Verona population. In Section 4 we illustrate the data used for the econometric analysis and in Section 5 we present the estimation results and then offer some interpretations. Section 6 concludes with possible extensions.

2 Measure: Methodology and Data

Massey and Denton (1988) hold that residential segregation is a global construct subsuming five underling dimensions of measurement, each related to a different aspect of spatial variation in the distribution of people. *Evenness* refers to inequality in the relative distribution of people between different partitions of urban space; *exposure* refers to potential interactions between members of different groups; *concentration* measures the relative amount of space occupied by a group; *centralization* concerns proximity to the city center and finally *clustering* refers to proximity of subareas that manifest similar group concentration to one another. Reardon and O'Sullivan (2004) classify evenness and exposure as *a-spatial* dimensions, while the last three are considered *spatial* dimensions. This distinction mainly relates to the informational requirements of segregation measures. A-spatial measures exploit information about the distribution of people across urban sections and approximate social distance between groups accounting only for the social composition of areal units, whereas spatial measures relate population or areal units by certain measures of physical distance or space structure.[3] The distinction between a-spatial evenness and spatial clustering is mainly an artifact of the reliance on spatial subareas (e.g. census tracts) at some chosen geographical scale of aggregation. In fact, clusters of sections with high immigrant concentration obtained with a fine space partition, may cause high levels of evenness when a less finer partition is adopted. Conversely, evenness at a fine space partition may not directly induce evenness at a larger partition if no clustering effects occurs. Although, in general, the two dimensions are supported by different frameworks of measurement, we rely on Reardon and O'Sullivan intuitions and we use only a-spatial measures in our analysis, thereby gaining some benefits from lower computational and data requirements. If a sufficiently fine space partition is adopted, we can also use a local concentration index to measure the contribution of each areal unit to overall segregation and to detect a cluster of areas, simply by focusing on adjacent sections where our index records high and increasing values across time.

2.1 Methodology

This section develops an analytical background for assessing residential segregation based on several a-spatial measures.

Let a metropolitan area be partitioned into T sections and the city population composed of K groups with k=1,...,K. A two-dimensional study of residential segregation is developed. The distribution of each group is analyzed and compared with the distributions of the other K-1 groups. Let x_k^j be the number of individuals belonging to group k living in section j, with j=1,...,T; then $X_k := \sum_{j=1}^{T} x_k^j$ is the total number of individuals in group k, while X defines the total population in the city and $X_{-k} := X - X_k$ denotes the number of individuals that do not belong to group k. We also define

[3] See White (1983) for a first definition of a distance-based measure of segregation and Wong (1996, 2004) for an analysis of urban distribution using GIS techniques.

$X^j := \sum_{k=1}^{K} x_k^j$ as the total population that lives in section j. Let $s_k^j := x_k^j / X_k$ denote the proportion of all individuals belonging to group k living in section j, whereas $p_k^j := x_k^j / X^j$ and $p_k := X_k / X$ respectively denote the proportion of group k in section j and in the whole city. A similar definition holds for group -k. Given the K vectors of $2T + 2$ dimensions $\left[s_k^j, s_{-k}^j, X_k, X_{-k}; j = 1 \ldots T\right]$, containing the shares s_k^j and s_{-k}^j for all T sections and the total number of persons belonging to groups k and -k, it is possible to obtain a first measure of residential segregation, the *Concentration Index* Q_k^j, which measures the relative concentration of group k with respect to group -k for every urban section j. It is expressed as:

$$Q_k^j := \frac{s_k^j}{s_{-k}^j}$$

and takes values $0 \leq Q_k^j < 1$ if in section j the group k is underrepresented or absent; while $Q_k^j = 1$ if the presence of group k in the section perfectly reflects its presence in the city; $Q_k^j > 1$ if the group is concentrated in the section. As a local measure of segregation, this index identifies the urban sections that mainly contribute to overall segregation by observing extreme low or high values. These values are obtained sections where the presence of an immigration group or the native group respectively exceeds the expected value under the hypothesis of spatial evenness. The concentration index has two important features. First, it is not sensitive to the absolute dimension of the groups. Second, it is not additive with respect to urban space decomposition, so it must be computed independently for every different partition.[4]

Once sections have been ranked in order of magnitude of Q_k^j, for every group k it is possible to derive the relative *segregation curve* (see Duncan and Duncan 1955 and Hutchens 1991). This curve starting from the (0,0) origin and ending in (1,1) connects all the points whose coordinates are the cumulative sum of s_k^j on the horizontal axis and the cumulative sum of s_{-k}^j on the vertical axis. Segregation curves coordinates express the distribution of the shares of an immigration group between areal units, sorted according to group concentration. If all areal units reflect expected citywide group distribution, then cumulative shares of immigrants and natives grow proportionally and the segregation curve is a straight line denoting perfect evenness in the distribution. Con-

[4]Though this may seems a problem, it may also represent a desirable property, as the statistic is not sensitive to the density of residents and the dimension of the sections considered. In alternative to Q_k^j one could use another location index as the location quotient $LQ_k^j := p_k^j / p_k$. However notice that when the focus of the analysis is on comparisons between sections of the concentration of each group, then for every two sections j and i, the following condition holds: $Q_k^j \geq Q_k^i$ if and only if $LQ_k^j \geq LQ_k^i$. Thus the two indices convey the same ordinal information. This is not in general the case when we compare different groups k and h belonging to the same section, unless $p_k = p_h$.

versely, disparities in unit-level distribution generate a convex curve due to unit sorting order. If one distribution Y exhibits a lower segregation curve than a distribution Z, then any measure of segregation consistent with Transfer Principle (see Hutchens, 1991[5]) will record higher segregation for Y. Conversely, when segregation curves intersect unanimity in ranking distributions is lost and the choice of an appropriate set of indices is focal for the final results.

We focus on the following segregation indices that are commonly used in literature and allow powerful and clear interpretations of the results.

DISSIMILARITY INDEX (D_k): it measures the departure from evenness by taking the mean absolute deviation of every spatial unit proportion of group k from the proportion of the group in the whole city and expressing this quantity as a proportion of the maximum value (to standardize the index to a range between 0 and 1)

$$D_k := \frac{1}{2}\sum_{j=1}^{T}\left[\frac{X^j}{X}\frac{\left|p_k^j - p_k\right|}{p_k\left(1-p_k\right)}\right].$$

GINI INDEX (G_k): given two distinct urban sections j and i, the Gini Index is the mean absolute difference in group k proportions weighted across all pairs of areal units, expressed as a proportion of the maximum weighted mean difference (the index ranges in the unitary interval)[6]

$$G_k := \frac{1}{2}\sum_{j=1}^{T}\sum_{i=1}^{T}\left[\frac{X^j X^i}{X^2}\frac{|p_k^j - p_k^i|}{p_k(1-p_k)}\right].$$

ENTROPY INDEX (H_k): it is a measure of the weighted mean departure of each spatial unit j entropy for each group k, from the citywide entropy of k. It is another measure of a-spatial evenness, where E denotes the total entropy of the city while E_j the entropy of the urban section j[7] (the

[5]The Pigou-Dalton Transfer Principle (P7 in Hutchens) occurs when the distribution of a group k across urban sections is obtained by another through a "regressive transfer" such that, for any two areas i and j with $Q_k^i < Q_k^j$, we move group k members from i to j.

