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Changes in the ethnic composition of neighbourhoods: Analysis of household's response and asymmetric preference structures

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Short Abstract

When choosing their neighbourhood of residence, people take account of ethnic composition of its inhabitants. Relating to their experience, households may evaluate alternative neighbourhoods based on ethnic characteristics of their current residential location, showing sensitivities to changes in the levels of co-ethnics and/or other ethnic minorities. This study uses a pivoted choice experiment to explore the asymmetric preference structures for ethnic composition of neighbourhoods. Our empirical example applied to Swiss city of Lugano confirms the existence of asymmetries, showing that individuals tend to be averse to decreases in the share of their co-nationals, while being indifferent to any increases.

Full Abstract

When choosing their neighbourhood of residence, people take account of the ethnic composition of its inhabitants. Relating to their experience, households may evaluate alternative neighbourhoods based on the ethnic characteristics of their current residential location. They could thus be sensitive to changes in the presence of their co-ethnics or other ethnic groups, exhibiting different valuations for increases and decreases in ethnic concentrations. To test these assumptions, this study uses a pivoted choice experiment, analysing the reference-dependence and asymmetric preference structures for ethnic composition of neighbourhoods. The aim is to empirically examine hypotheses of Schelling's segregation models, which indicate the asymmetries in ethnic preferences to be at the basis of existing segregation outcomes. The main findings of the empirical application in

Switzerland confirm the existence of such asymmetries. In line with Schelling's assumptions regarding weak ethnic preferences (Schelling, 1971), individuals tend to be averse to decreases in the share of their co-nationals, while being indifferent to any increases. The heterogeneity in preferences however plays a relevant role across different population segments.

JEL classification: D110; D120; R200; R210; R230.

Keywords: residential location choice; ethnic residential segregation; pivoted choice experiment; reference-dependence; asymmetric preferences.

1. Introduction

Residential location choices have a major impact on the development of urban areas. Diverse socio-economic segments of inhabitants which choose to live in certain residential locations create specific demands for infrastructure and services which shape the path of change in their neighbourhood. One of the multiple socio-economic dimensions of particular interest across European cities in last decades is the ethnic composition of neighbourhoods and its impact on a variety of socio-economic and urban elements. According to the ethnic segregation literature, the presence of co-ethnic neighbours and the presence of ethnic minorities in a neighbourhood are potential key drivers of residential location choice for immigrants as well as natives. In fact, it is widely observed that these two characteristics have an impact on residential location choices not only in the US but also in Europe (Aslund, 2005; Bolt and Van Kempen, 2003; Schaake et al., 2010; Van der Laan Bouma-Doff, 2007; Zavodny, 1999; Zorlu and Mulder, 2008; Ibraimovic and Masiero, 2014) and that there is potentially a strong size effect, i.e. this impact can be stronger or weaker depending on the existing level of ethnic concentrations in a specific neighbourhood or urban context (Van der Laan Bouma-Doff, 2007). In this sense, ethnic preferences could be negligible in contexts where the concentration levels are low, but quite important for environments where a strong ethnic segregation dominates the urban scene. This connects directly to Schelling's (1972) idea of tipping points in residential segregation dynamics, where ethnic preferences become dominant over other location choice drivers as soon as ethnic concentrations in the neighbourhood reach certain levels, thus making households want to move out of such neighbourhoods into "ethnically" more desirable ones.

Such tipping points in the levels of ethnic concentrations have been approached through various theoretical, analytical and simulation models based on Schelling's pioneering work (1969, 1971, 1972, 1978). Many of these models indicate or assume asymmetric structures of preferences for different degrees of neighbourhood ethnic integration[1]. For example, in a unified analytical version of two classical Schelling's models[2], Zhang (2011) uses an asymmetric utility function where individuals prefer to live in an integrated (half white, half black) neighbourhood, but if this is not the case they prefer to be a majority rather than a minority. Even Schelling (1971) himself assumes weak preferences for an integrated neighbourhood, where individuals are equally happy with any neighbourhood composition, thus also with the perfect integration, as long as their ethnicity represents at least a majority of residents[3]. Such asymmetries in preferences are argued to be at the basis of high degrees of segregation existing in many urban contexts, especially in the US. Indeed, the literature findings indicate that even though people prefer integration as the best state, if they hold weak preferences for the same ethnicity in the absence of perfect integration, this leads to highly segregated outcomes (Schelling, 1972; Zhang, 2011; Pancs and Vriend, 2007)[4]. Moreover, Pancs and Vriend (2007) test the robustness of Schelling's models considering all possible levels of ethnic preferences through different

[1] That means, when departing from a perfectly integrated neighbourhood situation, individuals tend to have higher utility from being a majority group than being a minority group in a neighbourhood.
[2] The checkerboard model and the neighbourhood tipping model.
[3] Such assumption in the neighbourhood tipping model is referred to as the "limit of tolerance" of the other group, which can vary accross ethnic groups.
[4] We are thankful to the anonymous reviewer for suggesting us some important literature references in this domain.

asymmetric utility functions[5]. In their first model type, they find that the best response dynamic will lead to segregation even if individuals hold strict preferences for perfect integration; while in the second model type they argue that "the key element driving the segregation is the asymmetry in the utility function, i.e., the fact that agents favour a large-majority status over a small-minority status".

Despite the widespread acceptance of the above ideas on asymmetries, it could be argued that the empirical foundations producing this evidence base have some weaknesses. Indeed, previous empirical studies on ethnic preferences (e.g. Farley et al., 1978; Clark, 1991, 1992; Charles, 2000, 2003) have been widely based either on direct questions in hypothetical settings or on the *Farley-Schuman showcard methodology* (Farley et al., 1978) and related methods, which consider the ethnic characteristics in the neighbourhood as the only location choice drivers. In reality, individuals choose their neighbourhood based not only on ethnic but also other neighbourhood characteristics, trading off such characteristics against each other based on their preferences. This paper thus aims to empirically test the hypothesis of previous theoretical and analytical models regarding ethnic preferences and their asymmetric nature, but allowing for the fact that residential location decisions are likely influenced by a multitude of factors. Discrete choice models are widely used to study individual level decision making across numerous research areas (see Train, 2009). They allow us to gain an understanding of the relative importance of different characteristics of a neighbourhood, permitting us to derive trade-offs and willingness-to-pay (WTP)

[5] See Pancs and Vriend (2007) for a graphic representation and description of different asymmetric utility functions.

measures to establish the weight ethnic preferences have in the utility function vs. other residential location choice drivers[6]. The insights can be refined by accounting for heterogeneity in preferences according to individuals' socio-economic and ethnic characteristics, and, as we show in the present paper, allowing for differences in the way respondents react to increases and decreases in a given attribute.

The notion of differential consumer response to improving or worsening a characteristic of an alternative/product is not new within the context of the analysis of decisions using discrete choice models. Indeed, it is known (see e.g. de Borger and Fosgerau, 2008; Hess et al., 2008) that individuals often evaluate alternatives and their characteristics with respect to some reference point, being sensitive to changes from their reference rather than to states. Moreover, sensitivities could differ depending on whether we look at positive or negative deviations from the reference values, leading to asymmetries in preferences around this starting point. In the residential location choice domain, the utilities of various alternative residential locations might be dependent on the experienced levels of co-ethnics or ethnic minorities in the current neighbourhood of residence, whereas the increases in current ethnic concentrations could be evaluated differently than decreases. For example, people might have a strong dislike for increases of ethnic minorities in the neighbourhood, while valuing their decrease to a lesser extent or even being indifferent to it. Similarly, given the positive preference for residential proximity to co-ethnics, people might strongly dislike decreases in the rate of co-ethnics, while being less sensitive, and thus valuing less positively, any increases. Such preference asymmetries are a key

[6] See Ibraimovic (2013) for an extensive analysis to residential choice.

component of the prospect theory framework of Kahneman and Tversky (1979) and evidence thereof can be found in different contexts, notably in the form of *loss aversion*, i.e. higher valuation for (monetary) losses than for gains which is often found in situations of decision making under risk. Accounting for reference-dependence and asymmetries in preferences in the choice modelling domain can not only result in gains in the model fit, but can also give important insight into the loss aversion effects in choice behaviour. The impact of such effects on welfare measures has been demonstrated across applications stemming from a range of disciplines, from transport (e.g. Hess et al., 2008; Masiero and Hensher, 2010) to marketing (e.g. Hardie et al., 1993; Klapper et al., 2005). In the residential location choice literature only a handful of studies have looked into these issues (e.g. Habib and Miller, 2009), and, to the best of our knowledge, asymmetric preferences have not yet been explored in the context of residential choice models focusing on ethnic segregation drives.

Accordingly, we seek to address some important questions which arise in this context: i) Given a certain ethnic concentration level in a specific neighbourhood, how do people react to increases and decreases in the presence of their ethnic community members or changes in the number of foreign neighbours? ii) How do these reactions translate into WTP measures and how people trade off ethnic and other residential location choice drivers against each other? iii) Do preferences and asymmetries in preferences differ according to individuals' origins or other socio-economic characteristics?

