

Ethnic segregation and residential location choice of foreigners

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Abstract

Ethnic residential segregation is one of the key issues raising attention in today's urbanistic policies across European cities. As in the US and other traditionally immigration countries, the racial description of the neighbourhood is gaining in importance also in European states, given the increasing immigration rate of the last decades. It is widely argued that among others, two important factors driving segregation phenomena have a significant effect on the residential location choice of households, immigrants as well as natives, the first being represented by the preferences towards the concentration of co-nationals in specific neighbourhoods and second accounting for the presence of ethnic minorities at the neighbourhood level. Through a stated preferences experiment this study aims to assess the importance of such preferences on the neighbourhood choice across ten major national groups living in the city of Lugano, Switzerland. A mixed logit model is employed in order to represent the heterogeneity in valuing the presence of co-ethnic neighbours and immigrants in general among households of different ethnic backgrounds, socio-economic status, integration and attitudinal indicators.

Keywords

Ethnic residential segregation – stated preference experiment – mixed logit choice models

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1. Introduction

The recent increase of immigration in Europe has raised concerns about the integration of different communities into the hosting society. In this regard, a particular attention is directed to “new” immigrants who exhibit very distinctive and different characteristics than the hosting population and their tendency to voluntarily or involuntarily concentrate in specific neighbourhoods. Many politicians, sociologists, economists, urban planners and citizens in general are concerned with the consequences that the residential segregation can have on aspects of integration and social exclusion of immigrants in the new country contexts. There is a general fear that these tendencies could make the integration process more arduous¹, as well as influence the development of several urban areas. Even if the situation in Europe is not as severe as the one in US metropolises, in order to prevent the formation of ghettos, there is interest to explore whether the residential location choice is influenced by factors such as ethnical composition of neighborhood or grouping behavior of individuals of same origins, how strong this influence can be and which outcomes can it produce in the future.

When deciding on their residence households consider many factors such as the structural characteristics of the dwellings as well as those of the surrounding area (environment, distances, amenities, but also socioeconomic neighbourhood characteristics or ethnic composition of residents). When it comes to modeling such decisions and thus the preferences that households hold for each of the cited characteristics, it is necessary to identify the most important factors that drive the choice. In this paper we focus on the immigrant population in attempt to discover the importance that different ethnic groups place on the presence of their co-nationals in choosing their residence and its location. We also try to identify the preferences that the native population holds for the foreigners’ concentration in different neighbourhoods. The geographic level of the analysis are the neighborhoods of the city of Lugano in Switzerland, and the preferences for the segregation are studied in the context of the residential location choice models.

The paper starts with the literature overview focusing on European and Swiss studies analyzing the residential segregation phenomena. Section 3 presents the data used for the analysis, describing the spatial context and observed segregation patterns, as well as the stated preference experiment and the relative survey used as the data collection method. The theoretical background of the discrete choice models is presented in the Section 4, followed by the model specification and comment of the results in Section 5. Finally, the conclusions and proposals for the further research are presented in Section 6.

2. Literature review

The causes of residential segregation can be of diverse nature. Economists, sociologists, psychologists and urbanists all have developed theories over the potential forces that lead to the segregation phenomena, which can be grouped into two main branches, the first suggesting a voluntary nature of segregation caused by preferences for self-segregation, and second indicating the involuntary type of segregation as the primary segregation driving force. One of the most prominent examples from the economic theory is the Schelling's segregation model (1971), where he shows how even small preference for neighbours of same color can lead to total segregation.² On

¹ There is a large debate on positive and negative effects of the segregation for the immigrant population, nevertheless it is not the scope of this paper to investigate its pros and cons, but to analyze its driving factors.

² The assumption that Schelling makes is that the preference about the racial composition becomes predominant over all other housing and neighbourhood characteristic when the racial composition of the neighbourhood reaches certain percentages (tipping point), so the households choose to move away from these neighbourhoods.

the other hand, theories such as place stratification theory suggest that the segregation arises mainly due to factors such as income constraints, social exclusion, discrimination in the housing market and concentration of social housing (Van der Laan Bouma-Doff, 2007; Darden 1986). In this regard, Özüekren and van Kempen (2002) argue that the adequate policy strategies can be formulated only with the prior knowledge of the real segregation drivers. It is therefore fundamental to investigate if the segregation rises due to the self-segregation preferences of minority ethnic groups or due to the specific barriers in the housing market.

In assessing the preferences driving the residential location choice, one of the main methods used in the literature are the Discrete Choice Models (McFadden, 1974) and more specifically Residential Location Choice Models (McFadden, 1977). Various empirical studies have tried to assess the importance of different structural and location characteristics of dwellings as well as their surroundings on the residential location choice (Earnhart, 1998; Guo and Bhat, 2002). In fact, the households choose the neighbourhood that exhibits the best combination of attributes within the feasible choice set. This paper integrates the ethnical description of the neighborhood into the residential location choice models and measures its impact on the neighbourhood choice.

