
*Investigating the role of ethnic preferences
in residential location decisions:
Choice analysis on Stated Preferences data*

by

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Abstract

Ethnic pluralism and its increasing trend across European countries, has sparked debate on residential segregation, a phenomenon that has various repercussions at economic, social and urban dimensions of modern societies. Social integration and cohesion in residential areas is, indeed, seen as one of the main challenges of urban development today. The question leads to two main issues: on one side, an increasing residential-spatial gap between the affluent and less affluent social classes, on the other geographical separation between inhabitants of different origins, cultures and religions.

This thesis addresses such issues, analysing the ethnic determinants of residential location choice of inhabitants in the City of Lugano, Switzerland. A new approach to examining the voluntary segregation drivers, mainly represented by preferences that families from different ethnic and socio-economic background hold for living next to their co-nationals or to other foreign communities and the native population, is presented and applied to the urban context in Lugano. Other than revealing preferences, main results provide an indication of the value that households place on ethnic neighbourhood characteristics and of the trade-offs with other choice drivers. Such analysis permits to determine the degree of importance of ethnic versus other residential location choice factors for the inhabitants. In such analysis, a particular attention has been given to investigation of behavioural aspects (such as the asymmetries in preference structures and dependence from the current residential location attributes), as well as to aspects of observed and unobserved heterogeneity in ethnic preferences across households with different ethnic and socio-economic characteristics.

The study offers three main contributions for academia as well as for public policy makers. Firstly, it proposes an innovative way of studying the voluntary component of ethnic segregation, which importance has been emphasized by

academics and politicians, but which failed to be empirically tested due to methodological issues of different approaches used in this field of studies. In this thesis I propose the Stated Choice method developed and employed in many fields comprehending transport, marketing and environmental studies, adapted and applied to study the ethnic aspects of Residential Location Choice behaviour through a specifically designed Stated Preferences experiment of Neighbourhood Choice. Such approach, applied to segregation analysis, provides the possibility to empirically measure the impacts and implications of self-segregation preferences on observed segregation patterns, which represents a big step forward in comprehending and managing residential segregation, a phenomenon of great complexity. Secondly, it develops further the proposed approach and empirical evidence by exploring psychological factors of residential location choice and the latent heterogeneity across population segments, giving some important insights into factors that influence more or less strongly the self-segregation preferences of different ethnic communities. Finally, it not only explains aspects of existing segregation patterns, but it provides a reflective discussion on the implication of main results of this study for the future development of segregation phenomena in the urban context under analysis. Such indications are valuable contribution for urban planners, social workers and public policy makers.

Preface

On 18th June 1994, when I was a 14 year old girl, obliged to exile due to a war in my home country, I has writing to my best friend Fatima who I left behind in Bosnia:

“For the third time I travel through the world looking for some peace and tranquillity, all things that now seem as difficult as ever to reach. We left knowing that there is no happiness without our Bosnia. Being a foreigner in any place is just the same thing: Living in the basement or in the castle, the heart aches for its land.

This morning, a severe look of a customs officer and the border remained behind us. They haven't stopped us, yet I'm not sure that this was what I really desired. And arrivederci Italia! Now, here I am in Switzerland, still dazed, as if dreaming. Hardly have you got used to a place, and you already have to start all over again ... Now I am here trying to convince myself of our popular saying: "The third time is the lucky one!"

We now live in an asylum reception centre near the border, together with people in our same situation...Finally I am with those who know what it means to be a foreigner. They understand how we feel and why are we here. So far we were always surrounded by people who had a normal life, who could not understand our torments. They thought that eating, drinking, and a roof over the head was the maximum for us ... It is true that this is already much, but eating, drinking, breathing and sleeping, you cannot call "life" ... if anything it is a mere "survival". Ah ... if only they could understand, if they could put themselves in our shoes, I'm sure they would change their mind.”

Writing not to forget – Tatjana Ibraimovic, Eds. Casagrande, 2011.

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When I started this Ph.D. adventure - I have always in a way felt like something I would certainly do in my life – I never thought it would be so fascinating and involving, nevertheless so troublesome and suffered experience. However, big difficulties and efforts bring about big achievements and satisfactions, and at the end this is what matters the most and what one can really be proud of.

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...To my family, my two most loved men Lassaad and Ahmed. What can I tell them with these words which cannot describe even a little piece of my feelings for them... however I'll try just to address them with a few words:

...To my husband Lassaad, who patiently listened to my theories, thinking, philosophising...I don't know if I would have been so patient in his place. He, I

must say, not only listened but actively participated to the conception of many ideas I have brought up in this work, so I need to acknowledge him for his valuable contribution and encouragement. He sacrificed and compromised his own for my success and development, deserving my sincere gratitude, esteem and love.

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...To my friends, Fatima, Imama, Mayam, Nejia and all others who stood by me in good and bad times, being always around me even when far away...

...To my native country, Bosnia, which taught me to believe, to have courage and not to give up no matter what. To my adoptive country, Switzerland, who believed in me, giving me the best education and teaching me professionalism, precision, stimulating my perfectionism (a characteristic I have had since my early years).

...And finally, last but not least, to my faith that gives a meaning to my work and existence ... and some miracles along the way ...

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Introduction

1.1. Ethnic pluralism in modern cities

Ethnic pluralism and the need for social integration in residential areas are seen as two of the main challenges of urban development in present times across EU states. The spreading of the risk of socio-spatial polarization of society and the emergence of sensitive neighbourhoods characterized by concentration of precarious and socio-economically sensible population segments (such as ethnic minorities, elderly, unemployed, mono-parental families) has sparked debate on residential segregation. This phenomenon, largely known in US but studied only to some extent in the European context, has various repercussions at the economic, social and urban level.

Residential concentration (or more extremely residential segregation) occurs when households from different origins, socio-economic profiles, religions, age groups or life cycle tend to cluster in different urban areas. In particular case of ethnic clustering, the consequences are not necessarily negative: such spatial patterns can bring advantage for different ethnic communities allowing the preservation of culture, language and customs, facilitating the access to housing and labour markets. However, when the concentrations of similar profiles exceeds certain levels becoming a separation from the "others", this can lead to various problems often found in modern cities, such as social exclusion and isolation, formation of "ghettos" and concentration of poverty.

Understanding the causes underlying residential segregation along ethnic lines is crucial for monitoring the phenomenon, predicting future scenarios and eventually intervene with adequate policy measures to counteract its negative consequences. In such spirit, this thesis¹ aims at gaining a better insight over

¹ This research is based on the interdisciplinary Swiss National Science Foundation research project "Effects of Neighborhood Choice on Housing Markets: a model based on the interaction between microsimulations and revealed/stated preference modeling" conducted from 2008 to 2010 by the Institute of Economic Research (IRE) and MACS-Lab, University of Lugano.

the causes of ethnic residential clustering. A particular attention is given to the role of preferences for ethnic neighbourhood mix in determining housing location choice decisions. Integrating different behavioural aspects, from modelling the observed and unobserved heterogeneity to reference dependence and asymmetries in preference structures, the thesis includes four chapters: the introductory section and three research papers each dealing with a different research question.

In the next sections of the introductory chapter, I present the motivation and background of the study, followed by a brief overview of main theories, empirical studies, policy discourse and unanswered questions in the residential segregation domain of studies. According to these arguments I define research questions, objectives and scopes and propose adequate methodological framework to analyse such topics. The application of this particular method for studying ethnic preferences and their impact on the neighbourhood choice constitutes the main contribution of this work, along with other contributions each responding a separate but interrelated research question addressed in different scientific papers composing this thesis. Finally, the structure of the thesis is illustrated.

1.2. Motivation and background

Along with a large body of literature from the United States, the thematic of ethnic residential clustering is coming to the forefront of the research also in Europe. Several recent studies were conducted across European countries exploring ethnic residential concentration from different perspectives, aims and focus. Four main topics are typically analysed: Firstly, the existing levels of segregation across counties in relation to socioeconomic characteristics of immigrants (Andersson 1998; Bolt and van Kempen 2003, Musterd, 2005); Secondly, the mobility patterns of immigrants and natives linking the location choices to the segregation outcomes (Zavodny, 1999; Aslund, 2005; Zorlu and Mulder, 2008; Bolt, van Kempen & van Ham, 2008; Bolt & van Kempen, 2010); Thirdly, the forces triggering ethnic segregation and the relative policies

implemented in different countries to contrast such tendencies (Özüekren and van Kempen, 2002; Ireland, 2008). Finally the consequences of ethnic residential segregation are explored in different contexts (Ellen and Turner, 1997; Borjas, 1998), from immigration and integration issues (immigrants' labour market performance, educational attainment and socioeconomic mobility), economic effects (rents and housing prices), urban change, renewal and development, to social issues (population dynamics and change, social fabric cohesion and integration and safety perception).

1.2.1. Premises on segregation contexts, concepts and definitions

Apart from their focus and main objective, these studies differ in various other aspects, not only from their US counterparts but also among themselves, being the main feature of difference their definition of a “segregated neighbourhood” in terms of ethnic mix as well as its concentration levels. Differences in definitions stem from the differences in the context under study, being different countries and even cities very heterogeneous in the ethnic composition of their inhabitants as well as in the numerosity of different ethnic groups. Clearly, what one can think of when asked about a “segregated neighbourhood” in Paris can be different to London or the city of Leeds. These aspects are nevertheless crucial to consider when studying ethnic residential segregation phenomenon as they have direct implications on peculiarity of measurement and methodological tools at use, as well as on comparability of results and generalization of anti-segregation policies. So, when comparing segregation levels and outcomes it is extremely important to clearly define what is it to be intended by a “segregated neighbourhood” or even better, use measures that do not classify neighbourhoods into types but those which allow as much as possible to account for factors such as: immigrant levels (shares of immigrants or specific ethnic communities), neighbourhood diversity (number of diverse ethnic communities), neighbourhood mix (mono-ethnic segregation vs. ethnically mixed neighbourhoods). Therefore, before turning to the core investigation of this study, I present an overview of US and EU literature,

focusing on the main differences and similarities in terms of the concept, definition, levels and measures of ethnic residential segregation phenomena.

Concept and definition of ethnic residential segregation in EU & US

Among different typologies of ethnic concentrations arising in different contexts we can differentiate between the clustering of single ethnicities or nationalities, that of various ethnic communities similar in their socio-economic and cultural characteristics, and the segregation patterns between the foreign population and the natives. In this respect, the concept of ethnic residential segregation in the European context differs from the US one. While the US cities mainly exhibit patterns of homogeneously segregated neighbourhoods, the spatial distribution of foreigners in the European urban and neighbourhood environment shows minor levels of concentration of single ethnicities, but is rather highly mixed in terms of immigrants' countries of origin (Musterd, 2005; Van der Laan Bouma-Doff, 2007), often comprising a large share of country's native population. In other words, the so called "multiethnic neighbourhoods" are dominant in European cities, as compared to "monoethnic neighbourhoods" of US metropolises. Moreover, the concept of "whites" from the US domain is often replaced by "natives" in the EU context, where the segregation of natives vs. foreigners is often a major focus of study across European countries.

Hence, in defining residentially segregated neighbourhoods in Europe, the emphasis is often put on ethnic clustering linked to the socio-economic and cultural distance from the native population rather than to race, and the immigrants are more often identified by their geographic origin or nationality rather than by ethnicity. In the same manner, term ethnic or racial residential segregation translates into concentration or clustering (of nationalities or minority ethnic groups) in the EU discourse. This because the existing residential groupings of different ethnic communities in most European cities do not reach levels of the US monoethnic segregation and marginalization from

the mainstream society, but represent more softened patterns of ethnic clustering often mixed with other foreign and native population presence.

In the European literature we hence encounter different definitions of ethnically segregated neighbourhoods, on one hand with respect to the ethnic mix, on the other hand with respect to the segregation levels and amplitude of the phenomenon. Looking at the ethnic mix, Van der Laan Bouma-Doff (2007) and Zorlu and Latten (2009) define segregated neighbourhoods as those in which a large percentage of inhabitants are of non-Western origins, putting the emphasis on differences between the socio-economic status and cultural distance of Western vs. non-Western immigrants, while Zorlu and Mulder (2008) focus on concentrations of largest single ethnic minority communities as well as immigrant categories linked to their social status, origin and migration motive. Following this rationale many studies pay a particular attention to the so called “disadvantaged ethnic groups” which often show poorer socio-economic characteristics compared to natives and privileged foreign communities, exhibiting a major social distance from the native population in terms of linguistic, cultural and religious background. In the political discourse, segregation of such categories of immigrants is deemed to be the most problematic and their integration to the hosting society as well as their social mobility is believed to be more complex than that of other foreign groups.

Considering the existing segregation levels which vary significantly between US and EU, as well as in EU internally, not only do the definitions of “segregated neighbourhood” differ in terms of its ethnic mix, but they also do in terms of the segregation degree in a particular context, i.e. the immigrants’ presence across cities or neighbourhoods in absolute numbers and in shares. So for example, in the EU context Van der Laan Bouma-Doff (2007) defines an ethnically concentrated neighbourhood that with at least 30% of minority ethnic groups of non-Western decent, whereas in the US settings segregated

neighbourhoods are mainly defined as those in which a majority of the population belongs to one dominant ethnic community.