A crucial point arising in this context is that of an appropriate data source for testing our hypotheses. This is the second novel element of our study. Past studies

looking at using discrete choice models to study ethnic segregation would have relied on revealed preference data, i.e. information on real world residential location choices. While the use of real world data is of course in many ways desirable, it removes the ability for the analyst to *control* the scenarios in which choices are made. This in turn limits the richness of the data, preventing us from truly exploring how a decision maker would react across a variety of contexts. In order to address our research questions we thus follow the work of Ibraimovic (2013) and Ibraimovic and Masiero (2014) who use a pivoted Stated Preferences (SP) experiment[7] of neighbourhood choice and model preferences for ethnic neighbourhood attributes employing discrete choice models.

The SP choice survey (Ibraimovic, 2013) used for the empirical analysis brings about two main benefits. Firstly, by presenting respondents with multiple choices involving shifts in either direction for key neighbourhood characteristics, it permits the analysis of asymmetries in preferences for different residential location choice drivers giving an insight into the impacts of potential changes from the present neighbourhood situation and characteristics. Such asymmetries might also have a large impact on willingness to pay (WTP) and willingness to accept (WTA) measures, where the former relates to paying for improvements in a desirable attribute (or reductions in an undesirable one) and the latter relates to requiring monetary incentives to accept reductions in a desirable attribute (or increases in an undesirable attribute). Accounting for these effects leads to more

[7] Hypothetical choice experiments are generally used and widely applied method for studying preferences in situations where revealed preferences data are not available (e.g. new products on the market), or in markets subject to choice constrains (Louviere et al., 2000), the latter being the case of choice-constraint issue in residential location choice decisions for ethnic minorities (see Van der Laan Bouma Doff, 2007; Ibraimovic and Masiero, 2014). Moreover, in this type of experiment, the choice scenarios presented to respondents are framed around real world settings, increasing realism and reducing the risk of hypothetical bias.

accurate estimates of monetary values attached to different location attributes especially when considering the aspect of population heterogeneity. Secondly, the use of a pivoted experiment where choices are framed around real world settings rather than abstract decisions, greatly increases realism. It permits the adequate representation of the urban context under analysis, thus adapting the study and results to the existing ethnic characteristics of different residential areas, as well as representing housing choice situations similar to ones that inhabitants face in the real housing market. Such elements are essential for policy guidance, giving insight over reactions to changes in ethnic concentrations, thus permitting the analysis of potential developments in future segregation dynamics.

In addition to testing whether asymmetries in preferences exist in the context of our experiment, we specifically look at whether this varies across different population groups. In line with earlier indications in the choice modelling literature, this is crucial in revealing the existence and assessing the impact of preference asymmetries (see for example Klapper et al., 2005; Nicolau, 2012). The context under analysis suits well to reaching such a goal. Indeed, the constant growing trend of immigration in Switzerland, a conspicuous foreign population and a wide diversity of foreign communities, made the discourse on management of ethnic pluralism and clustering in cities an important novel topic in the political and urban debate. This study focuses on the Swiss city of Lugano, one of the main recipients of increasing immigration trends in the country, with nearly 40% of foreign residents. For empirical evidence, we aim to investigate the potential effects of such trends on the housing location choice behaviour of different ethnic groups.

The paper is structured as follows. In Section 2, we present the geographical settings, discussing the housing market and ethnic concentration patterns in urban context under analysis. In Section 3 we describe the data along with the SP experiment of neighbourhood choice and descriptive statistics of the sampled population. This is followed, in Section 4, by an outline of the theoretical framework of discrete choice models and of different model specifications used. The results are presented in Section 5 while conclusions and suggestions for further research are discussed in Section 6.

2. The geographical settings, housing market and ethnic concentration patterns

Geographical settings and the national housing market

The geographical setting of the study is the highly ethnically mixed city of Lugano in Switzerland, with nearly 40% of foreign residents which come from more than 140 different nations world-wide. Lugano is the ninth largest city in Switzerland by population[8] and the biggest city of Canton Ticino, an Italian-speaking area of Switzerland. The city lies on Lake of Lugano and is surrounded by Lugano Prealps.

The housing sector in Switzerland is strongly decentralized and cities hold the main responsibility on housing issues and policies (Kakpo and Cattacin, 2013). Nevertheless, there is a general framework of common regulations and specific features similar throughout the country.

[8] With around 63'000 inhabitants in the Municipality and 150'000 inhabitants in the District, Lugano reflects the average small to medium city size characteristic to Swiss urban context.

The first specificity is the relatively low ownership ratio of 37,5 % in 2013 (Swiss Federal Statistical Office, 2016), while the private rental market is well-developed and dominates the national housing scene (Schneider and Wagner, 2015). Secondly, the public sector in Switzerland has a marginal role in the residential market as compared to the private sector. In fact, public entities detain less than 1% of total housing stock in the Canton Ticino (Swiss National Census, 2000). Thus it is the private rental market that accounts for more than 60% of Swiss population (Kakpo and Cattacin, 2013). Thirdly, the social housing does not really exist in Switzerland, but it is replaced by particular forms of subsidization (Kakpo and Cattacin, 2013), mainly aimed for the housing developments and limited to a certain time-period. The objective of such subsidization policy is to encourage the construction of housing units offered at below-market rents, or so called "affordable housing units" (Bourassa et al., 2009)[9], while the renal aid is far less developed and available in some cantons only (Schneider and Wagner, 2015).

As in the rest of Switzerland, the residential housing market in Lugano is much less regulated with respect to other EU countries. Nonetheless, some important laws exist, among which the main are rent price regulations and some restrictions of ownership by foreign citizens. The landlords are free to choose the tenants and the rent prices are freely agreed between the parties.[10] However, the rent price regulations prevent modifications of the agreed prices during the tenancy, except in case of important restructuring or increases in interest rates (Bourassa et al., 2009). The intention of such regulation is to protect the tenants and the housing

[9] Dwellings fundend by the state in Switzerland represent 11% of the housing market (Swiss National Census, 2000).
[10] There are no publicly acessible information on prices, neither for the rents nor for the ownership. The only information on market prices is driven from the private ads indicating the asking prices.

market from the speculative increases in housing prices and encourage the long-term rental tenure (Bourassa et al., 2009); however it also has the effect of creating the price scissors[11] which limits the housing mobility.

Immigration trends, ethnic residential clustering and the local housing market

In studying the Swiss foreign population and their residential behaviour some peculiarities regarding the structure and typology of foreigners should be taken into account (Schaerer and Baranzini, 2008). According to Wanner (2004), foreigners in Switzerland represent a very heterogeneous group, characterized by a very high degree of diversity, either in terms of national origin, migration experience, education level, family and professional situation or spatial location. In particular, he stresses the socio-economic and demographic diversity of two distinctive groups of foreigners, those from Western and Northern European countries and the migrants from Southern European and non-EU member states. Not only does the latter group exhibit comparatively lower socio-economic status, but differences also exist in the recognition of professional degrees, languages spoken, types of residence and work permits and rights granted by such permits. All these factors could potentially condition their demand for housing and their residential behaviour.

Given the relatively low patterns of segregation and a good level of integration of the Swiss foreign population in the past (Wanner, 2004; Kakpo and Cattacin, 2013), the literature on ethnic clustering in the country is rather scarce (Schaerer and Baranzini, 2008). Using the Duncan and Duncan (1955) segregation index

[11] Where older contracts tend to have significantly lower rents as compared to new contracts.

Wanner (2004) finds that the segregation of foreign communities in Switzerland is generally not very relevant. However, he also shows significant increasing trends of segregation index from 1979 to 2000, as well as phenomena of ethnic concentrations which can be observed in different urban contexts and for different ethnic groups. In fact, the recent spatial localisation of foreigners follows a stronger trend than grouping upon other socio-economic characteristics (Wanner, 2004).

As in the rest of Switzerland, residential segregation in Lugano did not represent a big problem in the past. Thus, no specific studies on ethnic segregation have been previously conducted in the city and no anti-segregation measures implemented by the public policy makers. Yet, with a relatively recent arrival of immigrants from more distant countries and cultures, the role of ethnic composition of neighbourhoods has gained in importance. Not only has the ethnic spectrum of different nationalities widened, but since the introduction of freedom of movement between Switzerland and the EU member states in 2002, the immigration from European countries has risen significantly. The appeal of Lugano region as one of the main business and touristic zones of Switzerland has enhanced the attractiveness of the City for EU and international professionals. Such increasing immigration trends, coupled with low borrowing costs and shortage of the housing supply has boost up the housing prices in the last decade.[12] There is a particular concern of the city authorities on the pressure in the

[12] A study by the Swiss Federal Housing Office highlights the correlation between the freedom of movement, shortage of housing stock and rental price increases between 2005 and 2010 (Credit Agricole, 2012). This is also confirmed by Degen and Fischer (2010) which relate growing immigration rates to increases in housing prices in Switzerland.

rental market and specifically in the affordable housing segment.[13] The same tendency of constant and increasing shortage of affordable housing units particularly in bigger cities (Kakpo and Cattacin, 2013) is present also at a national level.