2.1. Segregation studies in Europe

Residential segregation has been intensively studied in US and other traditionally immigration countries. Nevertheless, being the immigration of larger scale a recent event in most European states, the phenomenon of ethnic segregation in Europe has been investigated only to some extent. This is due to still relatively moderate levels of segregation and small number of mono-ethnic areas (Musterd, 2005). However the increasing trend makes it necessary to study adequate strategies and measures aimed to avoid the negative consequences of segregation before it reaches levels difficult to manage.

A series of recent studies conducted mainly in northern European countries indicate a positive and significant effect of ethnic concentration on the residential location choice. Many of them investigate the initial settlement behavior and the subsequent mobility of immigrants. Zorlu (2007) finds that the presence of co-nationals and immigrants from other ethnic minorities as well as socioeconomic neighbourhood characteristics influence significantly the residential location choice in Netherlands. In another study, however, Hartog and Zorlu (2009) find no evidence on the existence of mono-ethnic neighbourhoods in the Netherlands, indicating the housing composition as the possible attraction factor for the low-income immigrants who often come from a variety of non-Western countries. These results are supported by Aslund (2005) who indicates among others the concentration of co-nationals and the overall immigrant density as two significant factors which play an important role in determining the immigrants' region of residence in Sweden, and interprets these results as the tendency for the immigrant population to become more geographically segregated over time. Vervoort, Flap & Dagevos (2010) indicate that studies about residential segregation often fail to consider social contacts with co-ethnics and other ethnic minorities in their analysis. They also focus on the importance to explore different dimensions of the neighbourhood ethnic composition, i.e. the percentage of ethnic minorities, the percentage of co-ethnics, and the degree of ethnic diversity.

Other studies explore the interaction of segregation and socioeconomic characteristics (Andersson, 1998; Musterd, 2005), as well as the question whether immigrants' location choices are determined by economic prospective and welfare programs (Bartel, 1989; Aslund 2005). Bolt, van Kempen & van Ham (2008) study the behavior of native Dutch living in neighbourhoods with a high share of ethnic minorities, finding that the Dutch are more likely to move out of these neighbourhoods than the minority ethnic residents. In one of the few studies about the segregation in France, Pan Ké

Shon (2010) finds that the mobility of minority ethnic groups out of the “sensitive neighbourhoods” is hard, especially for Africans, and that these groups tend to move from one disadvantaged neighbourhood into the other. While Musterd (2005) presents an overview of the ethnic and social segregation in Europe, Bolt (2010) tries to assess if the socioeconomic mobility and acculturation have an influence on the residential mobility, finding only a partial confirmation to this hypothesis.

2.2. Segregation in the Swiss context

Nearly 22% of the total population living in Switzerland are foreigners, the majority of which come from neighboring countries (Germany, France, Italy and Austria). Only a smaller proportion of foreigners are recent immigrants coming from poorer European and non-European countries, who arrived to Switzerland as working force or in search of asylum (Arend, 1991). Since in the past the residential segregation did not represent a big problematic in Switzerland, only few studies analyzing this phenomena have been conducted in some of the biggest cities of the country.

One of these is that of Michal Arend (1991), who divides the foreigner population into two categories specific to the Swiss context – the highly qualified and privileged foreigners on one hand and the guest workers and refugees on the other. From a study made in Zurich (1970, 1980) computing the Duncan and Duncan Dissimilarity Index (1955) emerges that these two clusters of foreigners exhibit a very different behaviour. While Germans and Austrians show similar behaviour as Swiss citizens, British and French tend to concentrate in “high quality” districts. Italians, Spanish and Turks, on the other hand, exhibit a greater concentration in “low quality” neighbourhoods. These results seem to indicate two segregation forces leading to the phenomena – the voluntary segregation caused by preferences to live with own co-nationals in more privileged neighbourhoods and the involuntary segregation caused by limited accessibility of low-income foreigners to higher quality districts.

In this study we are interested to investigate the nature of the segregation drive in Switzerland by exploring the preferences for self-segregation of immigrants from different nationalities and socioeconomic status, as well as analyzing the impact of time spent in the hosting country. Moreover we want to question whether a greater social-interaction with own co-nationals results in a higher propensity for residential self-segregation.

3. Data

The main dataset for this study is obtained through a Stated Preference survey which is currently taking place. Until now, the survey has been completed for 57 households from 6 out of 10 different nationality groups, residing in the city of Lugano and 5 neighbouring communes.