Having exposed these important premises I now turn to the main aim of this thesis exploring the voluntary causes of ethnic segregation outcome.

1.2.2. Ethnic residential segregation: a question of choice or constraint?

A great effort has been made by the international literature to understand the main reasons underneath the segregation phenomenon. However, the studies reveal its great complexity resulting in difficulty to fully understand its triggers, developments and dynamics. Residential segregation can, in fact, arise from a variety of interconnected processes which, influencing each other, cause different types of spatial distributions of diverse groups of urban population. Such processes can, on one hand, be related to social and ethnic issues of both the native as well as foreign population – e.g. differences in socio-economic status and mobility, level of integration in the hosting society, acquisition of property rights or preferences guiding residential choices - while on the other hand, they can emerge as forces of urban change, including the population dynamics, urban planning and development, housing market characteristics, public policies and socio-economic measures. All these factors can have an impact on the levels and typologies of ethnic concentrations, but the opposite also holds true. The resulting concentrations may in turn influence the development of different urban areas, producing effects on rents and infrastructure, thus affecting the mobility and composition of the neighbourhood social fabric.

The debate over the causes of ethnic segregation has however not given a clear result yet. Two main segregation drivers are argued to be at the basis of ethnic clustering: the preferences and constraints, first leading to voluntary and second to involuntary segregation outcomes. If, for example, the preferences for proximity to own co-ethnics are the ones guiding the residential location choices for different communities, this can result in voluntary ethnic

concentrations. If, however, the residential choices of some ethnic groups are constrained by limited accessibility and discriminative practices in the housing market, or are dictated by concentration of social or low-cost housing in certain urban areas, such conditions can cause forms of segregation and marginalization on involuntary basis.



Figure 1. Residential location choice behaviour as a central element in ethnic segregation context

Heterogeneity of preferences and differences in constraints faced by different ethnic groups can also play an important role in explaining the segregation dynamics. In fact, the dominance of voluntary vs. involuntary segregation drivers could differ for diverse population segments, impacting not only on segregation levels of own ethnic community, but determining that of other ethnicities. This applies especially in contexts where a dominant ethnic group² exists and directly influences segregation patterns of other ethnic

² Generally the dominant group is represented by Whites in US and Natives in EU context.

minorities. Moreover, the existence of hierarchies of more vs. less desirable ethnic groups (Charles, 2000) could also lead to similar segregation patterns.

Theories of segregation

Following this thought, many theories have been developed over the causes underlying the residential segregation phenomena. One of the most prominent examples of theories suggesting its voluntary nature is the Schelling's segregation model (1971, 1972), where he shows how "even a small preference for neighbours of same colour can lead to severe segregation outcomes". The voluntary motivations of segregation forces are also supported by studies exploring the existence of self-segregation preferences, as for example Farley et al. (1978), Clark (1992) and Charles (2000) with their stated preferences card methodology applied to the case of "*black and white*" segregation in US. On the other hand, the most famous theories supporting the involuntary segregation drive are the spatial assimilation model and the place stratification model, the first emphasizing the role of social mobility and acculturation on the segregation dynamics, whereas the second pointing at discrimination and prejudice, both at inter-group and institutional level, as the main segregation causes (Darden, 1986; Charles, 2003; Iceland and Wilkes, 2006).

Yet, the segregation causes suggested by spatial assimilation theory are not only to be viewed as involuntary. In fact, a higher social mobility, for example, not only can facilitate removing the existing obstacles to the free choice of residential location, but can also influence the change in behaviour and thus in preferences of immigrants towards a higher level of integration (social and residential) within the hosting society. And, as the international evidence shows, such effects can eventually result in lower segregation tendencies of highly educated and socially mobile immigrants (Borjas, 1998). However, as pointed out by Charles (2003), in some cases discriminative practices can prevail over the socioeconomic performance, constraining to segregation members of certain ethnic groups targeted by prejudice, even if they reached a

socioeconomic status comparable to that of the mainstream society. Such cases are found in *black and white* segregation patterns in US, and can be applied in the European discourse, for example, on the North African ethnic communities in France (Pan Ké Shon, 2010).

There is a great debate on which of these voluntary or involuntary driving forces, or their combination, cause the existing segregation patterns. It seems that causes vary across different country contexts and even inside countries across different urban settings – metropolis vs. medium and small cities, cities with higher or lower foreigners' density, cities with different mix of ethnicities or those with different urban form and public policies. However, not only do the segregation drivers vary, but also do their effects. In fact, it is upon the nature of the main (voluntary or involuntary) segregation causes that various forms of urban segregation derive. For example, the existence of strong preferences for self-segregation by single ethnic communities can lead to formation of mono-ethnic neighbourhoods, while factors driving involuntary segregation can cause the emergence of mixed neighbourhoods composed by ethnic minorities typically of disadvantaged socio-economic profile.

[International evidence](#)

International studies support both theory branches, giving evidence of different segregation causes in different contexts and for different ethnic groups. However neither of them dominates over the other, as the evidence shows that the degree to which each theory applies to reality of a specific country or urban context mainly depends on the nature of segregation drive (voluntary or involuntary) and on the typology of ethnicities which compose the national multicultural environment (generally distinguishing between skilled and advantaged or unskilled and disadvantaged foreign communities, as well as those presenting a greater or smaller distance to the hosting country's language and culture).

Among involuntary segregation causes, the differences in socio-economic status are often found to be the most influential factors of the existing ethnic segregation patterns, where the ethnic minorities are constrained to live in cheaper locations due to their weak socio-economic status. However, many other studies show that even when the differences in socioeconomic status and other individual characteristics are corrected for, ethnic minorities result more often living in segregated neighbourhoods than the natives (Van der Laan Bouma-Doff, 2007; Zorlu and Latten, 2009; Doff and Kleinmans, 2011). Similar conclusions were made for *black and white* segregation in US (Farley et al., 1993). Such evidence promotes the view that discrimination, barriers and limited accessibility in the housing market play a greater role in shaping segregation patterns or that strong voluntary segregation preferences influencing residential location decisions exist (Zorlu and Latten, 2009). In fact, the involuntary segregation of some ethnic groups can be a result of voluntary self-segregation preferences of other groups, as the classical study by Farley et al. (1978) shows in the US context. An example of such outcomes in EU is the voluntary segregation of native population provoking concentrations of foreign citizens in certain urban areas; or that of higher income, skilled and advantaged groups excluding the poorer groups, typically disadvantaged immigrants, limiting their accessibility to the housing market in certain neighbourhoods through informal restrictions (Ioannides and Zabel, 2008). Deprived areas thus act as an attractor for low income groups, not necessarily because of their choice, but more because of their constraints.

This links directly to the other segregation cause based on ethnic as well as socioeconomic premises, the so called “white flight” in the US segregation discourse (see Pais et al. (2009) for some recent evidence in US context). In Europe such tendencies, where the natives or other privileged ethnic communities leave the “ethnically mixed” and “disadvantaged” neighbourhoods, have also been found (Schaake, Burgers and Mulder, 2010). Mixed neighbourhoods, often perceived as melting point of social problems and those of lower quality and poorer standards, are the ones for which all the

population segments generally hold negative preferences (Ellen, 2000). However, predominantly more privileged groups tend to move out of such neighbourhoods segregating those at the end of the social scale.

Even though, involuntary segregation causes dominate in the EU scientific evidence, other studies see the preferences for residential proximity to co-nationals as the real drivers of the existent ethnic segregation patterns. Connecting to the arguments presented above, the evidence shows that voluntary segregation is strongest for the more advantaged and skilled groups of population, i.e. natives and privileged foreigners in EU and whites in US context (Borjas, 1998, Charles, 2000). However, there is a lack of empirical evidence about the voluntary segregation on ethnic grounds (Van der Laan Bouma-Doff, 2007), which should be further explored and addressed by the segregation literature.

Political discourse

In the same way as in the scientific evidence the involuntary causes gain more advocates, in the political discourse preferences and voluntary segregation drive are the arguments that dominate. Practitioners and policymakers often miss to fully exploit the scientific evidence in developing their policies, while the research is still struggling to give a clear indication of segregation underlying causes. As a result, every country has developed its own views and accordingly adopted its own policies in response to the existing segregation issues and, as pointed out by Bolt (2009), in developing such policies many of the segregation driving factors are almost completely overlooked.

From comparison of five European countries Bolt (2009) underlines their differences in views and in the resulting policy measures. Finland, Germany and UK identify self-segregation preferences and residential choices as the main segregation drivers, the first two addressing the phenomenon through public housing allocation policies, while UK operates a tenure diversification in

order to mix households from different social and ethnic background. Netherlands sees the housing stock composition to be the main segregation trigger and responds with housing diversification, similarly to Sweden which however blames the lack of economic integration intervening also through some socioeconomic measures. Many argue that failing to identify and address the real causes in different country and urban contexts could limit the effects of the anti-segregation policies³ (Bolt, 2009) and therefore urge for an in-depth analysis of main segregation forces (Clark and Fossett, 2008; Özüekren and van Kempen, 2002).

1.2.3. Ethnic residential segregation: two unanswered questions?

Residential segregation might well be a result of combination of preferences of different ethnic groups and constraints in their choice decisions, leading to voluntary or involuntary ethnic clustering patterns. Both are probably at the basis of the observed segregation outcomes, but it might be upon the heterogeneity of preferences and differences in constraints across diverse ethnic groups that voluntary or involuntary factors dominate. In fact, heterogeneous population sub-samples (distinguished not only by ethnicity but also by differences in other socio-economic characteristics) might exhibit different choice behaviour, thus revealing differences in sensitivities to ethnic factors. In this sense, it is possible that ethnic factors dominate for some ethnic groups and do not play an important role on the residential location choice for other population groups. The same could apply for constraints, which also vary across ethnicities and socio-economic segments. And nonetheless, differences in tastes could also be observed for neighbourhoods or cities with different segregation levels. In this sense preferences in highly segregated areas could differ from those in less segregated areas. Such discourse is in fact presented by Schelling's theory of *tipping points* (Schelling, 1971, 1972).

³ For example, a policy addressing voluntary segregation by focusing on cultural integration of immigrants and natives could result ineffective in case of involuntary segregation on economic premises, while policies targeting ethnic concentrations through income support would not work for cases where such concentrations are due to the ethnic preferences for segregation.

The analysis of these factors and of their consequences can contribute in understanding several aspects of segregation dynamics proposed throughout the segregation literature, starting from causes (choices vs constrains), tipping points, white flight, etc. However, currently there is a lack of strong empirical evidence on such theoretical propositions, due to issues in measuring ethnic preferences from observed choice-constrained residential location decisions. This leads us to the two main unanswered questions in revealing the ethnic preferences and their impact on the neighbourhood choice.

The choice-constraint issue

The role of preferences for ethnic neighbourhood composition in the residential location choices of households was highlighted through the work of Schelling (1971, 1972). In fact, he suggests that preferences for and/or against specific ethnic groups are those driving the residential choice decisions which finally determine the ethnic concentrations, or more extremely ethnic segregation. In explaining the segregation dynamics he proposes the theory of “tipping points”, which states that above certain concentration levels, ethnic aspect of neighbourhood becomes dominant factor determining the relocation choice to a neighbourhood with a more desirable ethnic make-up. However, empirically revealing and measuring ethnic preferences as residential location choice drivers has been difficult due to the choice-constraint issue in the real housing market.

Prior studies generally find different probabilities of residing in or moving to the segregated vs. non-segregated neighbourhoods for different ethnic groups (see for example Zorlu and Mulder, 2008; Zorlu and Latten, 2009; Doff and Kleinhans, 2011). Nevertheless, they could not fully explain the causes that are underneath such residential patterns, nor could they measure the degree to which segregation arises due to its different voluntary or involuntary causes. The difficulty on the empirical level lies in revealing the impact of voluntary self-segregation tendencies on ethnic clustering dynamics. In fact, in the context of real housing markets, residential location choices can be constrained

by households' less favourable socio-economic position or discriminative practices. This is especially true for disadvantaged immigrant groups often subject to several choice limitations. The models using the observed location choices, generally employed for studying the segregation drivers, confound the effects of voluntary (preferences) and involuntary (constrain) components. Thus the results cannot be interpreted as pure preferences effects. In other words, the use of revealed preferences data on residential location decisions makes it unfeasible to explain whether the present residential location was voluntarily chosen by immigrants or it was dictated by constraints they face in accessing other urban locations.

The alternative method developed to measure ethnic preferences is the Farley-Schuman showcard technique. Firstly proposed by Farley et al. (1978) it was later implemented and further developed by various other researchers (see for example Clark, 1992; Charles, 2000; Charles, 2003). All these studies have shown that preferences for residential proximity to co-ethnics exist and vary in intensity for different ethnic groups (Clark, 1992, Charles, 2000). Nevertheless, such approach presents two major shortcomings. Firstly, it only captures the ethnic aspect of residential location choice and is therefore unable to explain if ethnic preferences dominate among other residential choice drivers. Secondly, this type of methodology relies on purely hypothetical bases, so that - as suggested by Clark (1992) - additional tests to examine the relationship between declared preferences and the real behaviour are needed (Ibraimovic and Masiero, 2013).