[6]This index, like the previous one, can be directly obtained by using segregation curves. Duncan and Duncan (1955) report graphically those results, expressing D as the maximum distance between curve and perfect distribution line and G as the proportion of the area between curve and the integration line on the total area. They also prove that G index is bounded in a possible interval with D and $D(2-D)$ as lower and upper bounds respectively. For one analysis of segregation indices properties we refer to Duncan and Duncan (1955), Silber (1989), Chakravarty and Silber (2007), James and Taeuber (1985), Hutchens (1991, 2001 and 2004), Reardon and O'Sullivan (2004), Frankel and Volij (2004), Echenique and Fryer (2007).

[7]Formally, $E := p_k \ln\left[\frac{1}{p_k}\right] + (1-p_{-k})\ln\left[\frac{1}{1-p_{-k}}\right]$ and $E^j := p_k^j \ln\left[\frac{1}{p_k^j}\right] + \left(1-p_{-k}^j\right)\ln\left[\frac{1}{1-p_{-k}^j}\right]$.

index ranges in the 0 -1 interval)

$$H_k := \sum_{j=1}^{T} \left[\frac{X^j}{X} \frac{(E - E^j)}{E} \right].$$

INTERACTION (EXPOSURE) INDEX (${}_kI_h$): it is a measure of exposure, the *experienced* segregation as felt by group k with respect to the other components of group h. This index represents the probability that a randomly drawn k member shares an area with a member of the group h (or with another member of her group if the *Isolation Index* ${}_kI_k$ is considered), that is:

$${}_kI_h := \sum_{j=1}^{T} \left[s_k^j p_h^j \right].$$

Since we deal with expected probabilities, the index is no more bounded in unitary interval but rather we obtain minimum segregation when the probability of finding a member of group k in the k and h population is constant for all sections and equal to the relative presence of k on the defined population. We can measure exposure segregation for any two groups of the population considering the population $X' = X_k + X_h$. Relative dimensions of populations analyzed can substantially affect our results. For every group k holds: ${}_kI_h + {}_kI_k = 1$ on the population compose by groups k and h. The index is also symmetric, i.e. ${}_kI_h = {}_hI_k$.[8] The Dissimilarity, Gini and Entropy indices measure for group k increasing segregation from value 0 (perfect evenness) to 1 (the group is completely concentrated in a unique urban section). Making use of ${}_kI_h$, segregation can also be measured as the distance between the index values and p_k. Thus, in order to assess whether segregation has decreased through time we need to take into account also the dynamics of p_k . In our work, we simply consider the basic ${}_kI_h$ index values to measure estimated social contact between groups.

The segregation of immigrants from 2000 to 2005 in Verona will be first studied by using segregation curves and indices. The analysis will be performed by considering two different partitions of the urban space. The concentration index Q_k^j will be used to highlight some aspects of social

[8] This index gives a completely different information from other indices proposed. In fact the experienced segregation of group k does not depend on the evenness of the group distribution across urban partitions, but on the relative dimension of the group. To give an idea, if we consider two groups k and h of equal dimension, then the index signals no segregation in terms of evenness when it is equal to its maximum value 0.5. This means that the two groups are equally distributed in all sections and the probability for a member of k to find a member of h is homogeneous across sections and equal to overall city probability. If we consider the whole city population we can write the index as ${}_kI_{-k}$.

concentration that cannot be captured by other a-spatial measures. The same analysis, performed in different periods, allows us to highlight sections where immigrant concentration is increased and, by observing whether these sections are spatially concentrated, to identify an area of attraction of immigrants.

2.2 Data

The data used in this paper are published by the Statistical Office of the Verona municipality for ISTAT, the Italian Bureau of Statistics, for the years 2000 and 2005. The dataset gives information pertaining to vital statistics like nationality, family affiliation and other demographic features of each inhabitant in the municipality of Verona.[9] Information about individual spatial location is available for different partitions of the urban space: 1940 "Census sections", CS, and 80 "Homogeneous Territorial Zones", HTZ.[10] Unlike the US, where segregation studies concerned with the racial nature of the phenomenon can benefit from the detailed self-identifying structure for race affiliation of interviewees in the *Census Bureau*'s survey, in Italy ISTAT has not yet defined a similar structure of information. Therefore, the immigrant population is partitioned into six groups using nationality codes and following the World Bank definition[11]: East Europe, UE 2001, Africa (North and Middle East, Sub-Saharan Africa), Asia, Latin America, Other. For Asia, two groups for China and Sri Lanka are also formed, given their relative importance in Verona urban space. Table 1 reports the absolute and relative presence of the selected groups in Verona in the years 2000 and 2005. The illegal immigration is not considered in the analysis.

For our empirical analysis based on a-spatial indices we are forced to impose partitions exogenously and we therefore face two potential problems: the *Modifiable Areal Units Problem (MAUP)* and the so-called *Checkerboard Problem.* The first problem arises since the definition of spatial units of the urban area is imposed exogenously and does not necessarily correspond with a meaningful

[9] We remark that the Verona metropolitan area has been chosen as our experimental field due to the city's relevance in the national immigration panorama. From 2000 to 2005, the share of immigrants in the city grew steadily, rising from 6% to 9.7%. In relative terms, Verona shows the second highest immigrant density in Italy after Milan (13.1%), and has done so since 2000. In 2005, 0.9% of immigrants living in Italy was resident in Verona, while native residents in the city are 0.4% of all Italian population. Turning to flows, the share of immigrants coming from abroad into the city has increased dramatically, as a result of policies in favor of granting residence permits: these increased by 20% in the 5 year time span.

[10] On average we count 137 people and nearly 70 households in a census section. However, the demographic dimension of the section is highly variable in the urban space, from 5 to more than 1000 individuals.

[11] The reference is to the system of classification of countries used by WB for geographical aggregates. See for example "WB, World Development Indicators, 2004".

definition of areal units. The Checkerboard Problem arises because, using a-spatial measures, the proximity between neighborhoods is neglected and we cannot measure spatial correlation between observed group frequencies across sections. To check the robustness of our findings we compare the results of indices under CS or HTZ partitions.

3 Measure: Results

In Figure 1 we report segregation curves for the years 2000 and 2005 associated to distributions of resident immigrant groups in Verona, compared according to the Census Section (left column) and the HTZ (right column) partition. We consider the following groups: (a) total immigrants, (b) East Europe, (c) Africa and (d) Asia, that represent the most important communities in the city. As a first result, the curves suggest an uneven distribution of immigrants in Verona in both years. Considering the CS partition, segregation curves are non-intersecting, identifying for each immigration group a slight increase in spatial evenness in 2005 with respect to 2000, though the population of immigrants (total and for each group) is still segregated. Given this very fine partition of urban space, it is also possible to observe the utmost level of space sharing between groups. For instance, the 90% of all Asians shares urban space with only 20% of other residents in 2000 and 38% in 2005, while all Africans live steadily with 60% of the other residents. Turning to segregation indices, these agree with the pattern identified by the curves (Table 2). The most striking decreases are observed for the total immigrants group,[12] East Europe[13] and Sri Lanka, while for other groups the decrease is less marked. Observing the Interaction index dynamics for the two periods in the same spatial dimension (table 3), no significant changes emerge in the Exposure dimension of segregation. An interesting fact is that exposure of immigrants to natives decreases for almost all immigration groups while exposure of each group to other immigrants slightly increases in the same period. We also report sharp differences between immigrant exposure to other immigrants and to natives, in both years and spatial partitions considered. This result is not surprising, as the group of immigrants is a relatively small fraction of the population and there is also a possible

[12] Dissimilarity index decreases from 0.44 in 2000 to 0.38 in 2005 while the Gini index passes from 0.6 in 2000 to 0.52 in 2005.