The lack of public intervention in the housing domain in Lugano makes that the choice of residential location is very much subject to the preferences and economic possibilities of households, as well as to the offer in different city locations. Such trends might further reinforce the double concentration patterns according to the socio-economic status, which in many cases also corresponds to specific ethnic background of immigrants. This is becoming more evident when we look at the concentration patterns of different nationalities in different city neighbourhoods. Indeed, the observed spatial distribution of foreigners across Lugano neighbourhoods suggests two distinct ethnic concentration patterns: on one hand a mix of disadvantaged ethnic communities in densely populated urban residential areas and on the other hand larger concentrations of advantaged foreigners and natives in more attractive central and suburban neighbourhoods. Moreover, a certain degree of concentration of single nationality groups exists, where the Turkish, South and North American and some European nationalities exhibit the highest concentration levels (Figure 1).[14] In this case, clustering of single nationality groups could be also due to a preference for living among the own ethnic community. Nonetheless, one of the significant features of the local housing market is a good housing mix in different city neighbourhoods as well as

[13] In 2013 the Municipality of Lugano has conducted a study on the local housing market in relation to a new housing plan of affordable housing and potential public policies (Planidea, 2013). The plan does not directly target foreigners but through lower socio-economic population segments it indirectly concerns housing opportunities for disadvantaged ethnic groups.
[14] For a detailed description of ethnic characteristics of Lugano see Ibraimovic (2013) and Ibraimovic and Masiero (2014).

a compact urban form. Such elements contrast the onset of ethnic segregation in its strict definition, which appears more in the form of higher or lower concentration rates of different nationality groups across city neighbourhoods.

[**Figure 1. Density of inhabitants of different nationality groups across Lugano neighbourhoods -** placed about here.]

[**Figure 1. Caption**: Density of inhabitants of a nationality group across neighbourhoods as a percentage of the total number of inhabitants belonging to the same nationality group in the Lugano area. Source: iCUP.]

All these specific features of the Swiss housing market together with the structure of the country's foreign population, their peculiar demand and economic status, could have an impact on shaping the social and ethnic composition of the population in different urban and suburban areas. In fact, in a context of free choice of residential location coupled with the large size of the private rental market characterised by an easier residential mobility, mutating neighbourhood characteristics such as the ethnic population composition or changes in rental prices might have important and rapid implications. For example, a high concentration of advantaged nationality groups could have the tendency to increase the prices at the neighbourhood level through the demand for luxury housing stock as well as by adding to the attractiveness of the neighbourhood by enhancing the investment possibilities in infrastructures and facilities due to higher income taxes. This could lead to involuntary dislocation not only of less wealthy ethnic groups but also of natives out of such neighbourhoods. On the other hand, a high concentration of disadvantaged foreign communities could lead to a "white flight" phenomenon (or in European terms, a voluntary relocation of

natives and wealthier foreigners) with the consequence of lowering housing prices as well as the investment in the housing stock, facilities and infrastructure.

However no previous studies have been conducted to explore the real and potential effects of changes in ethnic composition of neighbourhoods in Lugano.[15] This study analyses the reactions and measures the importance of hypothetical changes in ethnic shares in different neighbourhoods, giving an idea of the potential effects this might have on the residential behaviour of different ethnic communities. It also aims to investigate if the observed concentration patterns are mainly due to voluntary clustering and whether the preferences differ across ethnic and socio-economic groups. This reinforces the importance of obtaining a proper understanding of the relative importance of key neighbourhood characteristics, which is the core aim of this study. Thus, for representing such concentration patterns we consider i) the spatial clustering of single nationality groups and ii) the spatial division of foreign communities and the native Swiss population. Both of these are included in the stated choice experiment through two ethnic variables: “the concentration of co-nationals” and “the share of foreigners” in the neighbourhood.

3. Data

The main dataset used for the empirical analysis was collected through a neighbourhood stated choice study conducted in the Swiss city of Lugano in 2010, using a face-to-face computer aided questionnaire. For full details on the survey see Ibraimovic and Masiero (2014). The spatial units of the analysis are city

[15] Analysing the direct implications of concentration of ethnically and socio-economically similar profiles on the local housing market is beyond the scope of this paper. However, it constitutes an important topic for further resaerch.

neighbourhoods which represent the choice alternatives in the survey. A secondary data source, containing information about the present neighbourhood of residence and socio-economic characteristics of households was gathered from a previously conducted household survey. Both surveys were completed as a part of a broader research project[16] aimed at analysing residential location decisions of different nationality groups residing in Lugano and their propensity towards ethnic concentration.

3.1. Stated preference experiment of neighbourhood choice

The survey presented respondents with multiple tasks, each time looking at a future hypothetical situation where their neighbourhood of residence changes its ethnical composition in terms of the concentration of co-nationals and the share of foreigners. Respondents were then asked to choose from three alternatives: stay in the present neighbourhood of residence (representing the reference alternative) or move to one of the two unlabelled hypothetical neighbourhoods (neighbourhood A and neighbourhood B).[17] The attribute levels of the hypothetical neighbourhoods were pivoted around the reference alternative values, with changes in ethnic concentrations, rent prices and travel time to work according to an orthogonal experimental design.[18] The dwelling did not change in its

[16]"Effects of Neighbourhood Choice on Housing Markets: a model based on the interaction between microsimulations and revealed/stated preference modelling" funded by the Swiss National Science Foundation.

[17] It is important to stress that our survey does not ask direct questions about preferences but uses a broader context of choice tasks requiring trade-offs between different attributes. It is thus difficult to observe by the interviewer what the main choice driving factors of respondents in different choice tasks are, making the stigma of being classified as racist not applicable in this context. We also checked that point by a pre-survey question asking if respondents minded the nationality of their neighbours (with a large majority answering negatively), but then SP choice experiment revealed the existence of ethnic preferences. This is a key advantage of SP choice experiments, making them less prone to hypothetical and strategic bias than direct questions.

[18] For a review on stated preferences experimental design techniques applied to choice modelling see Louviere et al. (2000) and Hensher et al. (2005).

characteristics across alternatives; thus this is equivalent to moving the existing residence to a new neighbourhood.

The inclusion of a reference alternative added to the credibility of the experiment, permitting respondents to recognise a familiar situation and thus answer more realistically to the presented choice tasks. Moreover, given that the attribute values of hypothetical alternatives were designed as positive and negative percentage changes around the reference point, separate coefficients for increases and decreases in the relative attribute values could be defined (cf. Hess et al., 2008), allowing us to model sensitivities for increases in such attribute levels as well as decreases.

[**Figure 2. Stated preference choice situation example. -** placed about here.]

[**Figure 2. Caption**: The figure illustrates an example of the stated preferences choice situation presented to respondents in a computer assisted interview. Each respondent was asked to respond to 12 or 13 different choice tasks, which varied in values of attributes describing the three alternative neighbourhoods.]

Given the main effects fractional factorial design, the experiment resulted in 25 different choice situations divided into two blocks, the first block containing 12 and the second 13 choice situations, each appearing as in Fig. 2. Values of the attributes describing hypothetical alternatives varied across each choice situation, while the attributes of the reference alternative were kept constant for each respondent representing the values of his/hers current residential location. The four selected attributes describing the alternative neighbourhoods were 1) the concentration of co-nationals, 2) the share of foreigners, 3) the monthly dwelling

rent, and 4) the travel time to work.[19] It is important to note that while the concentration of co-nationals is a comparison with the city-wide concentration, the share of foreigners relates to the neighbourhood alone. For each attribute, five different levels were used, namely the reference value (corresponding to the attribute value of the respondents' actual neighbourhood of residence) and +/- percentage deviations from the reference value, as described in Table 1. Each respondent was presented with one of the two blocks from the design, gathering a database with a total of 1,665 valid choice observations from 133 respondents.

[**Table 1. Stated preferences experiment: description and sample statistics** - placed about here.]

Descriptive statistics of neighbourhood attribute values obtained from the population sample (Table 1) are consistent with the mid-sized urban environment and are in line with the housing market and the ethnic distribution patterns in the city of Lugano. In fact, a high variability of ethnic concentration across city neighbourhoods can be noted, both in terms of the concentration of groups with a single nationality (ranging from 3% to 48%), as well as in terms of the share of foreigners (ranging from 16.3% to 57%). The average monthly rent of CHF 1,485 corresponds to the market rental price of a two bedroom apartment, while the average travel time to work of 13.9 minutes is in line with the urban dimensions of the city.