The impact of ethnic preferences on neighbourhood choice

Another unanswered question is that of the impact of ethnic preferences on the neighbourhood choice. In fact, it is not only important to establish the existence of ethnic preferences, but it is also crucial to be able to quantify its impact on the neighbourhood choice compared to other residential location drivers. In fact, ethnic factor could be negligible in some urban contexts depending on the ethnic composition, level of ethnic concentrations, degree of

urban mix, degree of integration of ethnic minorities, etc. Therefore, other than questioning the existence and “type” of ethnic preferences, it is essential to analyse whether ethnic preferences are the driving or marginal factors of residential location choice for households of different origins or socio-economic characteristics. As stated above on the study of Farley et al. (1978): while addressing the first point in his research, ethnic preferences have not been traded-off against other residential location choice drivers.

1.2.4. Why studying residential location choice behaviour?

In order to answer to such questions we need to consider and analyse the residential location choice decisions of different population segments. In fact, looking at the ethnic preferences as a component of the residential location decisions might thus reveal their existence, sign and amplitude.



Figure 2. Ethnic variables as residential location choice drivers

When asked to choose the most suitable area of residence, individuals often consider various location characteristics such as average dwelling prices, travel time to work, schools, public services or accessibility. Among these determinants, in Switzerland like elsewhere in Europe, the role of ethnic composition of the neighbourhood is gradually gaining in importance. The relevance of such thematic is fundamental for social and urban development policies. In fact, individual preferences for ethnic and social neighbourhood composition translate into housing location decisions, generating concentrations of different ethnic groups in certain neighbourhoods. The resulting ethnic and socio-economic mix of different population segments in different urban locations create demand for certain type of housing stock, accessibility, public transport, schools and other infrastructure specific to their needs, also determining constraints on public sector intervention given the size

of their fiscal budgets. Such elements finally define the development path of neighbourhoods and cities as a whole. An in-depth investigation of individual preferences relative to ethnic and socio-economic population mix in neighbourhoods therefore becomes crucial for effective urban governance and planning.



Figure 3. The impact of residential location choice decisions on urban development

In this thesis I propose the Stated Preferences Experiment of Neighbourhood Choice⁴ which allows:

- i) Obviating the choice-constraints issue by assuming hypothetically unconstrained choice of alternative neighbourhoods;

⁴ For a detailed explanation of the SP Experiment of Neighbourhood Choice please refer to the paper constituting the second chapter of this thesis, i.e. Ibraimovic and Masiero, 2013.

- ii) Revealing the existence of ethnic preferences;
- iii) Measuring their impact on neighbourhood choice, computing trade-offs between ethnic and non-ethnic residential location choice drivers and willingness-to-pay measures;
- iv) Accounting for heterogeneity and other behavioural factors affecting ethnic preferences and residential location choice behaviour.

1.3. Research questions, objectives and scopes

This thesis aims at exploring the residential location choice behaviour in relation to the ethnic neighbourhood composition. The main objective is on revealing preferences for ethnic neighbourhood characteristics, and establishing their impact on residential location choice decisions. It combines the theoretical framework developed by Schelling (1971, 1972) in which he studies the segregation dynamics with the methodological framework proposed by McFadden (1974, 1978, 1984) for analysing the residential location choice decisions. Integrating different behavioural aspects - from observed and unobserved heterogeneity, to reference dependence and asymmetries in sensitivities to changes in ethnic concentrations - the thesis analyses the neighbourhood choice of immigrants and native population in the Swiss city of Lugano.

According to such objectives three main research questions are identified and addressed by the respective research papers:

1. *Providing empirical evidence on the role of preferences for ethnic neighbourhood make-up in the residential location choice decisions:*
 - a Do preferences for ethnic clustering exist? In particular, do households consider the presence of co-national neighbours

and other foreign communities as residential choice driving factor?

- b Are ethnic preferences dominant or marginal determinants in housing decisions?
- c What are the trade-offs between ethnic and other residential location choice drivers? And, what is the willingness-to-pay for a certain ethnic neighbourhood mix?

II. *Analysing the reference-dependence and asymmetries in preferences structure for changes in ethnic concentrations:*

- a How do individuals react to increases and decreases in the presence of their co-ethnics or other ethnic groups?
- b Do asymmetries in preference structure for deviations from the reference point exist?
- c Do these vary across different population segments?

III. *Understanding the observed and unobserved sources of heterogeneity in preferences for ethnic residential segregation among different immigrant groups:*

- a Do preferences for ethnic neighbourhood description vary among different population segments?
- b Can the heterogeneity be explained by observable socio-economic or demographic factors?
- c Do latent elements (such as attitudes and perceptions relative to ethnic variables) influence the residential location choice behaviour?

All these elements seek to untangle the segregation puzzle and address various questions relevant for policy guidance, such as the following. Is the ethnic segregation guided by voluntary or involuntary segregation drivers? Does the self-segregation tendency vary across distinct population segments? How does this translate into residential location choices, thus influencing the segregation dynamics? Which elements should be addressed by urban and socio-economic policies in order to adequately respond to negative segregation effects? What is the role of the context and present segregation levels in shaping ethnic preferences and observed segregation patterns? The final scope of this study is to help gain a better insight over the segregation driving forces. It is in fact widely demonstrated by international literature as well as experience, that if not addressed by proper policy means the results of anti-segregation policies could be narrow or the outcome might even worsen. Various studies, in fact, give evidence of limited effects of housing measures which fail identifying and targeting the real segregation causes (Bolt, 2009; Doff and Kleinhan, 2011). An in-depth investigation of the phenomenon and its main drivers therefore becomes crucial in order to deal with its complexity and devise proper strategies to manage its possible negative consequences.

1.4. Contributions

Summary of contributions

This research provides several contributions for the scientific community, as well as for the public policy makers. Firstly, it proposes an alternative approach for studying preferences for ethnic neighbourhood characteristics, obviating the current methodological issues encountered in the ethnic segregation literature. Secondly, it provides empirical evidence on the existence and impact of voluntary self-segregation preferences on residential location choice behaviour for households from different ethnic and socio-economic background living in the Swiss city of Lugano. Thirdly, it uses the state of the art techniques in modelling the residential location choice behaviour, which permit exploring various behavioural aspects of the

residential location choice decisions related to ethnic clustering preferences. Fourthly, it provides welfare estimates (willingness-to-pay measures) important for policy guidance and discusses the potential developments of segregation dynamics based on the research findings. Fifthly, it adds to the body of literature on ethnic residential segregation in the Swiss context, where a lack of studies focusing on the subject exists. Sixthly, it considers and analyses the segregation phenomenon in the context of medium-small urban dimensions, in contrast to the studies on large, metropolitan cities. Finally, it provides a reflective discussion on the implication of main results of this study for the future development of segregation phenomena in the urban context under analysis. Such indications are valuable contribution for urban planners, social workers and public policy makers. In particular, each of the research papers provides a set of contributions, as illustrated in the Figure N and presented beneath.

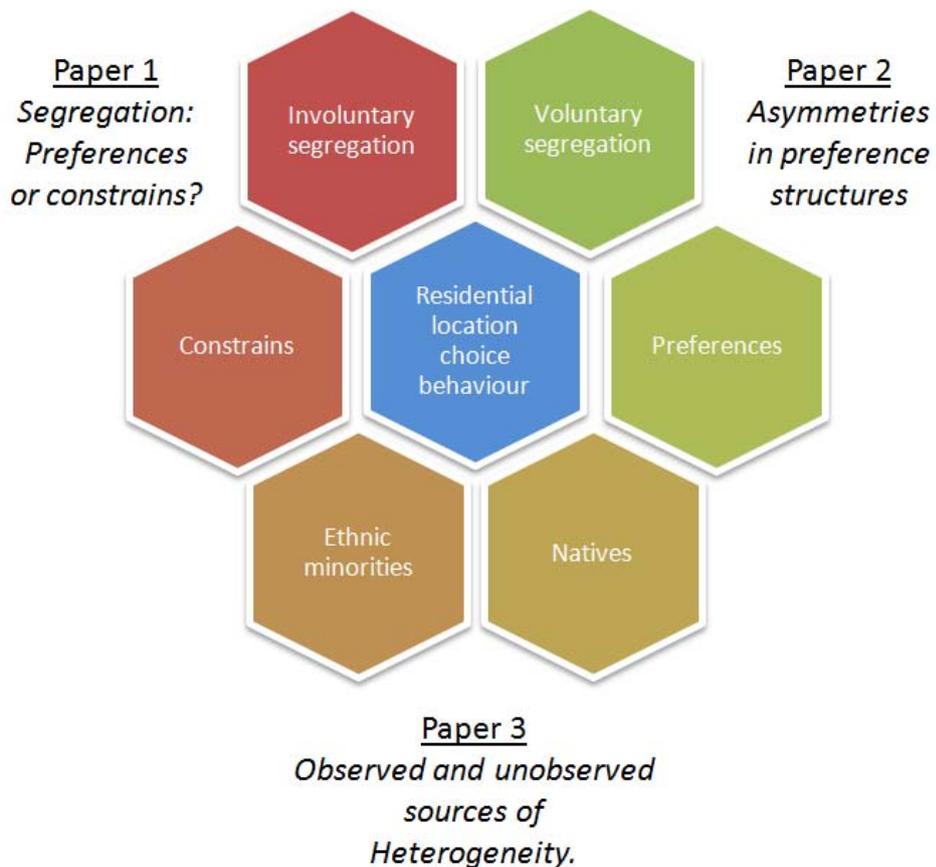


Figure 4. The main topics of the thesis

[First research paper \(Chapter 2\)](#)

Do birds of a feather want to flock together? The Impact of Ethnic Segregation Preferences on the Neighbourhood Choice

Authors: Tatjana Ibraimovic and Lorenzo Masiero

Forthcoming in *Urban Studies* (2013).

The paper presents alternative method for revealing ethnic preferences, obviating the choice-constraint issue from revealed preferences data and permitting to measure the impact of such preferences on the neighbourhood choice through trade-offs and willingness-to-pay measures of different residential location drivers. In fact, as explained in the Chapter 2, the issue of

choice constrains in deriving preference measures is well known in the choice modelling literature. Various stated choice techniques are developed in order to derive preferences in contexts where RP data are not available or adequate to identify preferences (Louviere et al., 2000), as in the case of markets subject to choice constrains. The validity of the stated choice method is widely documented across several fields of application.

In order to analyse the ethnic preferences and their impact on segregation dynamics, I employ the Stated Preference experiment of neighbourhood choice which, contrary to the revealed preferences (RP) data (i.e. the observed residential locations), permits a hypothetically free choice of alternative neighbourhoods assuming no constraints as in the real housing market. The SP experiment designed for this study embeds neighbourhood ethnic description among other residential location drivers, so that the underlying segregation preferences are revealed from the household's choices where respondents make different trade-offs between ethnic and non-ethnic location attributes according to their heterogeneous preferences. Moreover, pivoting or referencing the experiment around the experienced alternative - in this case the actual neighbourhood characteristics of the chosen location - is a widely tested method, developed for construction of behavioural reality in SP choice experiments (Hensher, 2008). I implement such method in order to adapt the hypothetical alternatives to the urban context under study, as well as to respondents' current housing situation. This adds to the realism of the experiment, putting households in front of a hypothetical yet credible and customized choice setting, matching more effectively their stated choices with the real behaviour in domain of housing location decisions.

In analysing the households' residential choice behaviour through the SP choice experiment, I primarily focus on preferences for self-segregation among the own community of origins and tastes for multicultural neighbourhoods with large presence of foreigners. Firstly, the voluntary segregation preferences of households from different ethnic and social background are

examined; Secondly the impact of such preferences on residential location choice behaviour is analysed; Thirdly, trade-off analysis is performed in order to establish whether the preferences for ethnic neighbourhood description are key or marginal drivers of ethnic concentration patterns. Finally, welfare measures for policy guidance are computed.

Other versions of this paper were presented at following conferences:

Paper 1. Ibraimovic, T. (2012). Voisinage: intégration ou ségrégation? (résultats d'une étude menée à Lugano). Journées du logement de Granges 2012, organisées par l'Office fédéral du logement (OFL), November 8, 2012. <http://www.bwo.admin.ch/wohntage/00135/00515/index.html?lang=fr>

Paper 2. Ibraimovic, T., Masiero, L. (2011). Tell me who you are and I'll tell you who you live with: The impact of ethnic segregation preferences on the neighbourhood choice. Discrete Choice Modelling Workshop, Leeds, UK, September 8, 2011.

Paper 3. Ibraimovic T., Masiero L., Scagnolari S. (2010). Ethnic segregation and residential location choice of foreigners. 10th STRC Swiss Transport Research Conference, Ascona, Switzerland.

Results from this paper are published as following articles in press:

Article 1. Ibraimovic, T. (2011). Entre intégration et ségrégation résidentielle, un défi pour les villes / Zwischen residentieller Integration und Segregation: Herausforderung für die Städte. *La Vie économique/ Die Volkswirtschaft*, numero di Dicembre 2011, pag. 35-39, SECO e DFE.