Besides data obtained through the SP experiment, other information including the current housing situation, as well as socioeconomic and behavioural characteristics describing the respondents' attitudes towards their neighbourhood were collected through a previously conducted Revealed Preferences household survey and are used for modelling the households' choice behaviour and preferences. The RP household survey was conducted in February and March 2008, and was completed for 1'397 individuals.

Other datasets included the MovPop dataset from the Cantonal Centralized Residents Control Office, which provided the necessary information for the spatial description of the existing segregation patterns across different neighbourhoods and nationalities; City of Lugano which made available the information about the distribution of foreigners in the City of Lugano and other relevant figures and i.CUP database from which we obtained geocoded information on location and environment for single dwellings as well as their neighborhood. All data from the MovPop database as well as from the RP household survey were georeferenced by means of the Geographic Information System (GIS).

3.1. Spatial context and observed segregation patterns

The spatial context of this study is the city of Lugano with its neighbourhoods and its 5 neighbouring communes. Lugano is one of the cities with a largest share of foreigners in Switzerland (about 40% of total population), including both privileged type of foreigners and economic or asylum seeking immigrants. Table 1 shows the major nationality groups residing in the Lugano area divided in the two mentioned groups.

Table 1. Total number of inhabitants per nationality group in the Lugano area

| Nationality group | Number of inhabitants | As % of inhabitants | As % of foreigners |
|---|------------------------------|----------------------------|---------------------------|
| <i>Swiss, Europeans, North American and Australian</i> | | | |
| Switzerland | 46'855 | 60,05% | - |
| Italy | 16'554 | 21,22% | 53,11% |
| EU, N. America and Australia | 2'097 | 2,69% | 6,73% |
| Germany | 928 | 1,19% | 2,98% |
| <i>Non Europeans and disadvantaged EU countries</i> | | | |
| Ex Yugoslavia | 5'278 | 6,76% | 16,93% |
| East Europe and Asia | 1'830 | 2,35% | 5,87% |
| Portugal | 1'806 | 2,31% | 5,79% |
| South America | 1'092 | 1,40% | 3,50% |
| Africa and Middle East | 881 | 1,13% | 2,83% |
| Turkey | 704 | 0,90% | 2,26% |
| Total number of foreigners | 31'170 | 39,95% | 100,00% |
| Total number on inhabitants | 78'025 | 100,00% | - |

Source: MovPop geocoded database.

Out of total foreigner population residing in the Lugano area the majority is constituted by Italian citizens representing 53% of all foreigner and 21% of the total population. On the other side, non Europeans and citizens of disadvantaged EU countries constitute 37% of foreigners and nearly 15% of all inhabitants of the area.

Due to still limited number of respondents to the SP survey, we limit this study to the investigation of preferences across the two above defined groups of inhabitants, i.e. Swiss, European, North American and Australian national on one side and citizens of non European and disadvantaged EU countries on the other.³ In further work, nevertheless, we aim to explore the preferences for self-segregation across singular nationality groups, as well as those of natives vs. other two foreigner typologies. From the database gathered from the RP household survey we present, in Table 2, some socioeconomic characteristics of respondents across these two typologies of inhabitants.

Table 2. Socioeconomic characteristics for the two groups of inhabitants in Lugano area

| | Non Europeans and disadvantaged EU countries | Swiss, Europeans, North Americans and Australian |
|--|---|---|
| <i>Number of respondents</i> | 756 | 634 |
| <i>Age*</i> | 38 | 52 |
| <i>Years in Switzerland* (foreigners only)</i> | 16 | 26 |
| <i>Education* (scale 1-6)</i> | 4,18 | 4,58 |
| <i>Job %</i> | 62% | 48% |
| <i>Unemployed %</i> | 8% | 1% |
| <i>Retired %</i> | 2% | 15% |
| <i>Number of household members*</i> | 3,03 | 2,66 |
| <i>Number of children*</i> | 0,79 | 0,41 |
| <i>Income* (scale 1-5)</i> | 2,49 | 2,71 |
| <i>Rent* (in Chf)</i> | 1'288 | 1'411 |
| <i>Owners %</i> | 9% | 35% |
| <i>House % (vs. Apartment)</i> | 7% | 24% |
| <i>Number of rooms per person*</i> | 1,22 | 1,76 |
| <i>Square meters of dwelling area*</i> | 94 | 120 |

*Average values.