[13] Measured dissimilarity decreases from 0.6 to 0.43, Entropy from 0.2 to 0.13 and Gini index from 0.76 to 0.59.

pattern in the spatial distribution of each immigration group. In fact, in the five years time interval the exposure of each immigration group to other immigrants increased, mainly driven by increases in immigrant arrivals in the city and the greater social proximity of the groups. Table 4 reports the cross-group exposure obtained considering only couples of groups as the population of analysis and measured by the interaction index for 2000 (lower part of the matrix) and for 2005 (upper part). We cannot identify a homogeneous pattern of segregation between groups. We highlights the different sorting path distinguishing each group from the other and the need to consider the groups separately. The greater exposure is measured between Africans and East Europe groups and Latin America and Other, though it decreases over time. These findings shed light on Table 3 aggregate results, considering how a dramatic change in the structure of immigration groups (Table 1) is not necessarily associated with great changes in the proximity of groups.

Performing a similar analysis for the HTZ spatial partition, a different picture emerges. First, segregation curves reported in Figure 1 cannot clearly rank the two distributions of immigrants (or groups) in Verona as they intersect in at least one point. As a result, we do not obtain unanimity in ranking produced by indices. We interpret this finding in relation to the definition of space partition adopted. A possible unobserved clustering effect between census sections can be captured by HTZ partition and manifested through segregation indices computed with this areal units definition.

We now analyze the information given by local concentration index Q_k^j in order to detect more interesting sections in urban space, in accordance with immigrant concentration patterns. We compare index values for different HTZs in the city and extend the analysis in both years considered. Then, we select areas that show particular patterns of this local statistic. For each year, we detect two areas in the central part of the city that exhibit sustained high levels of immigrant concentration: the tourist city centre area (hereafter identified as CC) characterized also by an intensive presence of tertiary activities, and an area of mainly housing land, Veronetta (see Figure 2). Comparing the level of $Q_{k,j}$ for 2000 and 2005, we identify also the HTZs that show an increasing immigrant concentration, as captured by the local statistic used. By examining the spatial position on a map of the HTZs characterized by high attractiveness to immigration, we furthermore find that these urban units are also spatially concentrated. We name South Area (SA) this new cluster of HTZs. SA is relevant for our following analysis because it is characterized as an attraction pole for immigrant groups.[14] Once we detect these areas, we have a meaningful decomposition of urban space obtained exploiting minimal information requirements. We can check whether the behavior of both natives and immigrant migration flows from/to outside the city or within urban sections have influenced the concentration, and if patterns of migration are differentiated between the four areas. Since differences in $Q_{k,j}$ are the results of changes in relative group presence in each area, we have simultaneously to control for the behavior of both groups used in the statistic to explain its variability. Observing a homogeneous birth rate within city areas, we are forced to investigate groups flows.

Table 6 reports the demographic movements both of Italians and immigrants (distinctly) from 2000 to 2005, between the four areas previously identified. The table reports in the central block (for both groups) the relative number of movements in the period from one area in 2000 (row) to another area (column) in 2005, computed as a share of the total population that decided to move *within* city areal units. The cell identified by the same area in 2000 (row) and 2005 (column) contains the share of people moving inside the same area. The row and column named "Outside" contain the relative share of people leaving (by row) and entering (by column) the specified areas of the city, obtained as a fraction of the total of movements to/from *outside* the city. Due to data shortage, we cannot observe whether individuals leave the city definitively or if they decide to move to suburban areas (not considered here), nor we can address the causes (job shifts, the decision to commute, housing decisions and so on). Using relative flows, we can easily compare the dynamics for different groups and areas. The first thing to note is the remarkable difference in the dynamic of people moving into/out of the city from abroad depending on their groups. While immigrants are only 5% of the population remaining in the city between 2000 and 2005, the group represents 14% of within city movers in the same period. More interestingly, immigrants are 29% of newcomers till 2005 and only 10% of leavers by 2000. Moreover, shares of Italian leavers and comers are roughly equal in total (53% and 47% respectively) and with respect to areas, while we observe a strong displacement for immigrants: only 9.6% of immigrant movements are due to people leaving the city from 2000 to 2005, while the 90.4% are due to new arrivals, manifesting a strong tendency to spatial stabilization. Looking at within city flows, we immediately see that relative movements inside the same area are

[14] By Table 5, average and maximum concentration in SA is increased for all groups. In Figure 2 is given a map of the city and the spatial position of the three areas to figure out the dimensions of the space portion considered.

less sustained for immigrants, denoting a natural tendency to stabilize in the initial space, giving support to the global results of increased exposure to natives as captured by the indices. These results do not translate in a dramatic shift of immigrants from the Veronetta area to SA, but rather in a new composition of the social structure of the areas due to joint location decisions of all groups considered.

As a further step, we explain the statistical association between population characteristics and the measured level of local segregation within the city.

4 Inference: Methodology and Data

We have shown that the local statistic Q_k^j, which associates to every spatial section a measure of immigrant concentration, constitutes the basic information from which to build up a wide class of segregation measures. Our aim is now to explain whether the observed variability of this local concentration statistic can be associated to the variability in households attributes. Under the assumptions of spatial stratification models, the preferences of individuals based on beliefs about average group characteristics drive discriminatory behavior against groups of immigrants. Individual or family characteristics are partially observable by other agents, which are usually interested in the average "quality" of families living in the same neighborhood. Housing market also play a determinant role in the sorting process, but we only take into account the observable features of buildings and no information about prices, avoiding problems related to non observable sorting components (native are willing to pay a premium not to live closer to immigration groups and this has an impact on housing prices through discriminatory or preference channels).[15] We choose to work with individual level micro-data to preserve all the information we possess instead of using section-level averaged attributes and we propose a model that avoids aggregation of single characteristics into an estimator for each area considered.[16]

We use ISTAT Census data for 2001, containing information about buildings, households and indi-

[15] Saiz and Wachter (2006) propose to measure this premium in terms of housing value, observing that the increase in value in many US MSAs has been relatively slower in neighborhoods of immigrant settlement, differently from a market based prediction when demand increases. Decreasing housing quality and native flight seem to play an important role in explaining this evidence and make it possible to determine the additional cost a native is willing to sustain to avoid areas with higher immigrant concentration.

[16] In support, we regress Q_k^j on j-averaged family and housing attributes used in the paper model (where j is the CS observation) and we find no significant estimations, both singularly and jointly. Results are available under request to the author.