[19] Residential location decisions involve a plurality of choice drivers consisting in various neighbourhood characteristics (including distances from facilities, historical position of a neighbourhood and other location attributes). During a pre-survey analysis all relevant factors for the city under analysis have been explored and the main choice drivers were taken into account (including the dwelling rent price and travel time to work). The study focused only on a subset of main attributes influencing choice in order to avoid further complexity, potentially affecting the response quality.

3.2. Composition and socio-economic characteristics of the population sample

The target population for this study consisted of all residents in the city of Lugano and in seven neighbouring communes, which in 2008 comprised a population of 78,025 inhabitants.[20] In order to represent all ethnicities residing in the area of study, the population was stratified by groups of nationalities and neighbourhoods of residence. The population sample which completed the choice experiment was composed of 133 families[21] including all ten different nationality groups. The first six groups represented single nationalities, namely Swiss, Italians, Germans, Portuguese, Ex-Yugoslavians and Turks. Given a high number of countries with only a few nationals residing in the city, clustering of nationalities was used for the last four groups, splitting the population into *"rest of the EU*, *USA and Australia"*; *"Eastern Europe and Asia*"; *"South America"*; *"Africa and the Middle East"*. For the same reason, some less represented nationality groups comprising a major variety of ethnic communities, thus being of particular interest to the scope of the analysis, were oversampled.[22]

[**Table 2. Figures of inhabitants per nationality group in Lugano (year 2008) -** placed about here.]

[20] The housing market in Lugano is dominated by rented properties, with about 70% of population living in a rented dwelling. Thus, for simplicity, this study considers the rental market only.
[21] For each household, the (male or female) household head was interviewed. For more details on the survey, please refer to Ibraimovic and Masiero (2014).
[22] No implications on the model results stem from such a sampling strategy, since the sampling criteria did not concern the choice variable (i.e. the categorical response variable), but exogenous individual-specific variables (for more details see Manski and Lerman, 1977; Manski and McFadden, 1981).

Foreign communities, in the Swiss context, show substantial differences in their socio-economic as well as spatial concentration patterns, exhibiting different degrees in cultural and linguistic distance to the native population. According to such characteristics, they can be divided into two categories: the *"advantaged foreign residents"* represented by immigrants from Western countries (mainly EU, USA and Australia) and the *"disadvantaged foreign residents"* comprising immigrants from third countries and some poorer European states (as indicated in Table 2). The spatial distribution of the foreign population groups as well as of the natives across city neighbourhoods shows patterns of residential separation, with advantaged foreigners living predominantly in more attractive neighbourhoods together with wealthier Swiss households, and disadvantaged foreign communities residing in majority within large residential neighbourhoods around the city centre. Such diverse concentration patterns indicate that different population clusters are likely to exhibit different behaviour in their ethnic preferences and residential location choices. We thus aim to explore the role that the origin and thus belonging to one of these three population groups plays in explaining the heterogeneity in households' residential behaviour, their segregation preferences and the relative asymmetries in sensitivities to changes in ethnic concentrations in their neighbourhood of residence. Other than considering the differences in origins, in our analysis of heterogeneity we also test the impact of other socio-economic characteristics that could influence households' residential choice behaviour. In particular, we investigate the existence of different propensities towards the segregation with co-ethnics, i.e. the self-segregation preferences, across the resulting population clusters as well as their tastes for living in a multi-ethnic residential environment.

[**Table 3. Stated preferences sample socio-economic descriptive statistics** - placed about here.]

The socio-economic description of the population sample is presented in Table 3. With an average age of 54, natives are the eldest category, as compared to 48 and 37 average years of age respectively for the advantaged and disadvantaged foreign groups. Disadvantaged foreigners are the most recent immigrants, although their period of residence in Switzerland is still relatively high corresponding to 18 years on average. They are also the most mobile category, having on average lived for about 8 and 10 years in the same dwelling and neighbourhood, compared to 13 and 14 years for the other two categories. Concerning the official language level (categorical variable denoting the proficiency in the Italian language, ranging from 1: no knowledge to 6: mother tongue) as well as the income level (categorical variable denoting annual household income, ranging from 1: less than CHF 20,000 to 7: more than CHF 500,000), the disadvantaged foreign group obtains the lowest values among the three groups; however, this sample group on average shows a slightly higher education level (categorical variable ranging from 1: none to 6; academic degree) than the native population and slightly lower level compared to the advantaged foreign group.[23]

4. Methodology and model specification

4.1. The base choice model

Within the random utility framework (cf. McFadden, 1974), a decision maker *n* chooses the alternative *i* which maximises his/her utility,

[23] It is to be noted that the sample contains mainly respondents with a relatively high education level which is typical for SP choice experiments.

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

where V_{nj} is the systematic part of the utility function for alternative *j* (out of *J*) and ε_{nj} is the IID random term distributed according to a Type 1 Extreme Value distribution in the a simple multinomial logit (MNL) model. With the further general assumption of a linear in attributes specification, the systematic part of the utility function of alternative *j* is given by:

$$V_{nj} = \alpha_j + \sum_{k=1}^{K} \beta_k x_{njsk} \quad (2)$$

where α_j are alternative specific constants (ASCs) for *J-1* alternatives, *x* are the *K* attributes describing the alternatives (such as the rent price or ethnic neighbourhood description) and β_k are the coefficients to be estimated representing the sensitivities to the different attributes. In the context of our analysis, the utility function of each alternative – i.e. present neighbourhood and two hypothetical alternative neighbourhoods: neighbourhood A and neighbourhood B - is specified as follows in the base model (referred to as M1 in the model results section):

$$V_{(Ref)} = ASC_{Ref} + \beta_{n(NatCon)} NatCon + \beta_{n(ForgCon)} ForgCon + \beta_{n(Time)} Time + \beta_{n(Cost)} Cost$$

$$V_{(A)} = ASC_A + \beta_{n(NatCon)} NatCon + \beta_{n(ForgCon)} ForgCon + \beta_{n(Time)} Time + \beta_{n(Cost)} Cost \quad (3)$$

$$V_{(B)} = \beta_{n(NatCon)} NatCon + \beta_{n(ForgCon)} ForgCon + \beta_{n(Time)} Time + \beta_{n(Cost)} Cost$$

where, $\beta_{n(NatCon)}$, $\beta_{n(ForgCon)}$, $\beta_{n(Time)}$, $\beta_{n(Cost)}$ are the coefficients associated with the four attributes, i.e. concentration of co-nationals (NatCon), share of foreigners (ForgCon), travel time to work (Time), and monthly dwelling rent (Cost), while two alternative specific constants are estimated for the reference alternative (ASC_{Ref}) and the hypothetical neighbourhood A (ASC_A).

4.2. Model with heterogeneity specification

Moving beyond the base model, the heterogeneity in preferences that might exist between respondents according to their socio-economic and demographic characteristics is introduced by using separate coefficients for given attributes in separate subsets of the sample population (Train, 2009). In this way, the choice behaviour of different population clusters can be investigated and the impact of individual characteristics on sensitivities to different attributes can be tested. In particular, we estimate separate coefficients for different population clusters segmented on the basis of origin, education level and income. A range of other individual specific variables were tested in the preliminary analysis, however their impact was not significant at conventional values. The resulting model is referred to as M2 in the model results section.

The first set of interaction terms concerns the concentration of co-nationals and the origins of respondents, distinguishing between disadvantaged foreigners and

advantaged foreigners together with native households[24], as well as education level where respondents are classified into the highly educated category (with academic degree) and that with lower or medium education level. Accordingly, we obtain four groups for this coefficient. Secondly, the heterogeneity in preferences for foreigners' concentration in the neighbourhood is assessed through interactions between the respective variable and the origin[25] of respondents, distinguishing between the disadvantaged foreign group, the advantaged foreign group, and the native population (Swiss), thus giving us three groups for this coefficient. Finally, different sensitivities to the housing cost are accommodated through separate coefficients for higher (than average) income and lower (than average) income households.

4.3. Reference-dependence and asymmetric preferences model specification

As a final step, we incorporate aspects of Prospect Theory by allowing for reference-dependence and asymmetric responses to positive and negative deviations in attribute values with respect to the reference point, here represented by the present neighbourhood of residence. Under this framework, the sensitivities to increases and decreases from the reference value are expected to be asymmetric, with the general assumption of loss aversion, meaning that a greater value is attributed to the loss in the value of a desirable attribute than to the gain given by its increase. In deriving the asymmetric preferences model, the linear

[24] Advantaged foreigners and Swiss are found to have similar behavior in this regard and are thus clustered together.
[25] A preliminary analysis showed that education level did not have a significant impact on this variable.

model can be expanded in order to represent the increases and decreases in attribute values, with the systematic part of the utility function taking the following form:

$$V_{nj} = \alpha_j + \sum_{k=1}^{K}\left(\beta_{k(inc)}x_{njk(inc)} + \beta_{k(dec)}x_{njk(dec)}\right) \quad (4)$$

where $x_{njk(inc)} = max\left(x_{njk} - x_{nk(Ref)}, 0\right)$ and $x_{njk(dec)} = max\left(x_{nk(Ref)} - x_{njj}, 0\right)$, with $x_{nk(Ref)}$ giving the reference value for attribute *k* and respondent *n*.