<http://www.lavieeconomique.ch/fr/editions/201112/pdf/Ibraimovic.pdf>

Article 2. Ibraimovic, T. (2011). Tra integrazione e segregazione residenziale: la sfida urbana. *Dati, statistiche e società*, numero 2011-2, pag. 46-52, Ufficio di statistica del Cantone Ticino (USTAT).

http://www3.ti.ch/DFE/DR/USTAT/allegati/articolo/208dss_2011-2_6.pdf

Article 3. Ibraimovic, T. (2011). Tra integrazione e segregazione residenziale: la sfida urbana. Corriere del Ticino, 7 luglio 2011, rubrica Primo Piano, pag. 3.

Other working papers based on the analysis results:

Paper 2. Ibraimovic, T., Hess, S. (2012). Trade-offs between commuting time and ethnic neighbourhood composition in a residential location choice context. Working paper.

[Second research paper \(Chapter 3\)](#)

Households' response to changes in the ethnic composition of neighbourhoods: Exploring reference-dependence and asymmetric preference structures

Authors: Tatjana Ibraimovic and Stephane Hess

Manuscript submitted for publication (2013); Presented at STRC 2013.

Relating to Prospect Theory framework of Kahneman and Tversky (1979), this paper explores the reference dependence from the ethnic concentration levels in the neighbourhood of residence and asymmetries in preferences structure for changes in ethnic levels relative to the reference value. In fact, relating to their experience, households tend to value alternative neighbourhoods based on the ethnic characteristics of their current residential location, showing sensitivities to changes in the levels of co-ethnics or ethnic minorities from this reference point. Moreover, these sensitivities could differ depending on whether we look at positive or negative deviations from the reference values, i.e. for increases and decreases in the presence of their co-ethnics or other ethnic groups. Finally it looks at the heterogeneity in such asymmetries which could vary across different population segments, especially in the context of ethnic clustering, providing an insight over the impacts of asymmetries and heterogeneity on willingness-to-pay and willingness-to-accept measures.

Other versions of this paper were presented at following conferences:

Paper 1. Ibraimovic, T., Hess, S. (2012). Asymmetries in ethnic residential segregation preferences. Discrete Choice Modelling Workshop, Leeds, UK, September 8, 2011.

[Third research paper \(Chapter 4\)](#)

***“Tell me who you are and I’ll tell you who you live with”*: A latent class model of residential choice behaviour and ethnic segregation preferences**

Authors: Tatjana Ibraimovic and Stephane Hess

Accepted for presentation at ERSA 2013 (Palermo), AUM 2013 (Cambridge).

The nature of ethnic residential clustering involves different population segments which through their location decisions influence the spatial patterns of ethnic settlements. Understanding the differences in the residential behaviour of a heterogeneous population and, in particular, the tastes dissimilarities for ethnic composition of neighbourhoods becomes essential for analysing the dynamics of ethnic concentrations. However, the residential location choice (RLC) behaviour and especially the preferences for ethnic description of the neighbourhood are subject to heterogeneity in tastes that quite often depend on attitudes and other elements not directly observable by researchers. Employing a latent class choice modelling approach, we aim to examine the observed and unobserved heterogeneity in RLC behaviour across households of different ethnic and socio-economic background. Combining the results from the choice and class-membership model components and interpreting the sensitivities and probabilistic composition of the latent classes allows us to evaluate the impact that each attribute exercises for each typology of respondents.

[Other contributions](#)

Defining the country and urban context under analysis, the introduction provides an extensive discourse on ethnic residential segregation which will be

developed in a separate research paper focusing on ethnic segregation in the European and more particularly Swiss country context.

Finally, each paper derives its conclusions and discussion of relevant findings in the context of the mainstream literature of the field, although the thesis conclusion to also presents a discussion of several policy indications stemming from empirical results, as well as some indications for further research. Such elements are to be considered a relevant part of the thesis which was presented by the author during the invited talk from the Swiss Government in the occasion of Swiss Housing Policy Days event in Grenchen 2012. The author has received the invitation for a talk on this work also from RAND Europe in Cambridge in June 2013, University “Roma Tre”, Italy in September 2013 and in University of Surrey in October 2013.

1.5. Research Methods

1.5.1. The analysis of ethnic segregation preferences in RLCM framework

Since the pioneering work of McFadden (1974, 1978) on a new methodological approach for analysing residential location choices, many studies have employed Residential Location Choice Models (RLCM) for studying the impact and importance of location and structural attributes on the housing choice behaviour. Two main data typologies are used for estimation of RLCM, the Stated Preferences (SP) and Revealed Preferences (RP) data. The stated choice experiments are used in contexts where one or more relevant alternatives do not exist in the real-world choice context, or for the applications in which methodological issues of the revealed choice data do not permit estimations of satisfactory behavioural choice models. Examples of studies employing SP datasets in modelling the residential location choice behaviour are those of Kim, Pagliara and Preston (2003) and Walker and Li (2007). The observed choices or revealed preferences (RP) data, on the other hand, are used by Gabriel and Rosenthal (1989), Guo and Bhat (2002) and Habib and Miller (2009).

Throughout this thesis I model preferences for ethnic neighbourhood composition in the context of RLC modelling framework. Tastes for ethnic location characteristics are introduced in choice models through two variables, first defining the concentration of co-nationals and second representing the share of foreigners in various neighbourhood alternatives. Both types of data, SP and RP, are employed for the model estimation. Stated preferences data were collected from a purposely designed neighbourhood choice experiment pivoted around revealed preferences data.

Modelling behavioural aspects of neighbourhood choice

Following recent developments in the predictive choice analysis to incorporate different aspects and methods from the behavioural approach of analysing choice decisions (Ben-Akiva et al., 1999; Ben-Akiva et al., 2002a, 2002b), I develop my work by integrating behavioural factors that affect decision process and preferences in the residential location choice models. In particular, following the expanded behavioural framework described in Ben-Akiva et al. (2002a, 2002b) I explore the observed and unobserved sources of heterogeneity in tastes among decision-makers and the influence of socio-psychological factors on choice decisions. Specifically, Random Parameters Logit (RPL) model and Latent Class (LC) choice models are used for latent heterogeneity representation (Train, 2003; Hensher and Greene, 2003; Hensher, Rose and Greene, 2005). (Chapter 3) Moreover, I connect the segregation theories (Schelling, 1971, 1972) and the prospect theories (Kahneman and Tversky (1979)) in order to examine the response of households to changes in the current levels of ethnic concentrations in their neighbourhood of residence (Chapter 2). For such purpose I exploit the pivoted design of the SP neighbourhood choice experiment for the analysis of reference-dependence from respondents present ethnic neighbourhood mix and asymmetries in preferences structure to changes in ethnic concentrations with respect to this reference values.

1.6. Empirical analysis

1.6.1. Ethnic Segregation in Switzerland

Despite a large preference of foreign citizens residing in Switzerland, the question of ethnic segregation has been addressed by very few studies focusing on major Swiss cities, Zurich and Geneva (Arend, 1991; Huissoud et al. 1999; Heye and Leuthold, 2004; Alfonso, 2004; Schaerer and Baranzini, 2009; Lerch and Wanner, 2010). In his study, Arend (1991) computes the Duncan and Duncan Dissimilarity Index (1955) in Zurich for years 1970, 1980, concluding that different clusters of foreigners exhibit different behaviour in relation to the location choice and segregation preferences. 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 the existence of two forces leading the segregation phenomena – the voluntary segregation caused by preferences to live with own co-nationals and the involuntary segregation caused by limited accessibility of disadvantaged immigrant communities to higher quality districts. The lack of research on the subject in the Swiss context highlights the need to gain a deeper knowledge about the segregation patterns as well as its roots and causes in order to design adequate policies to prevent large concentrations of minority communities and potential negative consequences on integration and urban development.

1.6.2. Study context: Ethnic preferences in the Swiss city of Lugano

In my research I investigate the ethnic residential segregation in smaller but very ethnically diverse city of Lugano. In particular, I analyse the levels, causes and impacts of such residential clustering in different type of environment differing from the traditional metropolis and big urban settings by its size, urban form and social fabric. In particular, I aim to gain insight of whether the existing segregation patterns in small-sized urban environment

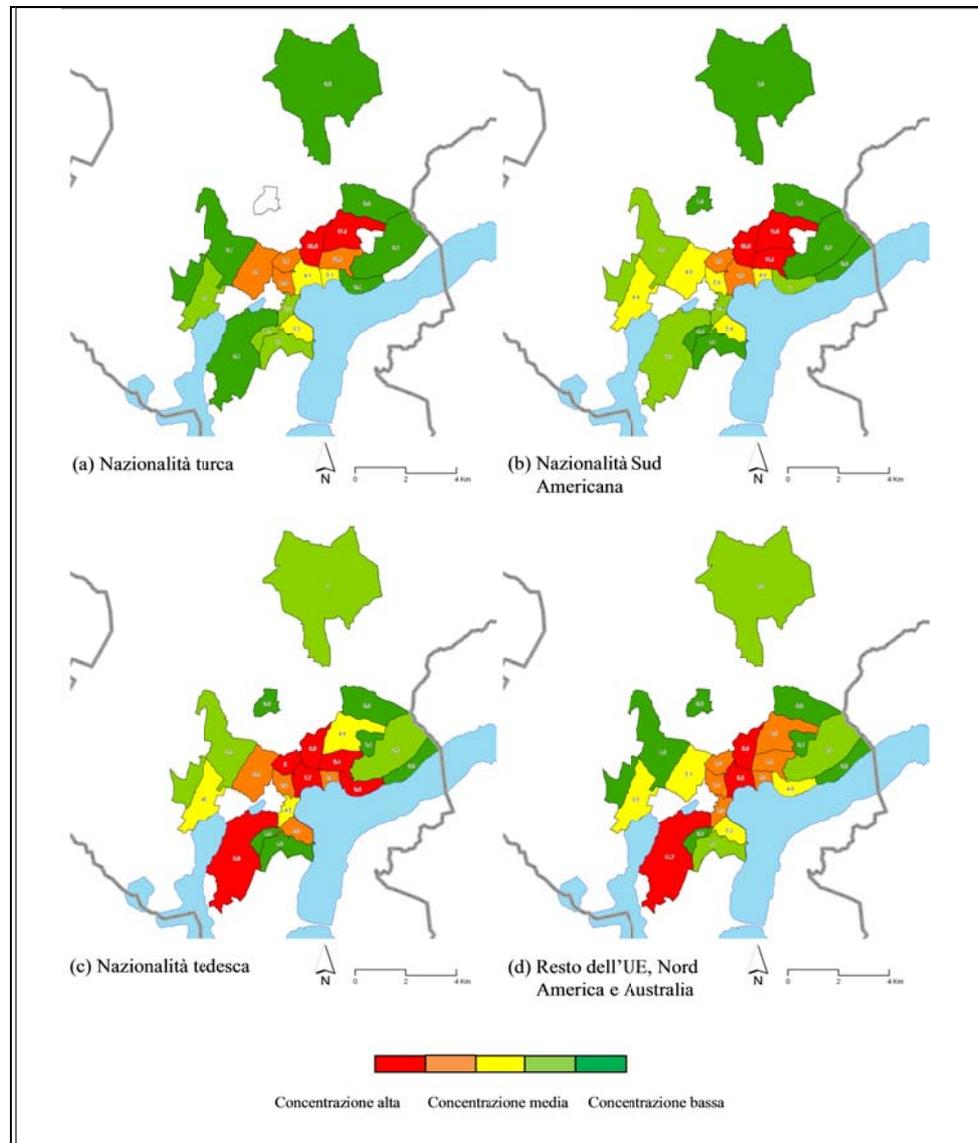
follow the same dynamics as in larger urban settings differing by the size, urban form and social fabric. In particular, the analysis turns on the levels, causes and impacts of residential clustering in different urban neighbourhoods.

The results of a descriptive study of ethnic distributions in the city shows a degree of spatial separation different typologies of foreign communities, highlighting a certain socio-economic hierarchy in residential location choices. Moreover, immigrants' distribution patterns exhibit certain concentration levels among some nationalities in specific neighbourhoods. However, the levels of such clustering are relatively moderate, thus not leading to the social isolation of single ethnic minority groups.

In particular the observed concentration patterns (see Figure 5) show concentrations of:

- a) Disadvantaged foreigners in ethnically mixed neighbourhoods of lower socio-economic classes.
- b) Advantaged foreigners clustering in single national groups in higher-income and more attractive city neighbourhoods

Figure 5. Concentration of different nationality groups in the city of Lugano



Density of nationality group normalized on the total number of individuals of the same nationality group in the area of study. *Source:* Movimento della Popolazione (MovPop), Amministrazione Cantonale ticinese, Bellinzona; GIS database from i.CUP, Accademia di Architettura, Mendrisio.

The main research question stemming from such analysis is to examine whether such concentration patterns are due to voluntary (preferences) or involuntary (constraints), for heterogeneous population groups.