viduals for the Verona municipality. We use the restricted version of data for the 253,208 inhabitants (109,786 families, 2.27 individuals per family; more than 4000 individuals live in communities) relating to the census tract they live in (there are 1940 census sections and 80 HTZ which include 130 sections each on average) at a civic number level. In Table 7 we summarize the main attributes of individuals, households and buildings, expressed as mean values of a set of dummy variables obtained for each qualitative or discrete variable. We use census section partition, while we consider six groups for our analysis: Immigrants (total), East Europe, North Africa, Sub Saharan Africa, Asia, Latin America, representing the most important communities in the city. Controlling for specific characteristic of the sections (availability of public services, hospitals, schools, public parks) and the spatial agglomeration (as identified from the previous analysis of the CC area, the Veronetta area and SA), we build a model in which we separately regress Q_k^j for six immigration groups on the characteristics of households and buildings, in order to value the combined explanatory power of these attributes on Q_k^j variability through space at a given time. In the model we face three dimensions to control for: households, groups and sections. For the *i-th* household living in section j and for each immigration group $k = 1, \ldots, 6$, we specify our model in a linear additive form as:

$$Q_k^j = \alpha_k + \beta_k X_i^j + \delta_k Y_i^j + \gamma_k Z_i^j + \lambda_k W_i^j + \pi_k S^j + \epsilon_{k,i}^j,$$

where Q_k^j is our local concentration index, specific for each census section of the urban environment and repeated for each observation living in the area j. We capture its mean variability by a linear function defined on X_i^j, the set of dummies for the residential area in which the family lives; Y_i^j the vector of structural characteristics of the house (quality, age, property, rent, housing project, number of rooms, dimension, kitchen); Z_i^j, the vector of socioeconomic characteristics of the household head (sex, age, education, working status) and family (number of children, head partner works); W_i^j, a set of dummies for the group of immigration to which the observed family head belongs and S^j, the vector of section specific characteristics, common to all families living in the same section (the percentage of commercial buildings, the share of buildings used for community purposes). The term $\epsilon_{k,i}^j$ is the individual and group specific random error assumed normally distributed. We estimate six different equations separately for each immigration group considered. As suggested by Bayer, McMillan and Rueben (2004), we treat reverse causation and simultaneity (segregation affects socio-demographics) issues as marginal and non influential on estimation bias. In fact, past segregation can be considered a good predictor for present individual outcomes, but we do not experiment in the city a sufficiently deep rooted phenomenon to be aware of its effects.

5 Inference: Results

The estimated marginal effects of the variables considered in our analysis on the concentration statistic are listed in Table 8. Since the dependent variable is a function of simultaneous presence of groups k and $-k$ members in the same section, its variability must be explained jointly considering both groups. We use standardized coefficients for a comparison of effects across regressors. The constant terms of each group represent the average population concentration for the reference category living outside the three critical urban sub-regions CC, Veronetta and SA. In this way, we can identify and measure the marginal effects on concentration of family-level differences for groups living in the other parts of the city. Controlling for spatial partitions of the urban environment suggested by previous analysis (where the special role of CC, Veronetta and SA emerged), we can capture the effects, specific to each area, of an unobservable attracting component.

Living in Veronetta has clearly a high positive impact on average concentration, twice as much as the effect of SA. This relation is similar for each group, except for East Europe group. This is mainly due to the sustained presence of the East Europe group in various areas of the city. Differently, the concentration statistic in CC does not vary uniformly between immigrants groups. Once we control for the effects of other covariates, its trend does not differ with respect to other areas. We immediately notice that the area SA in 2001 does not show a particularly high level of concentration (in fact, the relevance of this area emerges also from a time comparison) but already incorporates some attractive components with respect to the reference area. We also introduce dummy variables for immigration groups in order to capture interaction between groups. Among all immigrants, Africans show a significantly positive effect on the concentration of all other immigrant groups. This result confirms previous findings of a sustained level of interaction of Africans with other immigrants, but less intensive interaction with natives. Another section level characteristic we analyze is the local share of different typologies of buildings. We notice for all groups a significantly positive effect of the share of commercial buildings and a moderately lower but still positive effect of the share of schools and community buildings. This effect is nevertheless negative for the concentration of North Africans, more inclined to live in housing projects (see Table 7). An immediate interpretation is that housing prices in more industrialized areas are likely to be under average levels and such houses are more attractive for immigrants. The presence of other types of building is also very unusual in typical residential areas where immigrants have scarce access due to higher levels of home ownership. Our results indicate, for the total immigrants group, a scarce statistical significance of individual characteristics like sex, education or job position of the family head. F-test on these characteristics forces us to accept the null hypothesis of no joint significance of marginal effects for total immigrant group but not for each single group. Thus we interpret that single family attributes lose explicative power when we combine together different immigrant group sorting patterns, while they have a consistent joint effect for each immigrant group separately. This fact is surprising if we observe Table 7 and other average statistics. For example, average immigrant is 20-years younger than average Italian, explaining why only 15% of immigrants is currently not working. Although the proportion of self-employed is greater for each group of immigrants than it is for Italians, the disproportion is even more sensible looking at employees. Differences in such covariates are significant between immigrants and natives, but they reduce or disappear within immigrants of different groups. Also, only part of the coefficients shows the expected sign. Conversely, a different and clear picture emerges by looking at house characteristics. We find high significance and a major role in explaining variability of Q_k^j for housing features like age, preservation,[17] number of rooms, dimension, presence of a kitchen. The patterns, dimensions and signs of the marginal effects are the ones expected. For example, we expect that houses with more rooms are inhabited by larger families, and more likely to occur in the natives group as Table 7 reports. As a result, increasing number of rooms has a significant negative effect concentration, as we expect a higher probability to find a native family when the number of rooms grows, decreasing the expected concentration caught by Q_k^j. Otherwise, living in a housing project decreases expected concentration since the number of immigrants having access to the program is very restricted and houses are likely to be

[17]Interaction between age and preservation is also considered. In fact, we argue that the effect of increasing preservation on the value of a house increases with age of the building, so we also expect fewer immigrants to live in such kinds of houses. Though we still find positive but decreasing effects of both condition and age on concentration, the interaction of the two variables gives significantly negative marginal effects for all groups.

evenly distributed in the territory, contrasting segregation by forcing prevalently Italian families to live in such places.

Is there a possible new interpretation for estimation results, and in particular for unusual findings on individual family characteristics? We assert that, in general, it is not the single attribute of a resident family that has the power to explain immigrant concentration, but rather a combination of different attributes. OLS coefficients show that section averaged estimations leads to non significant marginal effects. This can happen if the aggregator of information by section (we used mean) does not account for some unobservable relations between variables. In this sense we can read stereotyping not in terms of single attributes, but rather of types of families, each showing a particular combination of attributes. If families sort in space by type (rather than single attribute), than only a combination of their characteristics may be a good predictor of the level of segregation observed. A similar result is also supported by a Bayer, McMillan and Rueben (2004) study. Using micro-data at family level, the authors find that *together* income, education, language and immigration status explain high shares of different immigrant groups segregation, whereas these variables can say much less when comparing Blacks and Whites. We suggest that the spatial stratification assumption must be reformulated for an immigration framework starting from a different perspective of analysis.

We find another interesting issue about housing characteristics, especially relevant in environments characterized by increasing immigration flows: the effect of home-ownership matters. For all groups and on a homogeneous scale, we find positive and significant effects of renting on the local concentration of immigrant groups. Looking at the data, we find a disproportionally high share of rented houses in our selected areas, from a 40% of SA to more than 50% in Veronetta, double the average value observed for the other areas. As a possible future research issue, we state that areas where renting -and natives renting- is more common,[18] are good candidates for attracting immigrants. As a policy issue, major integration through other channels than working place or linguistic homogeneity is needed. High polarization in housing property, some opportunistic behavior of renters and lack of controls leave room for the formation of heterogeneous communities inside the same city environment, despite a limited spatial dimension but a strong attractiveness to immigrants.

[18] For example, in SA area 40% of Italians live in a rented house, though this percentage decreases dramatically to 24% in the rest of the city.

6 Conclusions

We analyze immigrant sorting paths inside the urban environment of Verona municipality, characterized by increasing immigration in recent years. We compare segregation curves and indices to obtain a clear pattern of immigrants residential segregation through years (2000 - 2005). By mean of a local concentration statistic we detect areas that behave like attractors for immigration and mainly contribute to overall segregation. Assuming a spatial stratification process, we regress the group-specific local concentration statistic on family and housing attributes. Our main findings suggest that the variability of the statistic is significantly explained by house characteristics. A joint significant effect appears for household attributes like job position or education of the family head. Signs and magnitude of these effects vary consistently across immigration groups. Moreover, we suggest resorting to household type stereotyping as a focal predictor for immigrants concentration. Due to the important role played by housing ownership in explaining differences in immigrants concentration between city areas, we detect ownership polarization and natives attitude toward renting as promising topics for future research.