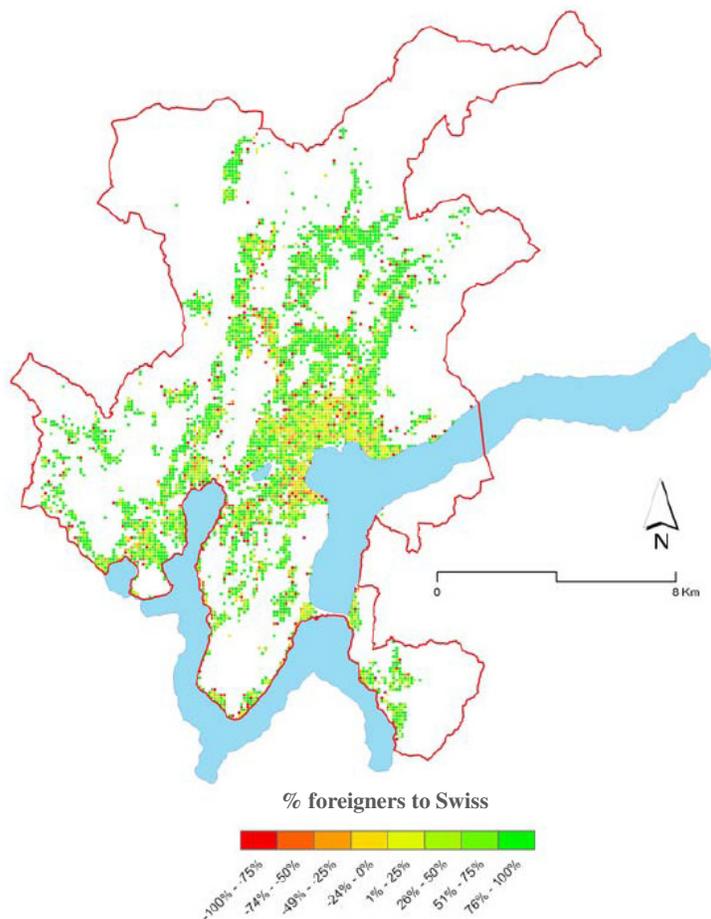
Source: RP household survey.

The first group is represented in average by younger and more recent immigrants compared to the second group of respondents. Their educational level is slightly lower, but their occupational as well as unemployment rate is relatively higher. This is consistent given their younger average age and therefore a much lower retirement rate than that of natives and other foreigners residing in Switzerland for a longer period of time. With respect to their familiar status, they live in larger households and have on average greater number of children. Their economic condition described by the household income is inferior respective to the second group of inhabitants. Moreover, they are less likely to own their own residence as well as to live in individual houses. They pay a lower rent for smaller apartments with regards to the number of rooms per person and the average square meters of dwelling area.

³ In this study we cluster natives with the privileged foreigners as they show similar socioeconomic and behavioral characteristics.

The spatial distribution of foreigners in the city is shown in the Figure 1. From the figure we can note the major concentration of foreign citizens in the city centre, while the suburbs are mainly inhabited by Swiss citizens and some of the privileged groups of foreigners.