We now estimate a separate coefficient for each decrease and increase in the attributes value relative to the reference alternative. Consequently, the utility function of the reference alternative will only contain the alternative specific constant (ASC_{Ref}) and the variable YearsN indicating the number of years lived in the present neighbourhood of residence. The system of utility functions of the model allowing for the asymmetric preferences (referred to as M3 in the model results section) is thus specified as follows:

$$V_{(Ref)} = ASC_{Ref} + \beta_{(YearsN)}YearsN$$

$$V_{(A)} = ASC_A$$
$$+\beta_{(NatCon,inc)} * max\left(NatCon_A - NatCon_{Ref}, 0\right) + \beta_{(NatCon,dec)}$$
$$* max\left(NatCon_{Ref} - NatCon_A, 0\right)$$
$$+\beta_{(ForgCon,inc)} * max\left(ForgCon_A - ForgCon_{Ref}, 0\right) + \beta_{(ForgCon,dec)}$$
$$* max\left(ForgCon_{Ref} - ForgCon_A, 0\right)$$
$$+\beta_{(Time,inc)} * max\left(Time_A - Time_{Ref}, 0\right) + \beta_{(Time,dec)} * max\left(Time_{Ref} - Time_A, 0\right)$$
$$+\beta_{(Cost,inc)} * max\left(Cost_A - Cost_{Ref}, 0\right) + \beta_{(Cost,dec)} * max\left(Cost_{Ref} - Cost_A, 0\right)$$

$$V_{(B)} =$$

$$\beta_{(NatCon,inc)} * max\left(NatCon_B - NatCon_{Ref}, 0\right) + \beta_{(NatCon,dec)}$$

$$* max\left(NatCon_{Ref} - NatCon_B, 0\right)$$

$$+\beta_{(ForgCon,inc)} * max\left(ForgCon_B - ForgCon_{Ref}, 0\right) + \beta_{(ForgCon,dec)}$$

$$* max\left(ForgCon_{Ref} - ForgCon_B, 0\right)$$

$$+\beta_{(Time,inc)} * max\left(Time_B - Time_{Ref}, 0\right) + \beta_{(Time,dec)} * max\left(Time_{Ref} - Time_B, 0\right)$$

$$+\beta_{(Cost,inc)} * max\left(Cost_B - Cost_{Ref}, 0\right) + \beta_{(Cost,dec)} * max\left(Cost_{Ref} - Cost_B, 0\right)$$

(5)

All models were coded and estimated in OX (Doornik, 2000), using maximum likelihood estimation and recognising the repeated choice nature of the data through a panel specification of the sandwich matrix for computing standard errors.

5. Model results

As outlined in Section 4, our analysis makes use of three models, namely two base models with unique coefficient specification for each of the neighbourhood attributes, and the third model focusing on asymmetric preferences to gains and losses from the reference alternative, i.e. the present neighbourhood of residence. We firstly present the base models explaining the ethnic and non-ethnic preferences in the neighbourhood choice decisions, i.e. the simple MNL model (M1) and the model accounting for the heterogeneity in preferences among households belonging to different ethnic communities and having different socio-economic characteristics (M2). We then continue discussing the third model (M3)

which explores the hypothesis on asymmetries for increases and decreases in values of ethnic neighbourhood attributes.

5.1. Investigating the preferences for ethnic neighbourhood composition: "*I like co-nationals and dislike foreigners*"

Table 4 reports the estimation results of the two base models M1 and M2. The coefficient estimates reflect the effects of attributes on the utility of the alternatives (and by extension their probability of being chosen from the available choice set). A positive/negative coefficient sign estimated for an attribute - in our case the variable associated with a specific residential location - indicates the increase/decrease in the utility of the concerned alternative and can thus be interpreted as marginal utility/disutility of such attribute for the decision maker. We firstly focus on and discuss the results of the two ethnic neighbourhood variables (the presence of co-national neighbours and the share of foreigners in the neighbourhood) which represent the main interest of the study. Following this, we present our findings on the other two location choice drivers (the rental rates and the travel time to work) along with the analysis of trade-offs and *willingness-to-pay* (WTP) measures among the ethnic and non-ethnic location characteristics.

Our first observation is the improvement in log-likelihood values for model M2 over model M1 by 50.09 units for only six additional parameters, where this improvement is highly significant with a χ^2_6 p-value of 0 for the associated likelihood ratio test. This highlights the presence of heterogeneity in preferences as included in model M2, in relation to origins and education levels of individuals. For model M1, the coefficient estimates for the neighbourhood attributes are all

significant and of the expected sign. In fact, a significantly positive coefficient for the concentration of co-national neighbours indicates that households value the residential proximity to their own community of origin. As a result, neighbourhoods with a higher share of co-national neighbours have a higher probability of being chosen. Conversely, a negative and statistically significant coefficient associated with the share of foreigners in the neighbourhood shows that households tend to avoid neighbourhoods with high concentrations of immigrant populations. These results are in line with the international evidence which states that, on one side, neighbourhoods with a high presence of co-nationals attract households from the same origin (see for example Aslund, 2005; Zorlu and Mulder, 2008), while, on the other side, neighbourhoods with a high share of immigrants, often perceived as poor and disadvantaged, might drive back households from choosing them as their place of residence (Charles, 2000; Ellen, 2000; Van der Laan Bouma-Doff, 2007).

Nevertheless, when looking at model M2, differences in ethnic preferences for households belonging to different immigrant categories can be noted. The country of origin and the educational level of households are two main variables which contribute to explaining such dissimilarities in tastes. With respect to the self-segregation preferences, i.e. preferences for co-national neighbours, the results show differences among households belonging to disadvantaged, advantaged and native population segments. Moreover, among the disadvantaged foreign communities, dissimilar tastes exist for highly educated households when compared to the ones with a lower education level. In fact, those with a lower education degree show preferences for residential proximity to their co-national community, as indicated by the positive and statistically significant coefficient

estimate. However, this does not hold for the highly educated households belonging to the same group: the negative sign of the coefficient (even if not strongly significant) shows that they indeed dislike self-segregating with their group of origin, preferring to live in neighbourhoods with a lower density of their co-nationals. Such result might indicate their tendency for social and residential mobility towards the mainstream hosting society. The advantaged foreign communities and Swiss households also show preferences for a higher presence of their co-nationals, highlighted by a positive and significant coefficient estimate. The estimated coefficient for this population segment is equal for respondents with higher and lower level of education, meaning that education does not play a role in shaping ethnic preferences for these population segments in the way that they do for the disadvantaged foreign households. However, when comparing the propensities for living with co-nationals, the preferences of advantaged foreign households and natives are twice as strong as the ones of disadvantaged foreign households. Such findings might indicate that the voluntary segregation preferences of the advantaged foreign communities and the native population could be indirectly influencing the residential concentrations of disadvantaged foreign communities in specific neighbourhoods.

When considering the coefficient associated with the share of foreigners in the neighbourhood, the results of the model M2 also indicate differences in preferences according to a household's origin, although education no longer plays a significant role. On one hand, the disadvantaged foreign group as well as Swiss households hold negative preferences towards high shares of foreigners, where such preferences are far stronger for native households, indicating their greater aversion to living with foreign neighbours. Advantaged foreigners on the other

hand are seemingly indifferent to such neighbourhood characteristic as shown by their statistically non-significant coefficient estimate.

Looking next at the non-ethnic location attributes (the rent price and the travel time to work) used in the SP experiment as control variables for impact and importance analysis among ethnic and non-ethnic residential location choice drivers, both attributes show the expected negative sign and are statistically significant in both models. Additionally, model M2 indicates differences in cost sensitivity across lower and higher income segments, the first one being more cost sensitive as expected. However, no significant interactions among the individual-specific variables considered in the analysis were found for the travel time to work variable. Finally, the positive and significant alternative specific constant for the reference alternative (ASC_{Ref}) indicates that, all else being equal, households prefer to stay in their present neighbourhood of residence, a preference which increases with the increase of the years lived in the neighbourhood (according to the positive estimate of the coefficient associated with the variable YearsN). The alternative specific constant associated with the hypothetical neighbourhood A (ASC_A) is not significantly different from zero, indicating that the two hypothetical neighbourhood alternatives (A and B) are equally considered by respondents, all else being equal, without any clear order effect of reading from left to right.

[**Table 4. Results of base multinomial logit (MNL) models** - placed about here.]

We next assess the importance of the various location choice drivers by deriving *willingness-to-pay* (WTP) and *willingness-to-accept* (WTA) measures for each of

these attributes (Table 5). The WTP/WTA measures in the discrete model framework are simply defined as the ratio between the attribute coefficient under observation and the cost coefficient. Such measures give us an indication of the monetary value that respondents associate to a certain increase in a desirable attribute, and on other hand, the monetary compensation that they would request for an increase in an undesirable attribute.