References

Bayer P., R. McMillan and K. S. Rueben, 2004. "What Drives Racial Segregation? New Evidence Using Census Microdata". *Journal of Urban Economics*, 56: 514-535.

Chakravarty S. R. and J. Silber, 2007. "A Generalized Index of Employment Segregation". *Mathematical Social Sciences*, 53 (2): 185-195.

Charles C.Z., 2003. "The Dynamics of Racial Residential Segregation". *Annual Review of Sociology*, 29: 167-207.

Cutler D. and E. Glaeser, 1997. "Are Ghettos Good or Bad?". *Quarterly Journal of Economics*, 112 (3): 827-872.

Cutler D, E. Gleaser and J. Vigdor, 2007. "When Are Ghettos Bad? Lessons from Immigrant Segregation in the United States". *NBER Working Paper No. 13082.*

Cutler D, E. Gleaser and J. Vigdor, 2008. "Is the Melting Pot Still Hot? Explaining the Resurgence of Immigrant Segregation". *The Review of Economics and Statistics*, 90(3): 478-497. Duncan O. and B. Duncan, 1955. "A Methodological Analysis of Segregation Indices". *American Sociological Review*, 20: 210-217.

Echenique F. and R. G. Fryer, 2007. "A Measure of Segregation Based on Social Interaction". *The Quarterly Journal of Economics*, 122 (2): 441 - 485.

Frankel D. and O. Volij, 2004. "Measuring Segregation". Mimeo, Iowa State University.

Ihlanfeldt K. R. and B. P. Scafidi, 2002. "An Empirical Analysis of the Causes of Neighborhood Racial Segregation". *Berkeley Program on Housing and Urban Policy. Seminar and Conference Papers*: Paper S00-003.

James D. R. and K. E. Taeuber, 1985. "Measures of Segregation". *Sociological Methodology*, 15: 1 - 32.

Hardman A. and Y. M. Ioannides, 2004. "Neighbors' Income Distribution: Economic Segregation and Mixing in US Urban Neighborhoods". *Journal of Housing Economics*, 13: 368-382.

Hoyt W.H. and S.S. Rosenthal, 1997. "Household Location and Tiebout: Do Families Sort According to Preferences for Local Amenities?". *Journal of Urban Economics*, 42: 159-178.

Hutchens R., 1991. "Segregation Curves, Lorenz Curves, and Inequality in the Distribution of People across Occupations". *Mathematical Social Sciences*, 21: 31-51.

Hutchens R., 2001. "Numerical Measures of Segregation: Desirable Properties and Their Implications". *Mathematical Social Sciences*, 42: 13-29.

Hutchens R., 2004. "One Measure of Segregation". *International Economic Review*, 45: 555-578.

Massey D. and N. Denton, 1988. "The Dimensions of Residential Segregation". *Social Forces*, 62 (2): 281-15.

Pancs R. and N. J. Vriend, 2007. "Schelling's Spatial Proximity Model of Segregation Revisited". *Journal of Public Economics*, 91: 1-24.

Rhode P. W. and K. S. Strumpf, 2003. "Assessing the Importance of Tiebout Sorting: Local Heterogeneity from 1850 to 1990". *The American Economic Review*, 93 (5): 1648-1677.

Reardon S. F. and D. O'Sullivan, 2004. "Measures of Spatial Segregation". *Sociological Methodology*, 34: 121-132.

Saiz A. and S. Wachter, 2006. "Immigration and the Neighborhood". *IZA Discussion Paper No. 2503*.

Schelling T. C., 1969. "Models of Segregation". *The American Economic Review*, 59 (2): 388-493.

Schelling T. C., 1971. "Dynamic Models of Segregation". *Journal of Mathematical Sociology*, 1 (2): 143-186.

Silber J., 1989. "On the Measurement of Employment Segregation". *Economics Letters*, 30 (3): 237-243.

White M. J., 1983. "The Measurement of Spatial Segregation". *The American Journal of Sociology*, 88 (5): 1008-1018.

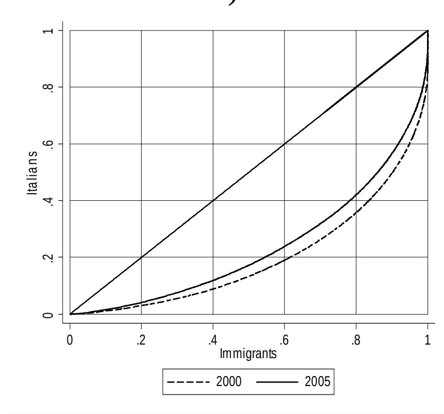
Wong D. W. S., 1996. "Enhancing Segregation Studies Using GIS". *Comput., Environ. And Urban Systems*, 20 (2): 99 - 109.

Wong D. W. S., 2004. "Comparing Traditional and Spatial Segregation Measures: a Spatial Scale Perspective". *Urban Geography*, 25 (1): 66 - 82.

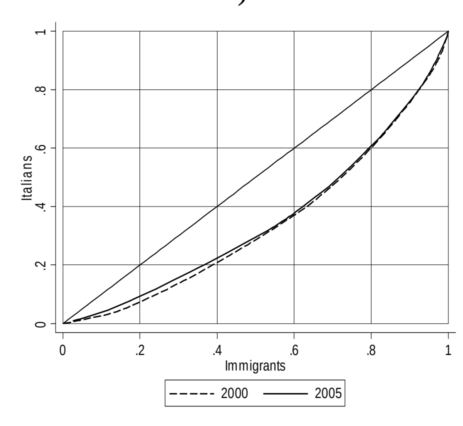
Yinger J., 1995. *Closed Doors, Opportunities Lost: The Continuing Costs of Housing Discrimination.* New York, Russel Sage Found.

Census Sections	HTZ

a)



a)



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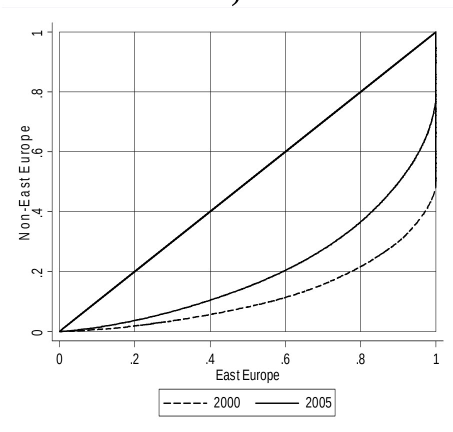

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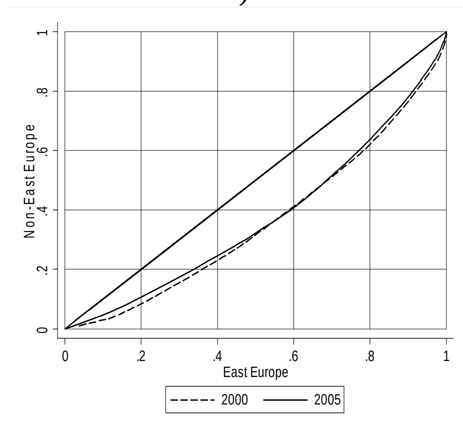