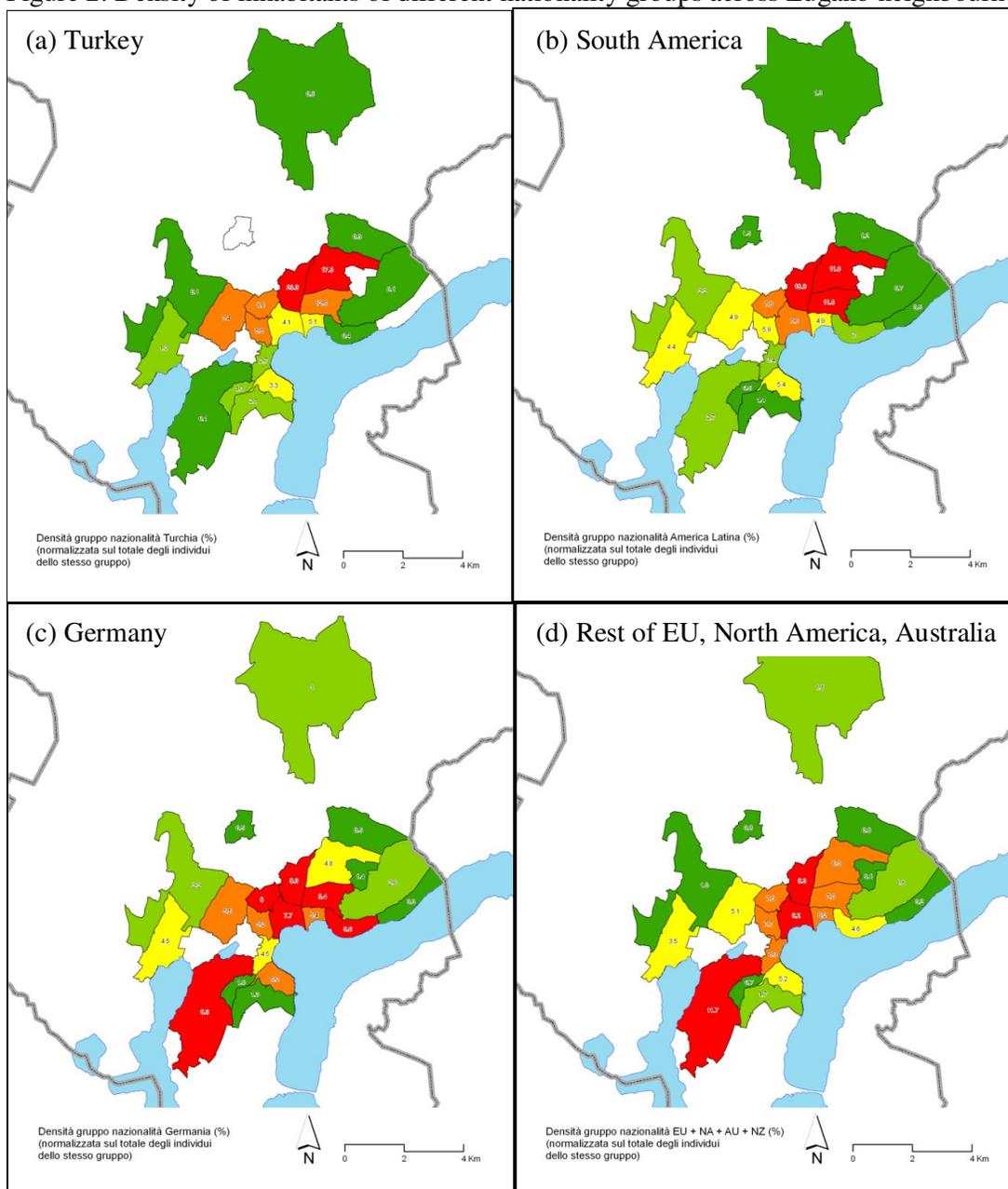
Figure 1. Hexametric density ratio between foreign and Swiss citizens in the city of Lugano



Source: i.CUP

The existing concentration in the city neighbourhoods of four different groups of nationalities is illustrated in the Figure 2. The first two graphs present the distribution of Turkish and South American immigrants, while the third and fourth graph represent the distribution of German and that of other European, North American and Australian immigrants. Two facts can be noted from this figure, on one side there is a major concentration of single ethnic groups in specific neighbourhoods. On the other side, the figure exhibits a concentration of the disadvantaged ethnic minorities in the neighbourhoods around the city centre, as well as major density of privileged groups of foreigners in the city centre and in the higher standard suburban neighbourhoods.

Figure 2. Density of inhabitants of different nationality groups across Lugano neighbourhoods



Density of inhabitants of a nationality group across neighbourhoods as a percentage of the total number of inhabitants of the same nationality group in the Lugano area.

3.2. Stated Preference experiment

The experiment consists in presenting the respondents a future hypothetical situation in which their neighbourhood of residence changed its ethnical composition in terms of co-nationals' concentration and foreigners' share. Because the characteristics of the dwelling itself do not change, but only the neighbourhood variables, this is equivalent to moving the existing residence to a new neighbourhood. Thus the respondents are asked to choose between the present residence, but with new neighborhood characteristics (reference alternative), and two alternative neighborhoods (hypothetical alternatives) described by the characteristics and respective attribute levels resulting from the experimental design. Other neighbourhood characteristics considered in the experiment

were the prices of dwellings and the travel time to work, attributes that are, according to the literature, the main factors driving the residential choice.

The experiment was designed in a pivoted stated preference setting, i.e. the hypothetical alternatives among which the individual had to choose were generated on the base of the currently chosen alternative. There were 4 attributes describing the alternative neighbourhoods (co-nationals' concentration, foreigners' share, dwelling monthly rent and travel time to work), each containing 5 levels (the reference value, +/- percentage deviations from the reference value), as described in the Table 3. The percentage deviations were set on basis of the context and characteristics of the city of Lugano. The resulting 25 choice situations were divided into 2 blocks, first block containing 13 and second 12 choice situations. The number of respondents was of 57 resulting in a total of 714 observations. The experiment was designed in orthogonal fashion using Ngene software.