1.6.3. Data

RP data were collected in a first household telephone survey conducted in 2008 on 1400 respondents. The stratified sampling technique was used for representing households from 10 main nationality groups residing in the city of Lugano. The household survey questionnaire was structured in three parts. The first part relates to the information on current and previous dwelling characteristics, socio-economic and demographic characteristics and some attitudinal and social behaviour elements (Sense of Community Index by McMillan & Chavis, (1986)). Additional data on individual and neighbourhood characteristics were gathered from secondary data sources. Three such data sources were considered among which: Centralized Residents Control Office database with the information about individual inhabitants characteristics of the selected communes for the conduction of our telephone survey as well as for sampling and modelling purposes; City of Lugano information about the spatial distribution of foreigners across neighbourhoods and municipalities; i.CUP datasets with Geographic Information System (GIS) type of data on location and environment for single dwellings as well as for their neighbourhoods.

All the information relative to the dwellings and households were geo-referenced using GIS tool. From preliminary hedonic pricing models relevant housing and location characteristics were identified and used for residential location choice modelling. SP dataset was collected in a second household survey conducted in 2010 on a subsample of 133 respondents of the first household survey. The main part of the second survey consisted in a face-to-face computer aided stated choice experiment on neighbourhood choice. Full version of the SP experiment is presented in the Annex 1 of the thesis.

1.7. Thesis outline

The study of the main topics of this thesis are exposed in three research papers, submitted for publishing in international scientific journals, and which constitute the main body of this thesis. The thesis is introduced (Chapter 1) by the discussion on ethnic diversity, segregation issues and their importance in the public domain. Motivation and research questions, contributions and research methods follow. Defining the country and urban context under analysis, the introduction provides a valuable insight over the ethnic segregation phenomena in Europe and Switzerland, which will be developed in a separate research paper.

The introductory chapter is followed by three research papers, each exploring one of the three main research topics. Chapter 2 (Ibraimovic and Masiero, 2013) explores preferences for ethnic neighbourhood composition (in terms of self-segregation preferences and preferences for foreigners share in the neighbourhood), impact of such preferences on residential location choice (willingness to pay measures and trade-offs of ethnic and non-ethnic neighbourhood attributes). Chapters 3 (Ibraimovic and Hess, 2013.a) and 4 (Ibraimovic and Hess, 2013.b) analyse behavioural aspects of choice (observed and latent sources of heterogeneity across households of different socio-economic and ethnic background, reference dependence and asymmetries in preferences for changes of the neighbourhood ethnic makeup).

Finally, each paper derives its conclusions and discussion of relevant findings in the context of the mainstream literature in the field, although the thesis' conclusion to also presents several policy indications as well as those for further research (Chapter 5).

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Chapter 2

Do birds of a feather want to flock together?

The Impact of Ethnic Segregation Preferences on the Neighbourhood Choice *

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Abstract

Ethnic residential segregation can arise from voluntary or imposed clustering of some ethnicities in specific urban areas. However, up to now it has been difficult to untangle the real causes underlying the segregation phenomena. In particular, voluntary segregation preferences could not be revealed from the observed location choices given the existence of constraints in the real housing market. This study aims at analysing the voluntary segregation drivers through a Stated Preferences experiment of neighbourhood choice. Such method obviates the choice-constraint issue by allowing a hypothetically free choice of alternative urban locations. The results suggest that ethnic preferences exist, positive for co-national neighbours and negative for other foreign groups. However, such preferences do not constitute a major location choice driver given relatively modest *willingness-to-pay* (WTP) for ethnic neighbourhood characteristics. Certain heterogeneity in preferences for higher concentration of own co-nationals is captured for households of different origins and educational attainment.

Keywords: Ethnic residential segregation; Ethnic segregation preferences; Residential location choice models; SP experiment of neighbourhood choice.

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2.1. Introduction

When choosing the most suitable area of residence, individuals often consider various location characteristics such as the average dwelling prices, travel time to work, quality of schools and public services or accessibility. Among these determinants, in Switzerland like elsewhere in Europe, the role of ethnic neighbourhood composition is gradually gaining in importance. Given the recent raise in immigration trends, the relevance of such thematic is becoming essential for the management of an increasingly multi-ethnic social fabric. In fact, individual preferences for ethnic neighbourhood composition translate into housing location decisions, which might generate concentrations of different ethnic groups in certain urban areas. Even if the ethnic grouping can be beneficial for recent immigrants helping them settle into the new social context (Bolt and Van Kempen, 2008), it is often a matter of concern for the consequences of its potential negative developments. There is, in fact, a general fear that such trends might evolve into the ethnic segregation phenomenon similar to that of the United States, often linked to a series of social problems such as racial inequality and marginalization, ghettoization and poverty concentration (Massey and Denton, 1993; Charles, 2003).

Residential segregation is often thought to arise from a combination of preferences of different ethnic groups and constraints in their choice decisions, first leading to voluntary and second to involuntary ethnic clustering patterns. However the dominance of preferences as determinants of residential grouping is often debated. While policymakers, often missing to consider the scientific contribution, expose divergent views on voluntary and involuntary triggering factors, research still struggles to untangle the real segregation causes. To this end, several theories, from spatial assimilation to place stratification, were developed. Yet, such theories still lack the support by strong empirical evidence. The difficulty on the empirical level lays in the so-called *choice-constraint issue* (Van der Laan Bouma-Doff, 2007) affecting immigrants' residential location decisions. In the context of real housing

markets, residential location choices can be constrained by households' less favourable socio-economic position or discriminative practices. The models using the observed location choices - generally employed for studying the segregation drivers - would, in this case, confound the effects of voluntary (preferences) and involuntary (constrain) components. In other words, the use of revealed preferences data on residential location decisions makes it infeasible to explain whether the present residential location was voluntarily chosen by immigrants or it was dictated by constraints they face in accessing other urban locations. Given that such constraints most frequently apply to disadvantaged ethnic minorities, which are also those who often show the highest segregation levels, the question of choice limitations in the analysis of voluntary segregation preferences becomes fundamental.

In this paper we aim at analysing the preferences for ethnic neighbourhood composition - which we refer to as *ethnic preferences* - and measure their impact on residential location choice. To this end we introduce the ethnic description of urban locations within the Residential Location Choice Models and design a Stated Preferences (SP) experiment of neighbourhood choice. Such method obviates the choice-constraint issue by allowing interviewed households to face with a free choice of alternative neighbourhoods described by different ethnic and non-ethnic factors. Households' preferences are thus revealed from hypothetically unconstrained residential location choices. Our specific focus is on the existence of self-segregation preferences and those for living with other foreign communities. For the empirical analysis we conduct the stated choice survey, considering at the geographic level choices among the different neighbourhoods within the city of Lugano in Switzerland.

In addition to the general analysis of tastes for ethnic neighbourhood make-up, we investigate the heterogeneity across different ethnic groups. Using observed and random components, we assess the impact of socio-economic characteristics potentially affecting the segregation behaviour. Finally, we quantify the relative importance of non-monetary attributes of

housing location choice, namely *ethnic neighbourhood composition* and *travel time to work*, in terms of willingness-to-pay (WTP) measures. The intent is to examine whether the ethnic preferences are the strongest determinants of the location choice decisions, or if their impact is weak against other residential choice factors.

The paper is organized as follows. Section 2 provides a literature review on previous studies analysing ethnic segregation drivers and presents the stated preferences experiment of neighbourhood choice, along with the main study hypotheses. The stated choice experiment is applied to a case study in a Swiss urban setting for which the spatial context and data are described in section 3. Section 4 presents the methodological framework and model specification, while section 5 illustrates and discusses the model results. Finally, chapter 6 provides the conclusions.

2.2. Exploring the Voluntary Ethnic Segregation Drivers

2.2.1. Previous Research

In analysing the ethnic segregation drivers, several studies examine the impact of households' and neighbourhood characteristics on the probabilities of moving to or residing in more vs. less segregated neighbourhood types (see for example Zorlu and Mulder, 2008; Doff and Kleinhans, 2011). Such studies commonly use data on households' observed residential locations, estimating OLS regression or logit models. Even though their findings show that probabilities of residing in segregated neighbourhoods differ across ethnic groups, they could not fully explain whether such outcomes result from voluntary or involuntary segregation causes. Zorlu and Latten (2009) focus on this point in attempt to identify preferences for ethnic neighbourhood make-up. Using the Oaxaca-Blinder decomposition technique they explore the native-immigrant differentials in the choice of destination-neighbourhood types. They thus separate the contribution of observed and unobserved factors, attributing

the latter (estimated to 35% of total differential) to preferences and discrimination effects.

Another methodology, extensively used in modelling the residential location choice decisions but applied to segregation issues to a lesser extent, are the Residential Location Choice (RLC) models (McFadden, 1977). Such models reveal the preferences for different alternatives and their attributes from households' choices among a predefined set of alternative residential locations. Applied to segregation analysis, they allow exploring the relative impact of ethnic neighbourhood attributes on the location choices compared to other residential choice drivers such as amenities, schools or environmental quality. Up to date only few studies focusing on segregation issues have estimated RLC models using revealed preference (RP) data. In his study Aslund (2005) finds that the population composition significantly affects immigrants' location decisions, where a particular importance is given to the presence of co-nationals and other immigrant communities. Both of these factors are found to act as attractors for new immigrants, as well as for those who relocate within the hosting country. However, as discussed previously, these model results cannot be interpreted as pure "preferences", since they are likely to confound the effects of preferences and constraints embedded in observed households' residential location choices.

A third stream of studies directly examines the preferences for segregation through stated preference experiments, employing the so called *Farley-Schuman showcard methodology*. Firstly proposed by Farley et al. (1978) the method was later implemented and further developed by various other researchers (see for example Clark, 1992; Charles, 2000; Charles, 2003). Such literature shows that preferences for residential proximity to co-ethnics exist and vary in intensity for different ethnic groups (Clark, 1992, Charles, 2000). Nevertheless, the approach presents two major shortcomings. Firstly, it only captures the ethnic aspect of residential location choice and is therefore unable to explain if ethnic preferences dominate among other residential choice

drivers. Secondly, the method relies on purely hypothetical bases, so that - as suggested by Clark (1992) - additional tests to examine the relationship between declared preferences and real behaviour are needed.

2.2.2. Stated Preference Experiment of Neighbourhood Choice

In analysing ethnic preferences and their impact on segregation dynamics we employ a Stated Preference experiment of neighbourhood choice. Contrary to the Revealed Preferences (RP) data (i.e. information on the observed residential location), SP choice experiment permits a hypothetically free choice of alternative neighbourhoods, assuming no constraints as in the real housing market. The validity of SP choice method is widely documented for situations where RP data are not available or adequate to identify preferences (for more details see Louviere et al., 2000). Such case applies to the markets subject to choice constrains.

Experiment designed for this study embeds neighbourhood ethnic description among other residential location choice drivers. Underlying preferences are thus revealed from household's choice decisions, where respondents make different trade-offs between ethnic and non-ethnic location attributes according to their heterogeneous preferences. The resulting choices are analysed in the context of Residential Location Choice models (Mc Fadden, 1977), allowing us to compute preference indicators as well as *willingness-to-pay* (WTP) measures for each of the ethnic and non-ethnic location characteristic.

Pivoting or referencing the experiment around the experienced alternative, in our case the actual neighbourhood characteristics of the chosen location, is a widely tested method developed for construction of behavioural reality in SP choice experiments (Hensher, 2008). We implement such method in order to adapt the hypothetical alternatives to the urban context under study, as well as to respondents' current housing situation. Putting households in front of a hypothetical, yet credible and customized choice setting adds to the realism of

the experiment permitting us to match more effectively their stated choices with the true behaviour in domain of housing location decisions.

Four other major advantages stem from such approach. Firstly, the SP experiment in which the dwelling characteristics are kept constant allows us to explore the residential location choices based uniquely on selected neighbourhood characteristics. On contrary, location choice models using RP data would involve a multilevel choice of dwelling and neighbourhood with the resulting difficulties in choice set definition and model estimation. Secondly, a priori definition of “neighbourhood types” widely used in the current practice for analysis of neighbourhood-type selection, can be obviated and instead the marginal (dis)utilities for neighbourhood characteristics directly identified. Thirdly, the orthogonal experimental design strategy overcomes the issue of confounding effects as in the RP data settings. Finally, the heterogeneity in marginal (dis)utilities across different ethnic and socioeconomic groups can be tested and WTPs for different population segments compared.

Ethnic Factors influencing the Residential Location Choices

Findings of previous research on immigrants’ location decisions show that households tend to live in areas with higher presence of co-ethnics (Alsund, 2005; Zorlu and Mulder, 2008) and higher share of other foreign groups (Zavodny, 1999; Zorlu and Latten, 2009). Yet, the literature suggests that different driving forces could be behind the residential choice behaviour relative to these two ethnic factors.