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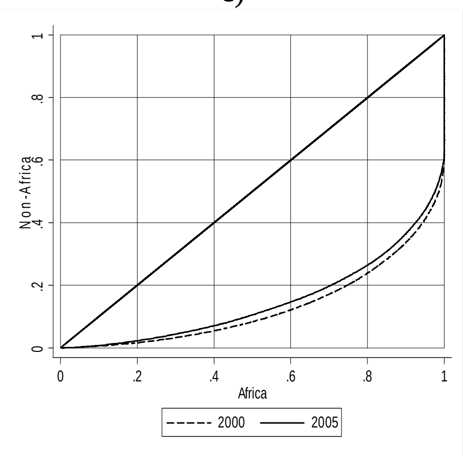

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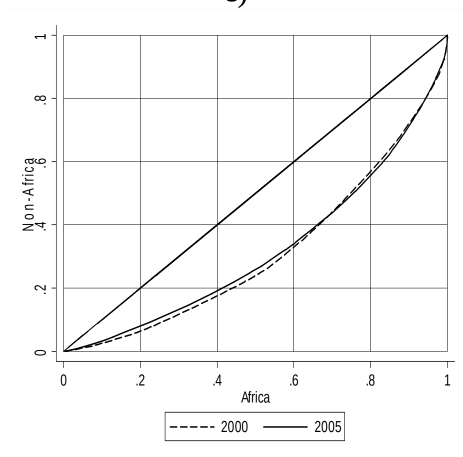
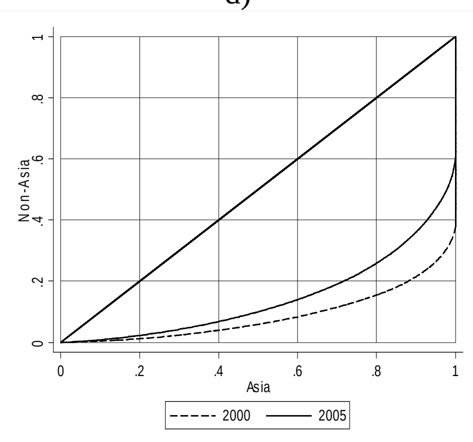


d)



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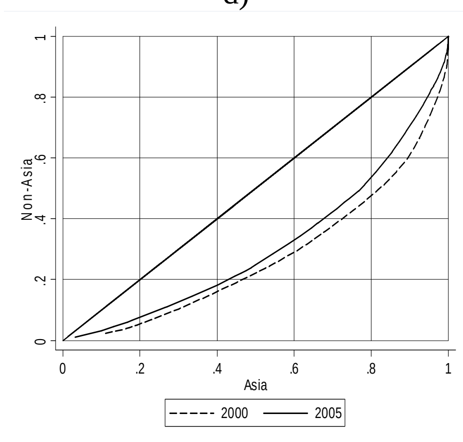
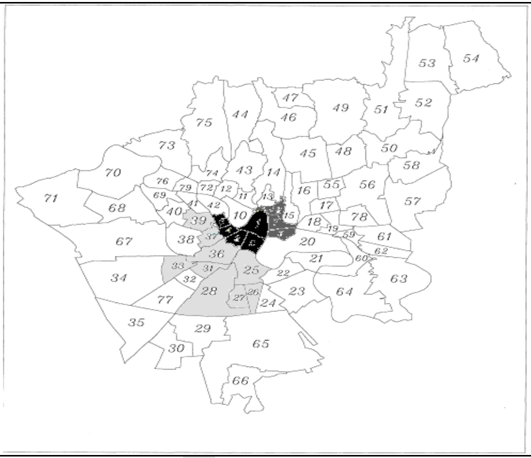


Figure 1: Segregation curves for 2000 and 2005 of four immigration groups living in Verona: a) total immigrants, b) East Europe, c) Africa, d) Asia.



Note: The three areas represented are South Area SA Central City CC Veronetta

Figure 2: The spatial partition of Verona Municipality in HTZ with the three areas of interest.

k	**2000**		**2005**	
	a	*b*	*a*	*b*
Immigrants (tot)	4.91	100	8.91	100
UE 2001	0.58	11.93	0.89	10
East Europe	0.83	16.98	2.38	26.7
Africa	2.06	42.4	2.52	28.39
of which				
North Africa	*0.76*	*15.5*	*1.04*	*11.7*
Sub-Saharian Africa	*1.3*	*26.9*	*1.48*	*16.6*
Asia	0.99	20.2	2.3	25.7
of which				
China	*0.17*	*3.58*	*0.33*	*3.78*
Sri Lanka	*0.66*	*13.58*	*1.64*	*18.44*
Latin America	0.34	7	0.76	8.6
Other	0.12	1.27	0.5	2.21

Note: % shares of total population (b) and total number of immigrants (b).

Table 1: Immigrants in Verona in 2000 and 2005 with regard to group distinction.

k	Census Tracts (1940)						HTZ (80)					
	D k		**G k**		**H k**		**D k**		**G k**		**H k**	
	2000	*2005*	*2000*	*2005*	*2000*	*2005*	*2000*	*2005*	*2000*	*2005*	*2000*	*2005*
Immigrants (tot)	0.445	0.384	0.60	0.527	0.157	0.131	0.233	0.222	0.32	0.299	0.042	0.038
East Europe	0.6	0.435	0.76	0.59	0.203	0.131	0.189	0.192	0.282	0.258	0.026	0.022
Africa	0.56	0.542	0.738	0.703	0.22	0.201	0.27	0.261	0.374	0.36	0.049	0.045
of which												
North Africa	*0.68*	*0.63*	*0.832*	*0.78*	*0.258*	*0.227*	*0.283*	*0.268*	*0.398*	*0.367*	*0.047*	*0.042*
Sub-Saharian Africa	*0.64*	*0.61*	*0.802*	*0.771*	*0.257*	*0.235*	*0.291*	*0.296*	*0.405*	*0.398*	*0.054*	*0.05*
Asia	0.68	0.546	0.827	0.71	0.263	0.199	0.324	0.276	0.452	0.377	0.062	0.048
of which												
China	*0.9*	*0.843*	*0.954*	*0.924*	*0.388*	*0.35*	*0.478*	*0.41*	*0.619*	*0.566*	*0.095*	*0.089*
Sri Lanka	*0.77*	*0.59*	*0.884*	*0.751*	*0.323*	*0.218*	*0.35*	*0.268*	*0.493*	*0.376*	*0.074*	*0.046*
Latin America	0.69	0.56	0.832	0.723	0.239	0.174	0.315	0.263	0.435	0.36	0.052	0.036
UE 2001	0.62	0.556	0.746	0.718	0.182	0.176	0.258	0.241	0.354	0.33	0.033	0.03
Other	0.65	0.54	0.803	0.71	0.22	0.168	0.293	0.257	0.412	0.348	0.047	0.034

Note: In order are reported Dissimilarity index, Gini index and Entropy index, for years 2000 and 2005 separately for two different partitions of urban space (Census Tracts partition is finer than HTZ one).