[**Table 5. WTP/WTA[a] measures in CHF[b] (of the monthly dwelling rent): Base models (M1 and M2)** - placed about here.]

In terms of the WTP/WTA measures derived from the model M1, the relative importance of the concentration of co-nationals (CHF 3.63) is higher than that of the share of foreigners (CHF 1.64), meaning that the impact of the presence of co-national neighbours on the residential location choice is larger than that of the share of foreigners. Moreover, a positive value is associated with the increase in the concentration of co-nationals. In particular, respondents are willing to pay an additional CHF 36.3 in monthly rent for a 10% increase in the concentration of their co-national neighbours. The opposite holds for the share of foreigners, which is negatively valued by respondents, requiring a monthly compensation of CHF 16.4 for a 10% increase in the share of foreign neighbours. Finally, the value of travel time savings equates to a monthly increase in rent by CHF 9.38 for each minute saved in of commuting time on a single trip. Assuming twenty return commute trips per month, this would equate to a value of CHF14.07 for a one hour saving in travel time, which is not too dissimilar from the official values reported by Axhausen et al. (2008) for Switzerland, with CHF18.93/hr for public

transport and CHF19.04/hr for car. The lower values can be explained by the higher share of disadvantaged households in the data.

While model M1 presents generic WTPs/WTAs for the whole population sample, model M2 accommodates heterogeneity in preferences, allowing us to derive different WTPs/WTAs for different population segments. Concerning the value associated with the presence of co-nationals, the results indicate that only highly educated individuals belonging to disadvantaged ethnic groups dislike living with their co-nationals, thus requiring a compensation of CHF 32.4 and CHF 62.8 for a 10% increase in such attributes for households in the lower income and higher income class respectively. On the other hand, advantaged foreigners and Swiss nationals as well as disadvantaged foreigners of lower education value co-national neighbours, where the WTP measure for advantaged foreigners and Swiss nationals is nearly double that of disadvantaged foreigners of lower education level. The second ethnic attribute denoting the presence of foreigners in the neighbourhood is negatively valued by the disadvantaged foreign groups and Swiss natives, with the WTA measure being more than three times higher for Swiss nationals (CHF 43.3 and 83.8 for 10% increase for lower income and higher income respectively) than for disadvantaged foreigners (CHF 13.5 and 26.2). The advantaged foreign group, on the other hand, shows a slight preference for foreign neighbours; however this result is supported only by a low statistical significance. The value of travel time savings differs across the lower and higher income classes, where it is nearly twice as high for the higher income (CHF 13.18 per minute) when compared to the lower income class (CHF 6.8 per minute).

5.2. Testing the asymmetric preferences structure and loss aversion hypothesis: "*I don't want to be alone in my neighbourhood*"

We next discuss the results of the third model (M3), which allows for different sensitivities to increases and decreases in attribute values with respect to the reference point. The reference point varies across respondents and is represented by the attribute values of the present neighbourhood of residence for each respondent. We follow the findings from the earlier stages of the analysis by allowing for heterogeneity in preferences in the same manner as the model M2.

Table 6 shows the M3 model results.[26] The adjusted ρ^2 measure indicates that model M3 outperforms both base models (M1 and M2), supporting the hypothesis of existence of asymmetries in the preference structures. With regards to the first ethnic variable, similar results as in model M2 are found, where the concentration of co-national neighbours is generally valued positively. However, model M3 shows different valuations of increases and decreases from the existing concentration of co-nationals in the neighbourhood of residence. In this sense, the most interesting finding of the study is that only the coefficient estimates for decreases are statistically different from zero. This would suggest that people only react to decreases in the share of their co-national neighbours, while they are indifferent to any increases. In line with Schelling's assumptions regarding weak ethnic preferences (Schelling, 1971), such findings might indicate that ethnic communities do not seek a larger degree of residential segregation, but that they also "do not wish to be alone" among other ethnic communities. Thus, even weak

[26] It is to be noted that a backward exclusion of variables has been implemented in the preliminary analysis in order to select significant and meaningful coefficient values.

ethnic preferences could generate segregation by triggering the "flight" in case of a decrease of co-ethnics, while an increase in co-ethnics would not have been perceived as important and would not have similar consequences on the self-segregation dynamics.

Similar findings were driven also from empirical studies on ethnic preferences which indicate that the majority of ethnic groups do not exhibit strong self-segregation preferences, but are intensely sensitive to "flight" of their co-ethnics out of their neighbourhood or reluctant to choose a neighbourhood with low presence of co-ethnics (Farley et al., 1978; Clark, 1991, 1992; Charles, 2000). Indeed, according to such literature, the dominant groups (natives in the EU and whites in a US context) are likely to show the strongest aversion to being minority groups and thus "lose" their actual dominant status in the neighbourhood (Farley et al., 1978; Charles, 2000). For ethnic minority groups, the motivation underlying preferences for co-ethnic neighbours might be a response to anticipated discriminatory practices and hostility by the dominant ethnic group (Krysan and Farley, 2002). Thus, living in the proximity of co-ethnics could sometimes constitute a "safe haven" against hostility and discrimination (Van der Laan Bouma-Doff, 2007).

Given this premise, we continue our analysis in considering the results given by the inclusion of heterogeneity in residential location choice behaviour. Considering the signs of coefficient estimates we can note that among all different household segments, disadvantaged immigrant communities of high educational level are the only group that does not show a negative valuation for neighbourhoods with a lower presence of their co-nationals. In fact, all other

groups, from disadvantaged foreigners with lower education to advantaged foreigners and natives, dislike decreases in the share of their co-nationals. The magnitude of this disutility varies across different population segments, where it is more than twice as strong for the advantaged and Swiss households of higher education level when compared to other nationalities with lower educational attainment. This means that, as discussed before, advantaged foreigners and native residents place a higher value on residential proximity to their co-nationals. Conversely, disadvantaged foreigners of higher education disregard the presence of co-nationals and prefer higher share of natives in their neighbourhood as a sign of wanting to reach major socio-economic integration within the mainstream society.

The second ethnic variable, representing the share of foreign residents in the neighbourhood, also presents interesting results and confirms the findings presented above. The coefficients associated with this variable indicate that some population segments consider as important increases in this attribute, while others care only about decreases, although it should be noted that the coefficients associated with increases are of low statistical significance. In particular, disadvantaged residents and Swiss households tend to dislike increases in the share of foreigners (even with a coefficient that has a low statistical significance level), while advantaged foreigners tend to value such increases. For decreases in the share of foreigners, the results show that only disadvantaged foreigners and Swiss nationals significantly value a diminishing share of foreigners in their residential location. However, this preference is nearly three times stronger for Swiss nationals than for disadvantaged immigrants, meaning that Swiss preferred neighbourhoods are those in which the share of their co-nationals is dominating.

[**Table 6. Results of asymmetric preferences model** - placed about here.]

Increases in the travel time to work are valued negatively, as expected, while decreases in travel time are valued positively. However, there is strong asymmetry, with respondents being twice as averse to increases than the way in which they favour decreases. Concerning the monthly dwelling rent, increases are valued equally negatively by all population segments, irrespective of their income level, however, while decreases are valued more than twice as much for the low income segment when compared to the higher income one.

[**Table 7. WTP/WTA[a] measures in CHF[b] (of the monthly dwelling rent): Asymmetric model (M3)** - placed about here.]

Using the results of model M3, WTP and WTA measures are computed for decreases and increases of attribute values based on their significance level (Table 7), relating to changes in monthly rent. All population segments except the disadvantaged foreigners with high education level dislike decreases in the concentration of co-nationals, thus requiring a compensation for lower levels of co-national neighbours (i.e. WTA). Advantaged foreigners and Swiss respondents with a high education level and higher income exhibit the highest WTA measure (CHF 34.77), more than double compared to the residents with the lower education level (CHF 5.93 and CHF 14.58 for lower and higher income segments respectively). Increases in the concentration of co-nationals, as discussed above, do not matter given the insignificant coefficient estimate in model M3.

With regards to the share of foreigners however, different population segments are sensitive to increases while others value decreases of this attribute. In particular, disadvantaged foreigners and Swiss citizens of higher income dislike increases in the share of foreigners, requiring a compensation for a higher presence of foreign citizens in the neighbourhood. On the other hand, these two population segments also value decreases in the share of foreigners and are willing to pay a premium for neighbourhoods with lower levels of foreigners. However, the WTP of Swiss citizens (CHF 8.13) is nearly three times as high as that of disadvantaged foreigners (CHF 2.87), meaning that natives are more averse to the presence of foreigners than the other foreign groups. The only segment that favours foreign neighbours are advantaged foreigners; however their WTP for increase in the share of foreigners is not strongly significant.