Development of ethnic networks is believed to facilitate new immigrants in gaining information and accessing labour and housing markets particularly at the initial stage (Van der Laan Bouma-Doff, 2007). Likewise, aspects as the preservation of native language and culture or the supply of specific ethnic goods are deemed to reinforce preferences for residential proximity to ones’ community of origin also in the long run (Zhou and Logan, 1991). Besides these positive externalities, the “voluntary choice for segregation” might also result

from negative factors, such as experienced discrimination from other ethnic groups (Van der Laan Bouma-Doff, 2007).⁵ It is thus assumed that the observed concentration patterns among co-ethnics arise following immigrants' preferences for residing next to own compatriots, regardless of whether such choices are based on positive or negative arguments.⁶

Conversely, high immigrant concentrations in specific neighbourhoods are frequently related to factors driving the involuntary segregation. In fact, it is often argued that residential location choices of immigrants are dictated by their weak socioeconomic position, limited accessibility and discrimination in the housing market (Darden 1986; Van der Laan Bouma-Doff, 2007). Similarly, the voluntary preferences of other (dominant) ethnic groups are thought to influence the involuntary segregation trends of disadvantaged ethnic minorities (Zorlu and Latten, 2009). Thus, even though immigrants are found to have major probabilities of residing or relocating to neighbourhoods with high immigrant levels, this could be a result of constraints rather than preferences.

In our choice experiment we test such hypothesis. Firstly, we aim to verify if the *concentration of co-nationals* has a positive impact on the probability of choosing certain residential location, indicating preferences for ethnic clustering among own community of origin. Secondly, we examine the preferences for the *share of foreigners*, expecting to find a marginal disutility associated with such attribute, denoting negative perception of neighbourhoods inhabited by a large immigrant population.

Differences in Tastes across Ethnic and Socioeconomic Groups

It has been widely observed that ethnic preferences, as well as their impact on the location choice differ across different population segments. Following

⁵ We thank anonymous reviewers for this suggestion.

⁶ Even if the scope of this analysis was not to explore the underlying motivations for the "choice of segregation", further insight into such factors could be very valuable for policy guidance.

such evidence, we point a particular attention to two socio-demographic characteristics: the origins and the education level. These factors are found to affect significantly the observed segregation patterns, as well as to influence the ethnic preferences and thus the residential location choice behaviour (Aslund, 2005; Zorlu and Mulder, 2008). A third element potentially affecting the preferences for co-ethnic neighbours is the households' income (Clark, 2009). This factor was tested in preliminary analysis but found to have a statistically insignificant effect in this particular study context. On such basis we propose another set of hypothesis relating to heterogeneity in ethnic preferences in order to test some theoretical postulates identified by the segregation literature as being of particular interest for policy guidance.

The first hypothesis concerns the origins of ethnic communities and investigates the differences in preferences for self-concentration across following population segments: the disadvantaged immigrant groups from underdeveloped and developing countries, the advantaged foreign communities of Western descent⁷ and the native population. The aim here is to gain insight over the underlying causes of existing segregation patterns where the disadvantaged groups are predominantly concentrated in large and highly mixed residential neighbourhoods, while the advantaged communities tend to establish in more attractive areas mainly dominated by the native population.

Another subject directly linked to the social status of immigrant groups is the education level. Education is in fact one of the key variables, together with the occupation and income, that according to the spatial assimilation theory could influence the segregation patterns into a major residential integration of ethnic minorities (Charles, 2003). Several studies demonstrate that the degree of spatial dispersion and residential integration is directly linked to the level of education of immigrant households. In their studies Aslund (2005) and Zorlu

⁷ Advantaged foreign communities in the Swiss context comprise EU citizens and other foreigners from the Western descent who, on average, hold similar socio-economic level as the Swiss and are entitled to exercise rights comparable to the native population.

and Mulder (2008) find an increasing residential mobility, especially to quality urban areas, of highly educated immigrant households. The underlying assumption is that higher education levels support social mobility and enhance the chances of economic success of immigrants (Hartog and Zorlu, 2009). Households with higher education levels are thus able to choose more freely their residential location as well as to access some more attractive neighbourhoods. We thus test the hypothesis that a higher education level not only helps eliminating constraints on residential choice but also weakens the ethnic self-segregation preferences stimulating a major residential integration within the mainstream society.

2.3. Data and Spatial Context

2.3.1. Spatial Context and Observed Segregation Patterns

The analysis considers a mid-sized Swiss city of Lugano and its seven surrounding communes inhabited by a population of 78'025 residents in the year 2008. With almost 40% of foreign residents coming from over a hundred different countries, Lugano is among the most ethnically diverse cities in Switzerland. Foreigners residing in the city, as those in the rest of the country, can be classified into two categories which exhibit different residential behaviour (Arend, 1991). These groups often occupy the extremes of the job market (Afonso, 2004) leading to strong differences in their socio-economic status. The highly skilled and wealthier foreign communities are represented mainly by citizens from neighbouring and other Western countries (EU, USA and Australia). Among the non-Western nationals, accounting for 31% of total foreign population, citizens from the Balkans and Turkey are the most represented groups, whereas other minorities are mostly recent immigrants from less-developed non-Western countries. Other than showing a poorer socio-economic position, the latter immigrant communities also exhibit a major social distance from the native population in terms of linguistic, cultural and religious background.

The spatial distribution of foreigners in Lugano resembles more to the European context of ethnically mixed rather than homogeneously segregated neighbourhoods as in the US. Moreover, the segregation levels are relatively low compared to US and some big European cities, due to a small and compact urban territory as well as a good degree of spatial and social integration among the major ethnic groups.

The existing distribution of different nationality groups across the city neighbourhoods indicates a distinct pattern of concentration between the advantaged and disadvantaged ethnic communities. While advantaged foreigners situate themselves mainly in more attractive neighbourhoods inhabited by a larger share of natives, the disadvantaged immigrant communities concentrate within the large urban residential areas with a cheaper housing stock. Still, apart from the socio-economic situation, foreigners' distribution patterns also show certain residential grouping among single ethnic groups. In this regard, each community exhibits certain degree of concentration in specific areas. The highest concentrations are observed for Turkish, South American, some western European and North American communities, while Italians are, as expected, more dispersed over the territory given their cultural and linguistic similarity to the natives.

2.3.2. Data

The empirical analysis of this study refers to a dataset obtained through the main Stated Preferences (SP) experiment⁸ and a secondary Revealed Preferences (RP) survey of location choice. The choice experiment was conducted as a computer assisted face-to-face interview and completed for 133 households from 10 different nationality groups⁹. Overall city population (over 18 years old) was firstly stratified according to the origins and neighbourhood of residence and consequently randomly sampled. Thus the male or female

⁸ For a detailed presentation of SP experimental methods see Hensher, Greene and Rose (2005).

⁹ Namely, citizens of Switzerland, Italy, Ex-Yugoslavia, Portugal, Germany, Turkey, Rest of EU, USA and Australia, Eastern Europe and Asia, Southern America, Africa and Middle East.

household head was interviewed. Such sampling strategy allowed us to include all nationality groups in the experiment as well as to represent the spatial distribution of the population. Given a particular focus on the immigrants' residential location choice behaviour, some less represented foreign groups were oversampled. However, no implications on the model results derive from such sampling procedure, since the sampling criteria did not consider the choice variable, but exogenous individual-specific characteristics (for more details on exogenous stratified sampling in discrete choice models see Manski and Lerman, 1977; Manski and McFadden, 1981).

In the experiment, respondents were presented with a future hypothetical situation in which their neighbourhood of residence changed its ethnic composition in terms of concentration of co-nationals and share of foreigners. They were thus asked to choose between the present neighbourhood of residence (*reference alternative*), and two alternative neighbourhoods (*unlabelled hypothetical alternatives*) defined by characteristics and respective attribute levels resulting from the experimental design (for more details on experimental design strategies see Louviere et al. (2000)).¹⁰ Because the characteristics of the dwelling itself did not change, but only the neighbourhood variables, this was equivalent to moving the existing residence to a new neighbourhood. In particular, the three alternative residential locations were described in terms of two ethnic attributes (namely, concentration of co-nationals and share of foreigners) and two other housing choice drivers (namely, prices of dwellings and travel time to work). The latter two attributes are used for trade-off analysis and impact testing in the experiment and choice models.

¹⁰ Geographically restricting the study area on neighbourhoods and suburbs of the city of Lugano does not constitute a major issue in this context. In fact, the hypothetical choice alternatives were unlabelled and thus the focus of the analysis was on trade-offs between (ethnic and non-ethnic) attributes describing different alternatives and not on the alternatives per se.

Table 1. Stated preferences (SP) experiment description

Residential location attributes	Attributes' description	Attributes' levels		
<i>Concentration of co-nationals (%)</i>	Number of co-nationals in the neighbourhood over the total number of co-nationals in the city	-80%, -40%, reference value ^a , +40%, +80%		
<i>Share of foreigners (%)</i>	Number of non-Swiss residents over the total number of residents in the neighbourhood	-50%, -25%, reference value ^a , +25%, +50%		
<i>Dwelling monthly rent (CHF)</i>	The monthly rent of the dwelling	-50%, -25%, reference value ^a , +25%, +50%		
<i>Travel time to work (MIN)</i>	Travel time to work by the habitually used mode type	-20%, -10%, reference value ^a , +10%, +20%		

Sample statistics	Average	Std.	Min.	Max.
<i>Concentration of co-nationals (%)</i>	10.2	5.9	3	48
<i>Share of foreigners (%)</i>	42.5	7.7	16.3	57
<i>Dwelling monthly rent (CHF)</i>	1,485	450	650	2,800
<i>Travel time to work (MIN)</i>	13.9	10	0	60

Experimental design	
<i>Choice alternatives</i>	Respondents' present neighbourhood of residence ^b , hypothetical neighbourhood A and hypothetical neighbourhood B
<i>Design strategy</i>	Fractional factorial orthogonal design for main attribute effects
<i>Choice situations</i>	25 (divided in two blocks of 12 or 13)
<i>Choice Observations</i>	133 respondents each completing 12 or 13 choice situations, resulting in a database of 1566 valid choice observations

^a Reference value is the value of the relative attribute of respondents' present residential location.

^b Respondents' present neighbourhood of residence represents the reference alternative in the experiment.

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. Each of the four attributes describing the alternative neighbourhoods contained five levels: the reference value and four positive and negative percentage deviations from the reference value (see Table 1). Percentage deviations were set on basis of the spatial context and characteristics of the city of Lugano.

According to an orthogonal main-effects experimental design, 25 choice situations reflecting different combinations of attribute levels, were identified and divided into two blocks. The blocking procedure has been applied for reducing the number of choice situations presented to each respondent (for details, see Louviere et al., 2000). Each of the 133 respondents was thus assigned to one of the two blocks and accordingly presented with 12 or 13 choice situations of the format shown in Fig. 1. The reference alternative attribute values were held constant for each respondent, reflecting the values of his present residential location; whereas those describing the two hypothetical alternatives varied across each choice situation defining different trade-offs between the neighbourhood attributes. The resulting database used for residential choice models estimation comprised a total of 1566 valid choice observations.

Figure 1. 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 **NEXT**

Note: In a context where the reference alternative is part of the choice set it is a common practice to allow a second choice among hypothetical alternatives only. Such procedure generates two distinct datasets (including and excluding the reference alternative). In this study the dataset being considered is the one allowing the reference alternative among the choice set.

2.4. Methodological Framework

Ethnic preferences are specified in the context of Residential Location Choice models derived from Random Utility Model (RUM) framework (McFadden, 1974). In particular, the utility function associated with 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:

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

where β_k are the coefficients associated with the observable variables x_{njks} , and 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 with 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 distribution¹¹:

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

where, β_k is the sample mean, η_{nk} is the individual specific heterogeneity with mean zero and standard deviation one, and σ_k is the standard deviation of β_{nk} around β_k , assumed normally distributed.

¹¹ Some other commonly used distributions are the lognormal, triangular and uniform distribution (see Hensher and Greene, 2003).

Recalling the choice experiment under study which comprises two unlabelled alternatives and the reference alternative, the system of utility functions for the first model to be estimated (referred as M1 in the model results section) is expressed as follows:

$$\begin{cases} Vn(A) = ASC_A + \beta_{n(NatCon)} NatCon + \beta_{n(ForgCon)} ForgCon + \beta_{n(Time)} Time + \beta_{(Cost)} Cost \\ Vn(B) = ASC_B + \beta_{n(NatCon)} NatCon + \beta_{n(ForgCon)} ForgCon + \beta_{n(Time)} Time + \beta_{(Cost)} Cost \\ Vn(ref) = \beta_{n(NatCon)} NatCon + \beta_{n(ForgCon)} ForgCon + \beta_{n(Time)} Time + \beta_{(Cost)} Cost + \beta_{yearsN} YearsN + \beta_{SCI} SCI \end{cases} \quad (4)$$

where, $\beta_{n(NatCon)}$, $\beta_{n(ForgCon)}$, $\beta_{n(Time)}$, are the random coefficients associated with three attributes, namely concentration of co-nationals (*NatCon*), share of foreigners (*ForgCon*) and travel time to work (*Time*); whereas β_{Cost} is the non-random coefficient associated with the dwelling monthly rent (*Cost*)¹². The alternative specific constants (ASCs) are estimated for the two unlabeled alternatives, namely neighbourhoods A and B, and hence normalized with respect to the reference alternative. Furthermore, the degree of neighbourhood attachment is represented by two additional variables introduced in the utility function for the reference alternative. The first variable refers to the years lived in the present neighbourhood (*YearsN*), while the second variable denotes the Sense of Community Index (*SCI*) – Attitudinal index proposed by psychologists McMillan & Chavis's (1986) focusing on the *experience* of community and measuring the degree of satisfaction with the own neighbourhood. These two variables are associated with coefficients β_{YearsN} and β_{SCI} , respectively.