Table 2: Three indices for a-spatial segregation of different immigration groups: Evenness.

k	Census Tracts (1940)				HTZ (80)			
	2000		**2005**		**2000**		**2005**	
	Italians	*Other immigrants*	*Italians*	*Other immigrants*	*Italians*	*Other immigrants*	*Italians*	*Other immigrants*
Immigrants (tot)	0.877	-	0.832	-	0.932	-	0.889	-
East Europe	0.954	0.722	0.933	0.717	0.987	0.842	0.968	0.781
Africa	0.903	0.623	0.896	0.694	0.965	0.686	0.96	0.764
of which								
North Africa	*0.939*	*0.709*	*0.933*	*0.769*	*0.985*	*0.837*	*0.982*	*0.872*
Sub-Saharian Africa	*0.913*	*0.663*	*0.911*	*0.748*	*0.976*	*0.767*	*0.974*	*0.842*
Asia	0.931	0.685	0.908	0.702	0.98	0.805	0.962	0.78
of which								
China	*0.95*	*0.738*	*0.934*	*0.793*	*0.995*	*0.931*	*0.989*	*0.935*
Sri Lanka	*0.929*	*0.696*	*0.92*	*0.727*	*0.984*	*0.85*	*0.974*	*0.826*
Latin America	0.967	0.777	0.966	0.82	0.992	0.914	0.987	0.912
UE 2001	0.971	0.747	0.959	0.785	0.99	0.872	0.986	0.885
Other	0.968	0.77	0.964	0.815	0.992	0.903	0.987	0.908

Note: Interaction index values are reported for each immigration group with respect to Italians and other immigrants for years 2000 and 2005, considering two partitions of urban space.

Table 3: Exposure of each immigration group to Italians and to other immigrants.

			Census Sections (1940)			
2000 / 2005	East Europe	Africa	Asia	Latin America	UE 2001	Other
East Europe	-	0.333	0.305	0.157	0.164	0.165
Africa	0.402	-	0.278	0.1401	0.139	0.144
Asia	0.221	0.156	-	0.144	0.147	0.152
Latin America	0.124	0.076	0.11	-	0.26	0.506
UE 2001	0.19	0.111	0.161	0.248	-	0.234
Other	0.143	0.085	0.126	0.511	0.17	-
			HTZ (80)			
East Europe	-	0.49	0.462	0.233	0.252	0.245
Africa	0.677	-	0.435	0.22	0.232	0.229
Asia	0.488	0.284	-	0.236	0.255	0.249
Latin America	0.267	0.132	0.235	-	0.483	0.514
UE 2001	0.377	0.198	0.331	0.548	-	0.43
Other	0.3	0.149	0.267	0.535	0.365	-

Note: Interaction index values are reported for each immigration group with respect to other groups for years 2000 (under the diagonal) and 2005 (over the diagonal), considering two partitions of urban space.

Table 4: Cross-groups Exposure for years 2000 and 2005, by spatial decomposition.

	Central City Area				**Veronetta Area**			
	2000		2005		2000		2005	
Group	*mean*	*max*	*mean*	*max*	*mean*	*max*	*mean*	*max*
Immigrants (tot)	1.330	1.944	1.195	1.465	2.742	4.022	1.938	2.992
UE 2001	1.758	2.736	1.540	2.037	2.205	3.735	2.099	3.679
East Europe	1.162	1.637	0.968	1.303	2.286	3.605	1.225	1.715
Africa	0.801	1.310	0.939	1.782	2.516	4.023	1.748	2.807
Asia	1.902	2.221	1.518	2.232	3.054	4.784	2.101	3.138
Latin America	2.119	7.100	1.069	1.579	2.660	3.866	2.381	4.072
Other	2.128	6.315	1.202	1.630	2.556	3.681	2.361	3.817
	South Area				**Other**			
	2000		2005		2000		2005	
	mean	*max*	*mean*	*max*	*mean*	*max*	*mean*	*max*
Immigrants (tot)	1.411	2.305	1.779	2.646	0.821	4.987	0.700	2.497
UE 2001	1.173	1.725	1.207	2.045	0.758	2.302	0.699	3.323
East Europe	1.302	1.998	1.703	2.298	0.838	3.026	0.706	3.108
Africa	1.571	2.938	1.905	3.065	1.038	9.026	0.978	8.179
Asia	1.302	1.820	1.632	2.541	0.496	3.096	0.517	2.716
Latin America	1.286	2.257	1.669	2.651	0.525	3.907	0.487	2.024
Other	1.164	1.997	1.604	2.484	0.572	3.869	0.492	1.950

Note: The statistics has been computed for each HTZ that is part of the four areas reported, then the mean and the max value by zone is reported for years 2000 and 2005.

Table 5: Mean and Max values for concentration statistic for seven immigration groups, by area and years.

NATIVES

Within city Areas 2000	**Within city Areas 2005**					**Outside**
	CENTER	VER	SOUTH	Other	*tot*	
CENTER	3.41	0.68	1.54	3.65	*9.29*	4.85
VER	0.67	0.89	0.89	2.46	*4.90*	2.59
SOUTH	0.76	0.28	10.52	8.81	*20.36*	10.90
Other	2.00	1.04	5.70	56.72	*65.45*	27.95
tot	*6.84*	*2.88*	*18.64*	*71.64*	*100.00*	*46.29*
Outside	5.60	3.48	13.34	31.28	*53.70*	

IMMIGRANTS

Within city Area 2000	**Within city Areas 2005**					**Outside**
	CENTER	VER	SOUTH	Other	*tot*	
CENTER	1.89	1.08	2.45	5.81	*11.24*	1.09
VER	1.06	0.90	1.41	3.92	*7.30*	1.23
SOUTH	1.21	0.44	8.43	14.01	*24.09*	2.69
Other	3.19	1.65	9.07	43.47	*57.37*	4.62
tot	*7.35*	*4.08*	*21.36*	*67.21*	*100.00*	*9.63*
Outside	9.43	5.86	22.45	52.64	*90.38*	

Note: Bordered block, for each group, reports the within city flows form one area to other or inside the same area, as a percentage of total within city movements from 2000 to 2005. Row "Outside" reports movements by 2000 from outside the city into the different areas; column "Outside" movements from the different areas away from the city to till 2005. Both values expressed as a percentage share of total outside city movements.

Table 6: Natives and immigrants flows distinctly form year 2000 to 2005 as a share of total flows.