Overall, the monetary measures corresponding to the two ethnic variables show a higher sensitivity of respondents for changes in the concentration of co-nationals than for the share of foreigners. Moreover, model results show a major concern by households for decreases when compared to increases in the concentration of co-nationals, indicating a major sensitivity for lower levels of concentration compared to their present neighbourhood of residence. The value attributed to a percentage change in the concentration of co-nationals is comparable on average to the value of one minute of travel time savings (per journey). Finally, we can note higher monetary valuations for all attributes discussed above for the higher income segment when compared to the lower income segment, given the lower sensitivity of this population segment to the cost of housing.

6. Conclusions

Many theoretical, analytical and simulation models of segregation, based on hypotheses about preferences for ethnic composition of neighbourhoods, have been developed with the aim to analyze the dynamics of ethnic segregation. Schelling (1971, 1972) and other Schelling based models (e.g. Zhang, 2011; Pancs and Vriend, 2007) use asymmetric utility functions to describe weak preferences for an integrated neighbourhood, argued to be at the base of existing segregation outcomes. However the literature lacks robust methods to empirically test such hypotheses. The main objective of this study is to empirically test the postulates of theoretical models of segregation regarding the asymmetries in ethnic preference structures using methods of analysis which combine discrete choice models and pivoted Stated Preferences (SP) choice experiments. In particular, we explore the reference-dependence and asymmetries in sensitivities to increases and decreases in ethnic concentration values for households with different socio-economic characteristics. Through our empirical example we show the benefits of such methods, while our findings add to the credibility and robustness of theoretical segregation models and their hypothesis. Three models are estimated on data gathered from a pivoted SP choice experiment conducted in the Swiss city of Lugano: i) a base MNL model, ii) a base model allowing for heterogeneity in preferences for different population segments and iii) a model allowing for asymmetric preference structures for positive and negative departures from the reference values.

In line with findings by Ibraimovic and Masiero (2014), the results of two base models indicate that households place a positive value on proximity to their

community of origin and are willing to accept longer commuting times or higher dwelling rents in order to live in a neighbourhood with a larger concentration of co-nationals. Conversely, the share of foreign population in the neighbourhood is valued negatively, with households requiring a shorter commuting time or lower dwelling rents as a compensation for higher shares of foreign neighbours. These findings however vary substantially across different population segments.

The main findings of the study derive from the third model which, in our empirical application, confirms the hypothesis of reference-dependence and asymmetries in ethnic preferences. In fact, households tend to value alternative neighbourhoods based on the ethnic characteristics of their current residential location. Relating to their experience, they show sensitivities to changes in the levels of co-ethnics or ethnic minorities from this reference point. In particular, the results suggest that only decreases in the share of co-national neighbours (negatively) affect the utility of a neighbourhood, while households are indifferent to increases in concentration rates.[27] In line with Schelling's assumptions regarding weak ethnic preferences (Schelling, 1971)[28], such findings might indicate that ethnic communities do not seek a larger degree of residential segregation, but that they also "do not wish to be alone" among other ethnic communities. In fact, as suggested by previous empirical studies on ethnic preferences, the majority of ethnic groups do not exhibit strong self-segregation preferences, but are intensely sensitive to "flight" of their co-ethnics out of their neighbourhood or reluctant to choose a neighbourhood with low presence of co-

[27] Such results constitute a partial deviation from the "traditional" *loss aversion hypothesis* as formulated by Kahneman and Tversky (1979), in which individuals tend to exhibit preferences for both decreases and increases, yet are more sensitive to losses than to gains.
[28] See also Pancs and Vriend (2007) for a graphic representation and detailed description of asymmetric utility function based on Schelling (1969, 1971, 1972, 1978).

ethnics (Farley et al., 1978; Clark, 1991, 1992; Charles, 2000). Thus, even weak ethnic preferences could generate segregation by triggering the "flight" in case of a decrease of co-ethnics, while an increase in co-ethnics would not have been perceived as important and would not have similar consequences on the self-segregation dynamics.

A further result of this analysis discusses implications of heterogeneity in preferences among different population segments which could imply different effects on concentration dynamics. In particular, Swiss nationals and advantaged foreigners of higher education and income level are particularly sensitive to decreases in the concentration of co-national neighbours, when compared to disadvantaged foreign groups. Conversely, disadvantaged foreigners of high education level are the only group that do not react negatively to decrease in the presence of co-nationals, showing that ethnic ties do not constitute a relevant driver for their residential location choice decisions.

With respect to the other ethnic variable under analysis, i.e. the share of foreign neighbours, the results suggest that the sensitivities to increases and decreases in such shares are not of the same magnitude and that they are largely affected by heterogeneity in preferences across different population segments. In fact, some segments are sensitive to increases while others are sensitive to decreases. In particular, Swiss nationals and disadvantaged foreign groups dislike increases and value decreases in the presence of other foreign inhabitants in the neighbourhood. However, while disadvantaged foreigners attribute nearly the same value to increases and decreases in the share of foreigners, native residents value decreases nearly three times as much. The advantaged foreigners group is the only one not

valuing such attributes negatively. Finally the results suggest that these asymmetries in preference structures have fairly strong impacts on WTP/WTA measures, especially relating to the concentration of co-nationals.

Linking these results with the findings of empirical studies in the field of residential segregation, two main motivations underlying such preferences could be suggested. On one hand, as argued above, households could prefer co-nationals because they do not want to be a minority in their neighbourhood. For natives it might be a question of social and decisional power, while for foreigners, it might regard the perceived discrimination and hostility, where "segregated neighbourhoods function as a safe haven for marginalized ethnic minorities" (Van der Laan Bouma-Doff, 2007). On the other hand, households might stereotype neighbourhoods with high shares of foreigners. In fact, many studies suggests that not only natives (in the EU) or whites (in the US), but also other minority ethnic groups might perceive high levels of ethnic concentration as potentially harmful (Ellen, 2000; Van der Laan Bouma-Doff, 2007; Bobo and Zubrinsky, 1996; Charles, 2000). In line with our results, such preferences are generally strongest for the natives or whites.

Understanding the real causes and mechanisms driving ethnic segregation, as well as possible future segregation trends, is fundamental for developing policy measures able to effectively prevent and address the negative consequences of these phenomena. There are no anti-segregation policies currently in place in Lugano due to relatively low levels of segregation in the past. However, with the recent increasing trends of immigration, from extra-European as well as from EU countries, levels of ethnic concentration are growing in several city locations.

Such trends are likely to evolve further in the future. Other than giving an insight on possible developments of ethnic concentration patterns, this analysis provides several policy indications for the local authorities. Firstly, it shows the need for a diversified intervention for different population segments, reflecting the dual nature of the Swiss foreign population. In particular, the policies tailored for the native population and advantaged foreign communities should be focused on ethnic preferences and neighbourhood attractiveness, which seem to be the main drivers of their residential location choices. Thus, modifying negative perception of multicultural neighbourhoods through awareness and pro-integration campaigns could be an example of possible measures for these population segments. For the disadvantaged foreign communities, instead, the policies should support their socio-economic integration and access to education. In fact, education seems to be the key element that on one hand facilitates social and residential mobility, and on the other hand has a direct influence on preferences for a greater residential integration. Secondly, any intervention on the housing market should be tailored upon its characteristics and peculiarities. Being the Swiss housing market dominated by the private rental sector, the spectrum of public anti-segregation policies (such as the forced dispersion or interventions on housing prices) is strongly limited. In this context, two distinct policies could be implemented each targeting different population segment. On one hand, increasing the housing supply especially in affordable housing sector could indirectly improve accessibility for disadvantaged foreign communities to less accessible urban locations. Furthermore, policies supporting the construction of affordable housing stock already in use in Switzerland[29] could be further

[29] For more details see Section 2.

reinforced by additional requirements[30] as for example quotas reserved to underrepresented ethnic groups. On the other hand, process of urban regeneration and requalification of neighbourhoods with higher concentration of disadvantaged foreigners could promote their appeal to the native population and advantaged foreign communities.

Moreover, we stress the importance of some requirements for an effective intervention on ethnic residential segregation departing from some of the main problematic points in today's anti-segregation policies. Firstly, the lack of comprehension of the underlying segregation causes should be addressed by in-depth analysis of the dynamics, causes and effects of segregation in different urban environments. Secondly, importing models from other dissimilar contexts and considering homogeneous populations with the same preference structures should be avoided. Instead, the intervention models should be adapted and tailored to the underlying context and to different fractions of the local population. Thirdly, operating through policy measures on a single element (social, economic or urban) without considering potential effects on other interdependent elements could provoke adverse outcomes for anti-segregation policies. Thus, defining specific and general effects of an intervention and correcting it through other supporting measures is needed (Ibraimovic, 2013).