¹² The cost coefficient has been treated as non-random in order to avoid ratio distribution in the successive derivation of marginal rate of substitutions (see Revelt and Train, 2000).

The model stated in Equation (4) allows us to test the two main study hypotheses regarding the ethnic preferences:

H1: The concentration of co-nationals has a significant positive effect on the households' neighbourhood choice.

H2: The share of foreigners has a significant negative effect on the households' neighbourhood choice.

Such hypotheses are in line with the current literature indicating the concentration of co-ethnics and that of other minority ethnic groups among the main drivers of immigrants' location decisions (Zorlu and Mulder, 2008; Aslund 2005). Furthermore, for H1 we expect a positive sign indicating a preference for residential proximity to ones' co-ethnics, whereas for H2 we expect a negative sign expressing a decrease in marginal utility with the increase of the foreigner' share in the neighbourhood.

Introducing the second model (M2) we aim to account for preference heterogeneity around the mean, so to explain part of the existing heterogeneity through individual socio-economic characteristics. We thus interact the observed individual characteristics with the mean estimate of the random parameter (Hensher and Greene, 2003). In this context the random parameters are defined as follows:

$$\beta_{nk} = \beta_k + \sum_q \delta_q z_{nq} + \sigma_k \eta_{nk} \quad (5)$$

where, δ_q are the coefficients associated with the individual socio-economic characteristics z_{nq} .

In particular, the second model (M2) considers two interactions that potentially link to the segregation patterns and opens to a second set of hypotheses addressed in this analysis, that is:

H3: The preferences for self-segregation are affected by the origin of immigrants distinguishing between advantaged and disadvantaged countries.

H4: The preferences for self-segregation decrease with the increase of the education level of immigrants.

Formally, the focus is on the interaction between the concentration of co-nationals and the origin of households and between the concentration of co-nationals and the level of education with the following specification:

$$\beta_{n(NatCon)} = \beta_{(NatCon)} + \delta_{DIS} z_{DIS} + \delta_{Edu} z_{Edu} + \sigma_{n(NatCon)} \eta_{n(NatCon)} \quad (6)$$

where, *DIS* is a dummy variable taking the value of one for households from disadvantaged countries and *Edu* is a six points categorical variable expressing the respondents' level of education (ranging from 1=none to 6=academic degree).

According to the model specifications expressed in Equations (4) and (6), the probability for household *n* to choose neighbourhood *j* is as follows:

$$P_{nj} = \int_{\beta} \left(\prod_s \frac{\exp(\alpha_j + \sum_k \beta_k x_{njks} + \sum_q \delta_q z_{nq} + \sigma_k \eta_{nk})}{\sum_j \exp(\alpha_j + \sum_k \beta_k x_{njks} + \sum_q \delta_q z_{nq} + \sigma_k \eta_{nk})} \right) f(\beta) d(\beta) \quad (7)$$

where, $s = 1, \dots, S$ indicates the panel structure of the data.

Given that the integral in Equation (7) has not a closed form, the coefficients are estimated by maximizing the following simulated log-likelihood function:

$$LL_n = \sum_n \ln \frac{1}{R} \sum_r \prod_s \frac{\exp(\alpha_j + \sum_k \beta_k x_{njks} + \sum_q \delta_q z_{nq} + \sigma_k \eta_{nk})}{\sum_j \exp(\alpha_j + \sum_k \beta_k x_{njks} + \sum_q \delta_q z_{nq} + \sigma_k \eta_{nk})} \quad (8)$$

where $r = 1, \dots, R$ indicates the random draws¹³ used for the simulation.

Finally, willingness-to-pay (WTP) measures representing the monetary value assigned by respondents to increase/decrease in a desirable/undesirable attribute can be computed from the relative coefficient estimates. In particular, for the first model (M1), the mean monetary values are obtained as follows:

$$WTP_k = \frac{\frac{\partial V_{nj}}{\partial X_k}}{\frac{\partial V_{nj}}{\partial Cost}} = \frac{\beta_k}{\beta_{cost}} \quad (9)$$

Furthermore, for the second model (M2) which includes interaction terms for origins and education level, the mean monetary measures for different population segments are computed as follows:

$$WTP_{NatCon(Adv)} = \frac{\beta_{NatCon} + \delta_{Edu} \times Edu}{\beta_{cost}}; \quad WTP_{NatCon(Dis)} = \frac{\beta_{NatCon} + \delta_{Dis} + \delta_{Edu} \times Edu}{\beta_{cost}} \quad (10)$$

where, $Edu=1, \dots, 6$ is the variable that distinguishes for the education level, while *Adv* and *Dis* stand for advantaged and disadvantaged ethnic groups.

¹³ In the following analysis 500 Halton draws have been used (see Train, 2003).

2.5. Model Results

Two Random Parameter Logit (RPL) models with a panel specification¹⁴ were estimated: a base model (M1) and a model including heterogeneity in the mean (M2). The evaluation of each model is based on log-likelihood at convergence, McFadden pseudo ρ^2 and the Akaike Information Criterion (AIC). The comparison between the two models relies on the log-likelihood ratio test. Table 2 reports the estimation results.

Table 2. Random parameters logit (RPL) model results ^a

	Base Model (M1)		Heterogeneity in the mean model (M2)	
	Parameter	(t-ratio)	Parameter	(t-ratio)
<i>Means for Random and Non-Random parameters</i>				
Concentration of co-nationals	0.0160	(2.13)	0.1049	(2.93)
Share of foreigners	-0.0108	(-2.61)	-0.0109	(-2.64)
Travel time to work	-0.0678	(-4.98)	-0.0684	(-4.99)
Dwelling monthly rent	-0.0055	(-19.49)	-0.0055	(-19.49)
Years in the neighbourhood	0.0280	(4.65)	0.0286	(4.73)
Sense of community index	0.0381	(1.63)	0.0388	(1.65)
Alternative specific constant Neighbourhood A	-0.4624	(-2.14)	-0.4569	(-2.11)
Alternative specific constant Neighbourhood B	-0.5163	(-2.38)	-0.5103	(-2.35)
<i>Standard deviation for Random parameters</i>				
Concentration of co-nationals	0.0009	(0.42)	0.0005	(0.04)
Share of foreigners	0.0271	(5.21)	0.0271	(5.20)
Travel time to work	0.0798	(4.36)	0.0807	(4.39)
<i>Heterogeneity in the mean</i>				
Concentration of co-nationals: Disadvantaged foreign community	-	-	-0.03637	(-1.87)
Concentration of co-nationals: Education level ^a	-	-	-0.01331	(-1.94)
<i>Model fits</i>				
Number of Observations	1566			
Log-L Restricted	-1689.66			
Log-L at convergence	-1270.35		-1266.83	
Number of Parameters	11		13	
Log-L ratio test	7.042 (p<0.05)			
AIC normalized	1.666		1.664	
McFadden pseudo ρ^2	0.248		0.250	

^a Education level is a six points categorical variable expressing the respondents' level of education (ranging from 1=none to 6=academic degree).

¹⁴ Panel specification takes into account the nature of stated choice data with repeated choice observations.

As introduced in the methodology section, dependent variable is represented by the utility associated with the choice alternatives and is expressed through the choice among three alternative neighbourhoods, namely present neighbourhood of residence, hypothetical neighbourhood A and hypothetical neighbourhood B. Accordingly the estimated coefficients are to be interpreted as marginal (dis)utilities associated with the attributes describing the choice alternatives. Thus, a positive (negative) estimate associated to an attribute denotes a marginal utility (disutility) which increases (decreases) the choice probability of a specific alternative.

Parameter estimates associated with the travel time to work and the monthly dwelling rent are statistically significant at 99% confidence level and have the expected negative sign for both, M1 and M2, models. Such result denotes a marginal disutility associated with these attributes, albeit showing a significant random heterogeneity in appraisals for travel time savings among respondents. Being the alternative specific constant (ASC) for the reference alternative normalized to zero, the negative and statistically significant ASCs for the two hypothetical alternatives, A and B, indicate the preference for staying in the present neighbourhood of residence. The present neighbourhood is also preferred with the increase of the number of years lived in the neighbourhood and the level of satisfaction with the social dimension of the neighbourhood (Sense of Community Index) for the decision-maker.

[Ethnic Preferences for Residential Proximity to Own Co-Nationals and Other Foreign Communities](#)

Turning to the main aim of the study, the estimation results presented in Table 2 allow us to test the four hypotheses formulated in the method section. Through such hypothesis we seek to explore if and in which way do preferences for ethnic neighbourhood composition affect the households' residential location decisions. In accordance with our first set of hypotheses, the results show that the ethnic description of neighbourhood matters. In fact, households consider both, the concentration of co-nationals and share of

foreigners, when choosing their preferred housing location. As expected, a positive coefficient estimate associated with the concentration of co-nationals indicates that the presence of co-national neighbours increases the probability of choosing a specific residential location. Such findings may be indicating the existence of positive externalities due to the presence of ethnic networks. Conversely, neighbourhoods with a large share of foreigners tend to be avoided not only by natives but also by foreigners.

As argued by prior studies, a high presence of foreigners may be related to a general negative perception and stereotyping of mixed ethnic neighbourhoods as melting pots of social problems, poor infrastructure and lower education quality (Charles, 2000; Van der Laan Bouma-Doff, 2007). However, considerable levels of random taste heterogeneity, denoted by a significant standard deviation for the *share of foreigners* parameter, suggest that not all households have the same response to foreigners' presence. In fact, some households are more keen and others more averse to the mixed neighbourhood environment. Further analysis could not identify the causes of such tastes variations, since the preferences for multiculturalism seem to be independent from socioeconomic and demographic characteristics of households.

Heterogeneity in Ethnic Preferences across Households of Different Origin and Education Level

Continuing the analysis we introduce heterogeneity in mean across different household segments and test the second group of hypotheses set out in model M2. A model comparison shows that model M2 outperforms model M1 exhibiting a higher log-likelihood and pseudo ρ^2 values. This result is supported by the log-likelihood ratio test (χ^2 7.04; $p < 0.05$). Hence, the two interaction terms representing the origin and education level of households, do impact the preferences for co-national neighbours explaining the differences within the resulting household clusters.

In particular, hypothesis H3 explores taste variations among households belonging to the advantaged¹⁵ and disadvantaged ethnic communities. A significant coefficient estimate for the first interaction term, indicating households' belonging to a disadvantaged ethnic community (*DIS*), confirms the hypothesis of different preferences across these two population segments. Moreover, its negative sign suggests that households belonging to disadvantaged immigrant communities together with natives exhibit lower self-segregation preferences compared to the advantaged foreigners and natives. Such results are in line with international evidence which shows that whites in US context and advantaged foreign communities in EU context tend to hold the strongest preferences for co-ethnic neighbours (Charles, 2000; Van der Laan Bouma-Doff, 2007).

Secondly, the impact of education level on self-segregation preferences (hypothesis H4) is tested through the inclusion of the second interaction term, namely the educational attainment (*Edu*). As expected, the negative and statistically significant coefficient estimate suggests that self-segregation preferences tend to decrease with the increase of education level. Many studies have, in fact, observed that highly-educated immigrants are much more dispersed, less dependent on ethnic ties and less likely to live in segregated areas (Bartel, 1989; Borjas, 1998; Bolt and Van Kempen, 2003; Zorlu and Mulder, 2008). Households with lower education level, on contrary, give more importance to the presence of immigrants from their national background (Aslund, 2005).

¹⁵ Natives are not found to have statistically different preferences for co-national neighbours from the advantaged foreigners, thus a common coefficient is estimated for these two population segments.

Importance of Ethnic Preferences in Residential Location Choice Decisions

Even though the parameters reported in Table 2 indicate the direction of the effects, the absolute magnitude of coefficients is not directly interpretable. In order to compare the importance of different neighbourhood characteristics on the choice behaviour we thus derive the monetary values, i.e. households' willingness-to-pay (WTP) for living in a neighbourhood with certain ethnic characteristics. In discrete choice models the WTPs are defined as the ratio between the estimated attribute coefficients and the cost coefficient, in our study, the monthly dwelling rent¹⁶. Table 3 reports WTP measures for M1 and M2 models.

Table 3. Willingness-to-pay in Swiss Francs (CHF^a), in terms of monthly dwelling rent^b

	Base Model	Heterogeneity in the mean model	
	(M1)	(M2)	
	All sample	Disadvantaged foreign groups	Swiss and advantaged foreign groups
Concentration of co-nationals (1% increase)	2.91	-	-
Education level			
1 = None	-	10.04	16.65
2 = Elementary school	-	7.62	14.23
3 = Junior high school	-	5.20	11.81
4 = High school	-	2.78	9.39
5 = Professional high school	-	0.36	6.97
6 = Academic degree	-	-2.06	4.55
Share of foreigners (1% decrease)	1.96		1.98
Value of travel time savings (per minute)	12.33		12.44

^a Approximate exchange rate CHF/USD= 1.6

^b The COST attribute in this study represents the monthly dwelling rent and thus the monetary values are expressed as the increase or decrease of the monthly rent price.