Table 3. Attributes and levels description

| Attributes | Description | Levels |
|------------------------------------|---|---|
| <i>Co-nationals' share (%)</i> | Number of co-nationals in the neighbourhood over the total number of co-nationals in the city | -80%, -40%, reference value, +40%, +80% |
| <i>Foreigners' share (%)</i> | Number of non-Swiss residents over the total number of residents in the neighbourhood | -50%, -25%, reference value, +25%, +50% |
| <i>Dwelling monthly rent (CHF)</i> | The monthly rent of the dwelling | -50%, -25%, reference value, +25%, +50% |
| <i>Travel time to work (MIN)</i> | Travel time to work by the habitually used mode type | -20%, -10%, reference value, +10%, +20% |

Each choice situation contained two choice tasks, generating two different datasets: one with and one without the currently chosen alternative. Thus in the first choice task the respondents could choose to stay in the same neighbourhood, while in the second choice task they were forced to chose moving in one of the two alternative neighbourhoods. An example of the choice situation is presented in the Figure 3.

Figure 3. Stated preference choice situation example

We present you the characteristics of your present neighbourhood and those of two other neighbourhoods in the city of Lugano, in 10 years time. Imagine that you can choose to live in the dwelling same as yours, situated in one of these neighbourhoods.

| | YOUR HOUSE | "YOUR HOUSE" | "YOUR HOUSE" |
|---|--|---|--|
| | Present neighbourhood | Neighbourhood A | Neighbourhood B |
| % residents of your same nationality (of all resident in Lugano) | 13 | 18,2 | 13 |
| % NON Swiss residents in the neighbourhood | 40 | 40 | 50 |
| Travel time to work (in minutes) | 15 | 7,5 | 11,25 |
| Monthly rent (in CHF) | 1500 | 1800 | 1800 |
| Choice 1: <i>In which of these neighbourhoods would you want to live?</i> | I choose to stay in the present neighbourhood <input checked="" type="checkbox"/> | I choose to move to neighbourhood A <input type="checkbox"/> | I choose to move to neighbourhood B <input type="checkbox"/> |
| Choice 2: <i>If you could choose only between the neighbourhood A and neighbourhood B, which one would you choose?</i> | | I choose to move to neighbourhood A <input type="checkbox"/> | I choose to move to neighbourhood B <input checked="" type="checkbox"/> |

BACK CHOICE TASK NUMBER ONE NEXT

4. Theoretical background

Within the Random Utility Models framework (McFadden, 1974) the utility function associated to the individual n , for alternative j , in a choice task s , is defined as follows:

$$U_{njs} = V_{njs} + \varepsilon_{njs} \quad (1)$$

where ε_{njs} is the unobserved part of the utility function which is assumed to be IID (Independent and Identically Distributed) and under the Logit type of models distributed according to the Extreme Value Type 1 distribution. The observed (or systematic) part of the utility function (V_{njs}) is expressed as a linear combination of the observable variables:

$$V_{njs} = \alpha_j + \sum_{k=1}^K \beta_{nk} x_{njks} \quad (2)$$

where α_j are alternative specific constants (ASC) for $j-1$ alternatives.

According to the Random Parameters Logit (RPL) model (Train, 2003; Hensher and Greene, 2003) the coefficients associated to the observable variables can be specified in order to account for the unobserved heterogeneity among individuals. The heterogeneity can be captured by adding a random disturbance drawn from a normal distribution.⁴

$$\beta_{nk} = \beta_k + \eta_{nk} \quad (3)$$

When the model contains more than one random parameter and we permit correlation among them, then the standard deviations are no longer independent, but can be decomposed in true (i.e. attribute-specific) standard deviations and the attribute-interaction standard deviations through the Cholesky decomposition method. The Cholesky matrix will thus contain the real standard deviations, i.e. unconfounded part of the heterogeneity around the mean, on the diagonal and the cross-parameter correlations as the off-diagonal elements.⁵

Once the correlation among the attributes has been accounted for, the unconfounded part of the standard deviation can be explained by individual specific variables such as socioeconomic, attitudinal and other respondents' characteristics. In this context the random parameters are defined as follows:

$$\beta_{nk} = \beta_k + \delta z_n + \eta_{nk} \quad (4)$$

where z_n are the interaction terms between the attributes and individual specific variables.

The coefficients specified in (4) are estimated by maximizing the following log-likelihood function:

$$LL_n = \sum_n \ln \frac{1}{R} \sum_r \prod_s \frac{\exp(\alpha_j + \sum_{k=1}^K \beta_k x_{njks} + \delta z_n + \eta_{nk})}{\sum_j \exp(\alpha_j + \sum_{k=1}^K \beta_k x_{njks} + \delta z_n + \eta_{nk})} \quad (5)$$

where $r = 1, \dots, R$ indicates the random draws and $s = 1, \dots, S$ indicates the panel structure.

⁴ Some other commonly used distributions are the lognormal, triangular and uniform distribution (see Hensher and Greene, 2003).

⁵ See Hensher, Rose and Greene (2005) for details.