Even though the present study offers interesting findings in terms of households' responses to changes in ethnic neighbourhood concentration levels, the analysis could be further extended in five main directions. Firstly, considering different

[30] Currently there are some income requirements and preference for households which benefit from national social security schemes (disability insurance or pension and survivors insurance).

reference points (see, e.g. Stathopoulos and Hess, 2012) would allow us to assess potential variations in preference asymmetries depending on a) levels of ethnic concentrations, b) urban dimensions and c) diverse urban settings. Further analysis could also reveal tipping points for different ethnic communities in different urban contexts, as well as the shape of the utility function for ethnic neighbourhood characteristics. Secondly, the analysis could benefit from the inclusion of other attitudinal factors (see, e.g. the expanded behavioural framework described in Ben-Akiva et al., 1999; 2002a; 2002b) related to ethnicity of neighbours in order to better explain the impact of such factors on residential choice behaviour of different population segments. Thirdly, applying similar research in other cities would be valuable, as would testing other neighbourhood characteristics. Fourthly, these empirical results, in terms of utility functions or WTP measures could be used in future analytical and simulation models as rules of agents' behaviour in order to model the dynamics of segregation in specific urban contexts, thus linking the real world preferences and contexts to the theoretical postulates and models. Finally, the impacts of ethnic concentrations on the local housing market and the implications for the urban development should be addressed further by ad-hoc analysis.

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Table 1. Stated preferences experiment: description and sample statistics

Residential location attributes	Description			Levels (percentages)
Concentration of co-nationals (%)	Number of co-nationals in the neighbourhood over the total number of co-nationals in the city.			-80, -40, reference[a], + 40, +80
Share of foreigners (%)	Number of non-Swiss residents over the total number of residents in the neighbourhood.			-50, -25, reference[a], + 25, +50
Travel time to work (MIN)	Travel time to work by the habitually used mode type.			-50, -25, reference[a], + 25, +50
Dwelling monthly rent (CHF[b])	The monthly rent of the dwelling.			-20, -10, reference[a], + 10, +20
Sample statistics	Average	Std.	Min.	Max.
Concentration of co-nationals (%)	10.2	5.9	3	48
Share of foreigners (%)	42.5	7.7	16.3	57
Dwelling monthly rent (CHF[b])	1,485	450	650	2,800
Travel time to work (MIN)	13.9	10	0	60

[a] "Reference" is denoting the attribute value at the present residential location of the respondent, whereas the other levels are pivoted around the reference value and are expressed as positive and negative percentage changes from this reference value.

[b] Exchange rate CHF/USD = 1.01; CHF/EUR = 0.91 (on 15 February 2016)

Table 2. Figures of inhabitants per nationality group in Lugano (year 2008)

Nationality group	Number of inhabitants	As % of inhabitants	As % of foreigners
Swiss	46,855	60.05%	-
Advantaged foreigners	19,579	25.09%	62.81%
Italy	16,554	21.22%	53.11%
Rest of EU, USA and Australia	2,097	2.69%	6.73%
Germany	928	1.19%	2.98%
Disadvantaged foreigners	11,591	14.86%	37.19%
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: Population Movement (MovPop) geocoded database from the Population Control Department of Canton Ticino, year 2008.

Table 3. Stated preferences sample socio-economic descriptive statistics

Variable (average values)	All sample	Swiss	Advantaged foreigners	Disadvantaged foreigners
Age	42.74	53.60	48.44	37.93
Years in Switzerland	25.26	-	31.13	18.10
Years in dwelling	10.19	13.39	13.14	8.21
Years in neighbourhood	11.84	14.94	14.08	10.24
Italian level (1-6)	4.77	5.76	5.00	4.46
Education level (1-6)	4.56	4.44	4.63	4.56
Income level (1-7)	2.50	2.44	2.69	2.43

Table 4. Results of base multinomial logit (MNL) models

	Model 1 (base)		Model 2 (heterogeneity)	
	Coeff.	robust *t*-ratio	Coeff.	robust *t*-ratio
Concentration of co-nationals	0.0181	(3.02)		
Disadvantaged low education			0.0234	(3.37)
Disadvantaged high education			-0.0231	(-1.42)
Advantaged and Swiss high/low educ.			0.0442	(3.66)
Share of foreigners	-0.0082	(-2.47)		
Disadvantaged			-0.0097	(-2.14)
Advantaged			0.0055	(1.16)
Swiss			-0.0309	(-2.55)
Travel time to work	-0.0468	(-4.81)	-0.0486	(-5.13)
Monthly dwelling rent	-0.0050	(-9.34)		
Lower income			-0.0071	(-7.57)
Higher income			-0.0037	(-6.14)
YearsN[a]			0.0304	(2.23)
ASC_{Ref}	1.0656	(7.70)	0.7549	(3.38)
ASC_A	0.0078	(0.12)	0.0057	(0.08)
Model statistics				
Number of Observations		1,665		1,665
Log-L at zero coefficients		-1829.19		-1829.19
Log-L at convergence		-1412.74		-1362.65
Number of Parameters		6		12
Adjusted ρ^2		0.2244		0.2485

Notes: Dependent variable is represented by the choice among three alternative neighbourhoods: present neighbourhood of residence, hypothetical neighbourhood A and hypothetical neighbourhood B.
[a] YearsN = Variable indicating the number of years lived in the present neighbourhood of residence.

Table 5. WTP/WTA[a] measures in CHF[b] (of the monthly dwelling rent): Base models (M1 and M2)

	Model 1		Model 2 (heterogeneity)			
	WTP	WTA	WTP		WTA	
			Lower Income	Higher Income	Lower Income	Higher Income
Concentration of co-nationals (% increase)	3.63	-				
Disadvantaged low educ.			3.28	6.35	-	-
Disadvantaged high educ.			-	-	3.24	6.28
Advantaged and Swiss high and low educ.			6.19	11.1	-	-
Share of foreigners (% increase)	-	1.64				
Disadvantaged			-	-	1.35	2.62
Advantaged			0.77	1.5	-	-
Swiss			-	-	4.33	8.38
Value of travel time savings (per minute on single trip)		9.38	-	-	6.8	13.18

[a] WTP = Willingness-to-pay; WTA = Willingness-to-accept
[b] Exchange rate CHF/USD = 1.01; CHF/EUR = 0.91 (on 15 February 2016)

Table 6. Results of asymmetric preferences model

		Model 3 (asymmetries)	
	Deviation from reference value	Coeff.	robust *t*-ratio
Concentration of co-nationals			
Disadvantaged, higher education	Decreases	0.0342	(0.84)
Advantaged and Swiss, higher education	Decreases	-0.1096	(-1.50)
All nationalities, lower education	Decreases	-0.0460	(-2.97)
Share of foreigners			
Disadvantaged and Swiss	Increases	-0.0079	(-0.90)
Disadvantaged	Decreases	0.0151	(1.90)
Advantaged	Increases	0.0169	(1.55)
Swiss	Decreases	0.0428	(2.15)
Travel time to work			
All sample	Increases	-0.0723	(-2.81)
All sample	Decreases	0.0369	(1.74)
Monthly dwelling rent			
All sample	Increases	-0.0053	(-5.93)
Lower income	Decreases	0.0078	(7.25)
Higher income	Decreases	0.0032	(3.85)
YearsN [a]		0.0333	(2.41)
ASC_{Ref}		0.6472	(2.82)
ASC_A		0.0060	(0.09)
Model statistics			
Number of Observations			1,665
Log-L at zero coefficients			-1829.19
Log-L at convergence			-1351.75
Number of Parameters			15
Adjusted ρ^2			0.2528

Notes: Dependent variable is represented by the choice among three alternative neighbourhoods: present neighbourhood of residence, hypothetical neighbourhood A and hypothetical neighbourhood B.
[a] YearsN = Variable indicating the number of years lived in the present neighbourhood of residence.

Table 7. WTP/WTA[a] measures in CHF[b] (of the monthly dwelling rent): Asymmetric model (M3)

		WTP[a] All Incomes		WTA[a] Lower Income		WTA[a] Higher Income	
1% deviation from ref. value		Coeff.	*t*-ratio	Coeff.	*t*-ratio	Coeff.	*t*-ratio
Concentration of co-nationals							
Disadvantaged high educ.	Decreases	6.51	(0.86)	-	-	-	-
Advantaged and Swiss higher educ.	Decreases	-	-	14.14	(1.48)	34.77	(3.47)
All nationalities lower educ.	Decreases	-	-	5.93	(2.62)	14.58	(5.57)
Share of foreigners							
Disadvantaged and Swiss	Increases	-	-	1.02	(0.89)	2.52	(2.16)
Disadvantaged	Decreases	2.87	(1.85)	-	-	-	-
Advantaged	Increases	3.22	(1.54)	-	-	-	-
Swiss	Decreases	8.13	(2.07)	-	-	-	-
Value of travel time savings	Increases	-	-	9.33	(2.41)	22.95	(5.36)
Value of travel time savings	Decreases	7.02	(1.69)	-	-	-	-

[a] WTP = Willingness-to-pay; WTA = Willingness-to-accept
[b] Exchange rate CHF/USD = 1.01; CHF/EUR