	Italians	Immigrants						Range
		Tot	East Europe	North Africa	Sub Saharan Africa	Asia	Latin America	
Observations	102025	6152	1003	857	1544	1421	490	
House Features								
1) Conservation								
Very good	0.308	0.198	0.232	0.16	0.151	0.193	0.247	{0, 1}
Good	0.557	0.545	0.55	0.502	0.552	0.556	0.602	{0, 1}
Bad	0.126	0.22	0.196	0.248	0.261	0.213	0.141	{0, 1}
Very bad	0.009	0.036	0.022	0.09	0.035	0.037	0.01	{0, 1}
2) Age								
<1919	0.116	0.195	0.19	0.16	0.191	0.237	0.145	{0, 1}
1919 – 1945	0.088	0.117	0.102	0.138	0.114	0.116	0.112	{0, 1}
1946 – 1961	0.201	0.26	0.23	0.308	0.285	0.259	0.235	{0, 1}
1962 – 1971	0.251	0.241	0.242	0.204	0.264	0.237	0.288	{0, 1}
1972 – 1981	0.157	0.104	0.117	0.1	0.095	0.093	0.116	{0, 1}
1982 – 1991	0.112	0.049	0.066	0.054	0.028	0.037	0.057	{0, 1}
>1981	0.076	0.035	0.053	0.037	0.023	0.021	0.047	{0, 1}
3) Title of Enjoyment								
Owner	0.653	0.125	0.131	0.104	0.064	0.124	0.148	{0, 1}
Rent	0.285	0.835	0.8	0.87	0.923	0.817	0.819	{0, 1}
Other	0.062	0.04	0.069	0.026	0.013	0.059	0.033	{0, 1}
4) Property								
Natural Person	0.909	0.934	0.919	0.865	0.946	0.968	0.953	{0, 1}
Firm	0.015	0.019	0.029	0.016	0.012	0.015	0.018	{0, 1}
Co-op	0.005	0.005	0.001	0.02	0.005	0.001	0.002	{0, 1}
Public	0.004	0.001	0.001	0.002	0	0	0	{0, 1}
Municipality	0.025	0.016	0.02	0.046	0.011	0.003	0.012	{0, 1}
Welfare Istitution	0.006	0	0	0	0.001	0	0.002	{0, 1}
Housing projects	0.023	0.008	0.009	0.022	0.008	0.004	0.002	{0, 1}
Other	0.013	0.017	0.022	0.029	0.017	0.01	0.01	{0, 1}
5) Floors	4.199	4.065	4.209	3.761	3.822	4.203	4.431	[1, 17]
6) Internals	20.081	19.233	22.027	17.991	16.459	19.474	23.118	[1, 351]
7) Rooms	3.417	2.664	2.693	2.477	2.543	2.749	2.713	[1, 28]
Sqm	95.789	78.851	79.635	73.433	72.727	83.837	80.563	[14, 929]
8) Kitchen	0.737	0.662	0.635	0.642	0.676	0.675	0.65	[0, 2]
Household Head Characteristics								
9) Sex F	0.324	0.293	0.354	0.099	0.338	0.193	0.514	{0, 1}
10) Age	56.303	36.452	35.625	36.895	34.612	35.89	36.132	[17, 102]
11) Education (years degree)								
0	0.025	0.047	0.016	0.121	0.042	0.051	0.039	{0, 1}
5	0.271	0.084	0.043	0.143	0.103	0.089	0.073	{0, 1}
8	0.284	0.438	0.315	0.478	0.485	0.594	0.4	{0, 1}
11	0.079	0.109	0.203	0.068	0.111	0.06	0.102	{0, 1}
13	0.205	0.19	0.264	0.14	0.17	0.128	0.25	{0, 1}
16	0.013	0.028	0.035	0.011	0.02	0.017	0.049	{0, 1}
18	0.092	0.081	0.108	0.033	0.062	0.043	0.075	{0, 1}
>18	0.03	0.022	0.016	0.006	0.006	0.019	0.012	{0, 1}
12) Job								
Employed	0.336	0.676	0.674	0.703	0.752	0.713	0.574	{0, 1}
Self Employed	0.153	0.167	0.184	0.159	0.113	0.178	0.223	{0, 1}
Unemployed	0.511	0.158	0.142	0.138	0.135	0.109	0.202	{0, 1}
Household Characteristics								
13) # underage	0.335	0.468	0.511	0.543	0.466	0.462	0.413	[0, 9]
14) # family members	1.282	1.047	1.057	1.175	0.879	1.226	0.941	[0, 12]
15) Partner works	0.534	0.336	0.336	0.346	0.257	0.451	0.226	{0, 1}

Note: Mean values for household head and house characteristics from Census Data 2001, Verona Municipality. Mean values are conditioned to immigration group and for Italians. The range of variation is also reported for each variable.

Table 7: Mean levels and range of variation of family head and house characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)
	Immigrants	East Europe	North Africa	Sub Saharan Africa	Asia	Latin America
Area: CC	-0.033	-0.145	-0.497	-0.917	0.588	0.631
	(0.019)*	(0.024)***	(0.041)***	(0.037)***	(0.030)***	(0.084)***
Area: Veronetta	2.055	1.311	1.282	1.571	3.097	2.447
	(0.046)***	(0.034)***	(0.097)***	(0.059)***	(0.060)***	(0.116)***
Area: SA	0.507	0.524	0.400	0.320	0.758	0.656
	(0.010)***	(0.012)***	(0.022)***	(0.021)***	(0.016)***	(0.028)***
House Characteristics						
Quality: good	0.041	0.072	0.257	-0.053	0.350	-0.598
	(0.032)	(0.047)	(0.094)***	(0.060)	(0.058)***	(0.080)***
Quality: bad	1.005	1.051	1.730	0.965	0.444	-0.820
	(0.314)***	(0.168)***	(0.228)***	(0.305)***	(0.229)*	(0.126)***
Quality: very bad	0.889	0.547	2.712	-0.443	2.853	-1.059
	(0.244)***	(0.603)	(0.754)***	(0.093)***	(0.663)***	(0.104)***
Age: <1919	0.532	0.379	0.144	0.783	0.755	-0.345
	(0.034)***	(0.039)***	(0.058)**	(0.055)***	(0.067)***	(0.112)***
Age: 1920 – 1945	0.396	0.253	0.489	0.770	0.540	-0.156
	(0.035)***	(0.041)***	(0.069)***	(0.067)***	(0.060)***	(0.127)
Age: 1946 – 1970	0.368	0.292	0.126	0.767	0.512	-0.350
	(0.017)***	(0.023)***	(0.034)***	(0.038)***	(0.030)***	(0.054)***
Age: 1971 - 1991	-0.009	-0.019	-0.176	0.110	0.089	-0.413
	(0.013)	(0.020)	(0.028)***	(0.022)***	(0.023)***	(0.046)***
Rent	0.125	0.166	0.204	0.309	0.262	0.187
	(0.012)***	(0.013)***	(0.038)***	(0.024)***	(0.017)***	(0.034)***
Housing project	-0.431	-0.348	0.060	-0.569	-0.769	-0.946
	(0.021)***	(0.019)***	(0.043)	(0.061)***	(0.026)***	(0.042)***
Immigration Group						
East Europe	0.928	-	0.298	0.018	0.158	0.502
	(0.109)***		(0.363)	(0.103)	(0.070)**	(0.170)***
North Africa	2.405	0.094	-	0.308	0.112	-0.040
	(0.383)***	(0.067)		(0.203)	(0.086)	(0.150)
Sub Saharan Africa	2.034	0.242	0.282	-	0.362	0.513
	(0.099)***	(0.053)***	(0.141)**		(0.081)***	(0.131)***
Asia	1.114	0.174	-0.421	0.038	-	0.179
	(0.065)***	(0.059)***	(0.141)***	(0.101)		(0.139)
Latin America	0.441	0.093	-0.274	-0.130	0.201	-
	(0.163)***	(0.177)	(0.260)	(0.267)	(0.273)	
CS average attributes						
% of industrial buildings	1.582	1.198	1.992	3.773	0.538	-1.201
	(0.123)***	(0.114)***	(0.191)***	(0.327)***	(0.145)***	(0.170)***
% of public use buildings	2.139	7.366	-11.874	3.237	8.750	-2.267
	(0.873)**	(0.961)***	(2.425)***	(1.578)**	(0.840)***	(1.968)
Constant	1.145	1.058	1.984	2.123	0.887	1.255
	(0.061)***	(0.056)***	(0.187)***	(0.126)***	(0.070)***	(0.137)***
Observations	109242	109243	109243	109243	109242	109243
R-squared	0.17	0.08	0.05	0.06	0.15	0.03

Note: robust standard errors in brackets (*** significant at 1%). The benchmark family characteristics are: House conservation very good, age >1991, owner; household head is man, with average education level with unemployed partner. Unit of analysis is Household head. Regressions also control for interaction between age and global quality of the house, number of rooms, dimension; family had attributes: sex, age, education, job position, number of sons.

Table 8: Regression results of house and household head characteristics on concentration statistic for six immigration groups.