5. Model results

Based on the dataset collected until now, we have performed preliminary estimation of different types of models, from which we present the following random parameters logit (RPL) models selected on the basis of the goodness-of-fit measures and interpretability of results. The estimation is based on a dataset of 57 respondents, representing partially 6 out of 10 nationality groups. The estimated models thus represent the preliminary and indicative results that will be reviewed and models improved once the SP survey is completed.

The first basic model involves the estimation of a set of random parameters and allows for the correlation among them. Adding up to this basic model we explain part of the observed heterogeneity in the second model by including a set of observable individual specific variables. The evaluation of each model as well as the comparison among them is based on the Log-likelihood at the convergence, McFadden pseudo ρ^2 and the Akaike Information Criterion (AIC). The models have been estimated using Nlogit 4.0 econometric software and considering 200 Halton draws.

The estimation results are shown in the Table 4. Focusing on the first model we observe that the coefficients of travel time to work (TIME) and the monthly dwelling rent (COST) have the expected negative sign, representing the marginal disutility associated with these two attributes. For the cost attribute we distinguish between the random parameter associated to the hypothetical alternatives and the fixed parameter associated to the reference alternative in order to select the best model specification in terms of goodness-of-fit.⁶ The first of the two variables relative to the preferences for segregation, representing the percentage of co-nationals resident in the neighbourhood (NATCON) is found to be non significantly different from zero in the mean, however its significant standard deviation shows the presence of heterogeneity among respondents. The presence of foreigners (FORGCON), on the other hand, is negatively valued by individuals in general.

Given that in the first model a significant taste variation among individuals was found for the segregation variables, even after introducing the Cholesky decomposition that allows identifying the unconfounded part of the standard deviation of random parameters, we try to explain part of this heterogeneity by introducing relevant individual specific variables⁷ related to the research questions about the segregation patterns in the second model.

The first variable we test is the dummy variable NEU which takes the value of 1 if the respondent has a non European nationality⁸, in attempt to explore the preferences of these “new” immigrants and examine if they differ from those of the natives and European citizens⁹. The results of the second model show that the two groups exhibit different tastes in relation to residing near their respective co-nationals. The significant negative sign of the interaction NATCON:NEU indicates that the non European citizens tend to choose neighbourhoods with a lower concentration of their co-nationals, while the coefficient associated to the other group is not significantly different from zero. Non European immigrants also value negatively the share of other ethnic minorities in the neighbourhood, as shown by the negative sign for the variable FORGCON and the insignificant interaction FORGCON:NEU. In this case the tastes of the two groups do not differ, indicating the general negative valuation of the foreigners’ density in the neighbourhood.

⁶ The modeling issues over the reference vs. hypothetical alternatives and the relative implications of the inclusion/exclusion of the reference alternative in the choice set will be investigated in future research.

⁷ We tried introducing a variety of socioeconomic variables such as the income, education, age and religion, which for now we found not to be influencing different preferences for the segregation.

⁸ In our SP sample 32 respondents of Turkish, African, Middle Eastern and Latino American nationalities.

⁹ In our SP sample 25 respondents of Swiss, Italian and German nationalities.

Table 4. RPL model results

| | M1 | | M2 | |
|---|------------|-----------|----------------|-----------|
| | Base model | | Heterog. model | |
| | Par. | (t-ratio) | Par. | (t-ratio) |
| <i>Means for Random and Non-Random parameters</i> | | | | |
| NATCON | -0.0147 | (-0.77) | -0.0724 | (-0.87) |
| FORGCON | -0.0587 | (-4.30) | -0.1326 | (-3.00) |
| TIME | -0.2489 | (-16.01) | -0.2155 | (-16.04) |
| COST | -0.0101 | (-13.37) | -0.0116 | (-16.66) |
| RCOST | -0.0094 | (-8.11) | -0.0082 | (-6.96) |
| ASC Alternative A | 0.1391 | (0.08) | 3.2486 | (2.16) |
| ASC Alternative B | 0.1772 | (0.10) | 3.3339 | (2.21) |
| <i>Heterogeneity in mean</i> | | | | |
| NATCON:NEU | | | -0.1477 | (-3.00) |
| NATCON:CH10 | | | 0.2057 | (3.19) |
| NATCON:FRIENDS | | | -0.0949 | (-2.03) |
| FORGCON:NEU | | | 0.0100 | (0.40) |
| FORGCON:CH10 | | | 0.1000 | (2.63) |
| FORGCON:FRIENDS | | | -0.0096 | (-0.40) |
| <i>Diagonal values in Cholesky matrix</i> | | | | |
| NATCON | 0.1214 | (3.76) | 0.0534 | (1.76) |
| FORGCON | 0.0467 | (2.04) | 0.0500 | (4.78) |
| TIME | 0.1153 | (11.52) | 0.3450 | (27.16) |
| COST | 0.0024 | (5.79) | 0.0015 | (6.49) |
| <i>Below diagonal values in Cholesky matrix</i> | | | | |
| FORG:NATC | 0.0916 | (4.85) | -0.0576 | (-4.00) |
| COST:NATC | -0.0031 | (-9.70) | 0.0037 | (15.38) |
| COST:FORG | 0.0007 | (1.62) | -0.0011 | (-7.40) |
| TIME:NATC | 0.0856 | (9.01) | 0.1199 | (12.34) |
| TIME:FORG | -0.0110 | (-1.11) | 0.0441 | (4.72) |
| TIME:COST | 0.3498 | (23.77) | 0.2140 | (19.78) |
| <i>Standard deviations of parameter distributions</i> | | | | |
| NATCON | 0.1214 | (3.76) | 0.0534 | (1.76) |
| FORGCON | 0.1028 | (4.32) | 0.0763 | (6.25) |
| TIME | 0.3782 | (27.16) | 0.4256 | (45.84) |
| COST | 0.0039 | (8.05) | 0.0042 | (18.20) |
| <i>Model fits</i> | | | | |
| Number of Observations | 687 | | | |
| Log-L Restricted | -754.747 | | | |
| Log-L at convergence | -452.99 | -429.41 | | |
| Number of Parameters | 17 | 23 | | |
| AIC normalized | 1.3683 | 1.3171 | | |
| McFadden pseudo ρ^2 | 0.3998 | 0.4311 | | |

The second aspect we aimed to assess is whether the preferences for self-segregation change over time. By introducing the dummy variable (CH10) which indicates that the immigrant has been living in Switzerland for more than 10 years, we want to study if the segregation preferences vary for households that immigrated recently from those who have been living for longer time in the hosting country. The significantly positive sign of the interaction NATCON:CH10 shows that the foreigners that lived for longer in Switzerland choose more often the neighbourhoods with a higher concentration of the individuals from their origin countries. The significantly positive sign of the interaction FORGCON:CH10 shows, on the other hand, less negative preferences for foreigners' density compared to the more recent immigrants.

Since the segregation of different communities can occur in two dimensions, the residential dimension explored in this study and the social-interaction dimension where the foreigners tend to socialize mainly with the community of the same linguistic or national background, we aim to examine whether the individuals who exhibit the social-interaction segregation do also tend to reside closer to their co-nationals. We modeled this by use of the dummy variable FRIENDS, indicating the respondents whose majority of friends comes from their native country, finding that the self-segregation at the residential level is negatively valued for this group of respondents.

Overall, by modeling the heterogeneity with introduction of the individual specific variables the goodness-of-fit of the second model has been significantly improved according to the Log-likelihood ratio test, as well as lower AIC indicator, and higher McFadden pseudo ρ^2 . The results given in this paper, nevertheless, will be validated in further research step and the rationale of the findings investigated more in depth.

6. Conclusion

This paper contributes in expanding the knowledge about the residential segregation drivers in the context of a middle sized city of Lugano in Switzerland. It assesses the self-segregation preferences of different groups of immigrants, as well as the impact that the foreigners' density has on the neighbourhood choice. Two preliminary random parameter logit models are estimated from data obtained from the stated preferences experiment, a basic model that involves the estimation of set of random parameters in order to explore the existence of heterogeneity in the attribute preferences, and a second model which explains part of this heterogeneity through inclusion of relevant individual specific variables. The preliminary results suggest that the non European immigrants tend to choose neighbourhoods with a lower concentration of their co-nationals. Likewise they exhibit aversion towards neighbourhoods with a higher percentage of foreigners, but their preferences do not differ from natives and European citizens in this respect. Moreover, we find that foreigners that live for longer time in Switzerland choose more often neighbourhoods with a higher concentration of the individuals from their origin countries and exhibit less negative preferences towards the foreigners' density compared to the more recent immigrants. Finally, the results show that the segregation on the social-interaction level influences negatively the segregation at the residential level.

This study presents some limitations that shall be addressed in future research. The weakest point is the limited number of observation used for the analysis, which will be incremented with the completion of the survey. Once the SP database is completed, the results given in this paper will be validated and the rationale of the findings investigated more in depth. We also aim to improve the models' specification as well as investigate the use of other alternative models that can account for heterogeneity and represent better the behavioral aspect of the neighbourhood choice. In this sense we will try the estimation of latent class choice models and the introduction of attitudinal indicators, as well as of other socioeconomic characteristics important for explaining the heterogeneity in segregation preferences for different types of households. Finally, we will also be able to represent and study the segregation preferences across singular nationality groups, as well as those of natives vs. other two foreigners' typologies as described in this study.

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