Monetary measures indicate that the respondents are willing to pay a higher monthly rent in order to live in a neighbourhood with higher concentration of own co-nationals, but lower share of other groups of foreigners. In particular, the M1 model results indicate that respondents are willing to pay additional 29.10 CHF of monthly dwelling rent for a 10-percent

¹⁶ The cost attribute in this study represents the monthly dwelling rent and thus the monetary values are expressed as the increase or decrease of the monthly rent price.

increase in the concentration of co-nationals in the neighbourhood, while they require a compensation of 19.60 CHF for the same percentage increase in the share of other foreigners. This suggests that even though existent, ethnic preferences translate into very modest WTPs (relative to the average sample monthly dwelling rent of 1485 CHF), thus exercising a minor impact on households' location decisions. Such impact is also modest when compared with the value of travel time savings, i.e. the value associated with a ten-minute decrease in travel time to work, which corresponds to 123.30 CHF of the monthly dwelling rent.

Nonetheless, as shown by the WTP measures derived from the model M2, there are significant differences in the value given to the residential proximity to own co-nationals across different household clusters. The focus is, in particular, on the comparison of WTPs for the concentration of co-nationals among the disadvantaged and advantaged communities in relation to education level. Because the educational attainment is a six-level categorical variable, while the origin is a dummy variable, twelve different WTP values expressed in equation (11), are obtained, one for each population segment. These measures suggest that both groups, advantaged and disadvantaged, place a positive value on the presence of co-nationals, which nevertheless decreases with the increase of their education level. This impact is even stronger for the highly skilled individuals belonging to disadvantaged immigrant communities. It is, in fact, interesting to note that households from the disadvantaged cluster having a high education level (i.e. academic degree) show very low or even negative WTPs for increases in concentration of co-national neighbours. Such results seem to confirm the findings of Borjas (1998) who suggests that *“highly skilled persons who belong to disadvantaged ethnic groups tend to have lower probabilities of ethnic residential segregation-relative to the choices made by the most skilled persons in the most skilled groups”*.

Significant differences in WTPs for self-grouping across the advantaged and disadvantaged ethnic groups also confirm such findings. In fact, the

monetary valuation for advantaged group of respondents is higher than that of the disadvantaged group. For example, considering the median sample value of the education level (i.e. degree from a higher professional school), a 10-percent increase in the concentration of co-nationals is valued respectively 3.60 CHF and 69.70 CHF (in terms of monthly dwelling rent) for disadvantaged and advantaged groups. This suggests that the proximity to co-nationals has a greater value and thus plays a greater role in the housing location decisions for the advantaged foreigners and natives, than for disadvantaged ethnic minorities.

2.6. Conclusion

This paper contributes to the research on voluntary determinants of ethnic segregation. Using a Stated Preferences experiment of neighbourhood choice three key questions were empirically addressed: 1) Do preferences for ethnic composition of the neighbourhood exist? 2) How and to what extent do such preferences affect residential location choice decisions? 3) Do ethnic preferences differ across households from different origins and education level?

Results from the residential location choice models suggest that the ethnic description of neighbourhood matters. Respondents, in fact, tend to choose neighbourhoods with a higher concentration of their co-nationals, but a lower share of other foreign groups. However, the monetary values measuring households' willingness-to-pay (WTP) for a neighbourhood with certain ethnic characteristics are relatively modest. This indicates that even if existent, ethnic preferences play only a marginal role in explaining the households' neighbourhood choice. Furthermore, the analysis of heterogeneity shows that preferences for co-national neighbours differ in strength and sometimes even in sign depending on the origins and education level of respondents. Such preferences are stronger for Swiss citizens and privileged foreign groups with respect to the disadvantaged immigrant communities, but they tend to weaken with the increase of the respondents' educational level.

Some interesting considerations about the implications of heterogeneous ethnic preferences on the segregation dynamics stem from such results. On one hand, a combination of two effects, the stronger preferences for co-nationals and the negative attitudes towards neighbourhoods with a large foreigners' concentration, could induce the advantaged foreign groups and natives to leave or avoid ethnically mixed neighbourhoods thus provoking higher segregation levels of disadvantaged communities in such neighbourhoods. On the other hand, the important role of education, not only in promoting the socio-economic mobility, but also in changing the preferences towards a greater residential integration particularly for the disadvantaged immigrant communities, could lead to their greater spatial dispersion. Hence, policies focusing on voluntary drivers for natives and advantaged foreign communities and on constraints for disadvantaged ethnic groups could promote the residential integration of these population segments. Integration policies, adequate housing mix and increasing attractiveness of neighbourhoods with large foreign population could be a way of stimulating the influx of natives into such urban areas. These policies along with the support to disadvantaged ethnic communities in accessing the education system and the job market would lead to their choice empowerment, guiding their behaviour towards a major residential integration.

In conclusion, this study provides empirical evidence of the existence of ethnic preferences which however seem not to be determining factors of housing location decisions in urban context under analysis. A possible explanation of such findings could be the relatively low segregation levels across single ethnic communities in the neighbourhoods of Lugano. This links to another important question for the research agenda regarding the intensity of ethnic preferences in urban contexts with differing levels of ethnic segregation. In fact, the impact of ethnic preferences on residential location choice behaviour could be stronger in contexts with higher segregation levels. This could result in non-linearities in ethnic preference structure and the existence of possible tipping points (Shelling, 1971). However, in the

geographical context under analysis, where the observed levels of ethnic concentrations are fairly small, it is reasonable to assume that even the major deviations (considered in this study) from these reference values do not reach levels at which the tipping points might exist. In this line, an interesting future research direction would be to consider (or hypothesize) urban contexts with much larger concentrations of ethnic minorities. Such analysis would permit to explore the existence of non-linearities in preferences through the stated choice methodology used in this study.¹⁷

Finally, ruled out the voluntary segregation causes, there might be other involuntary factors at the basis of the observed ethnic concentration patterns. A further research into accessibility constraints in terms of rent prices, existence of discrimination in the housing market and mobility of the native population could provide a better understanding of the existing segregation dynamics, suggesting directions to adequately address its potential negative effects.

¹⁷ We thank anonymous reviewers for raising this issue.

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Chapter 3

Households' response to changes in the ethnic composition of neighbourhoods: Exploring reference-dependence and asymmetric preferences structure*

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Abstract

When choosing their neighbourhood of residence, people often take account of the ethnic composition of its inhabitants, and in particular, the levels of concentrations of own co-nationals and other foreign groups. Relating to their experience, households tend to value alternative neighbourhoods based on the ethnic characteristics of their current residential location, showing sensitivities to changes in the levels of co-ethnics or ethnic minorities from this reference point. They could thus exhibit different valuations for increases and decreases in the presence of their co-ethnics or other ethnic groups, while such asymmetries could also vary across different population segments. Connecting this idea with *prospect theory*, this study uses a pivoted choice experiment to explore the reference-dependence and asymmetric preferences structure for ethnic composition of neighbourhoods. Focusing on heterogeneity in such asymmetries across households with different socio-economic characteristics, it aims to explore the effects of such factors on *willingness-to-pay* (WTP) measures. In our empirical example applied to the Swiss city of Lugano, we find evidence of preferences for living with co-nationals in most population sub-groups, along with an aversion to living with other ethnic groups. We also highlight the presence of important asymmetries between the sensitivities to increases and decreases in these factors, where such asymmetries vary according to the ethnic attribute under inspection as well as origins and

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educational attainment of individuals. Connecting this analysis with the mainstream segregation literature our findings indicate that people might react to Schelling's tipping points not because they are strongly averse to members of other ethnic groups, but because they are averse to being a minority in their neighbourhood of residence.

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

3.1. 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 (Aslund, 2005; Bolt and Van Kempen, 2003; Schaake et al., 2010; Van der Laan Bouma-Doff, 2007; Zavodny, 1999; Zorlu and Mulder, 2008) 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 studied in many contexts and for different ethnic communities (see for example Card et al., 2008; Clark, 1991; Easterly, 2009).

However, another important question arises in this context: 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? 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 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, 2011) to marketing (e.g. Hardie et al., 1993; Klapper et al., 2005). In the residential location choice literature on the other hand, 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 behaviour focusing on ethnic segregation drives.

Following the study by Ibraimovic and Masiero (2013) which proposes a residential location choice model for analysing the preferences for ethnic neighbourhood attributes, this paper extends such analysis by adding attitudinal components in order to question households' responses to changes in ethnic concentration in neighbourhoods. The main objective of the study is to examine households' response to shifts from the ethnic concentration values in their neighbourhood of residence. In particular, it investigates the reference-dependence and asymmetric responses to changes in the ethnic neighbourhood composition, with the underlying hypothesis of loss aversion (Kahneman and Tversky, 1979). In this case, loss aversion would correspond to the tendency of individuals to prefer avoiding decreases in a desirable ethnic variable, to acquiring gains from its increases. In such analysis, the issue of heterogeneity in tastes for different ethnic attributes is essential and is addressed in detail in the model structure. Exploring whether the asymmetries vary across different population groups has indeed been shown to be crucial for revealing the existence and assessing the impact of preference asymmetries in the choice modelling literature (see for example Klapper et al., 2005; Nicolau, 2012). Since the ethnic clustering patterns stem from residential location decisions of heterogeneous population segments, different degrees of households' taste asymmetries are expected. Finally, implications on monetary valuations (i.e. willingness-to-pay measures) are assessed, providing important indications for policy guidance over the potential developments in future ethnic settlement patterns and development of neighbourhoods with different ethnic mix.

For the empirical analysis, the study uses a dataset collected from a specifically designed Stated Preference (SP) experiment of neighbourhood choice. The benefit of using a pivoted SP choice experiment is twofold. Firstly, 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. Secondly, 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 asymmetric preferences 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 accurate estimates of monetary values attached to different location attributes especially when considering the aspect of population heterogeneity. 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.

The geographical setting of the study is the highly ethnically mixed urban environment of the city of Lugano, Switzerland. Lugano is well suited for such an analysis, having closely to 40% of foreign residents coming from more than 100 different nations world-wide. The observed spatial distribution of foreigners across Lugano neighbourhoods suggests two distinct ethnic concentration patterns, namely a spatial grouping of single nationality groups and a spatial division of foreign communities and the native Swiss population. Both of these clustering patterns are represented in the stated choice experiment. In particular, two ethnic variables describing the concentration of co-national neighbours and the share of foreigners are considered. This permitted the testing of various hypotheses through the empirical modelling of spatial concentrations. Firstly, the existence of self-segregation preferences as well as preferences regarding the foreign population in the neighbourhood of residence are examined. Secondly, the asymmetries in such preferences are

investigated. Thirdly, the heterogeneity among individuals belonging to different population segments (i.e. diverse ethnic communities and socio-economic profiles) is modelled.

The paper is structured as follows. In Section 2, we present the data, providing a description of the stated choice experiment of neighbourhood choice as well as descriptive statistics of the sampled population. This is followed in Section 3 by an outline of the theoretical framework of discrete choice models and a discussion of our different model specifications. The results are presented in Section 4 while conclusions and suggestions for further research are discussed in Section 5.

3.2. 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 (2013). The spatial units of the analysis are city 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 project¹⁸ aimed at analysing residential location decisions of different nationality groups residing in Lugano and their propensity towards ethnic concentration.

3.2.1. 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

¹⁸ "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.

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). 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.¹⁹ The dwelling did not change in its 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.

¹⁹ For a review on stated preferences experimental design techniques applied to choice modelling see Louviere et al. (2000) and Hensher et al. (2005).

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

Figure 1. Stated preference choice situation example.

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. 1. 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. 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

Attributes	Description	Levels (pivot around reference)		
Concentration of co-nationals (%)	Number of co-nationals in the neighbourhood over the total number of co-nationals in the city.	0%, -/+40%, -/+80%		
Share of foreigners (%)	Number of non-Swiss residents over the total number of residents in the neighbourhood.	0%, -/+25%, -/+50%		
Travel time to work (MIN)	Travel time to work by the habitually used mode type.	0%, -/+25%, -/+50%		
Dwelling monthly rent (CHF)	The monthly rent of the dwelling.	0%, -/+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)	1,485	450	650	2,800
Travel time to work (MIN)	13.9	10	0	60

Descriptive statistics of neighbourhood attribute values obtained from the population sample presented in 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, 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%), can be noted. The average monthly rent of CHF 1,485 corresponds to the market rent 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.

3.2.2. 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. 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 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.²⁰

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

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%	-

^a Source: Population Movement (MovPop) geocoded database from the Population Control Department of Canton Ticino, year 2008.

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.

²⁰ 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).

According to such characteristics, they can be divided into two categories: the “advantaged foreigner population” represented by immigrants from Western countries (mainly EU, USA and Australia) and the “disadvantaged foreigner population” 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 foreigner 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

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

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 foreigner 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 foreigner 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 foreigners group.²¹

3.3. Methodology and model specification

3.3.1. 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,

$$U_{nj} = V_{nj} + \varepsilon_{nj}$$

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

²¹ It is to be noted that the sample contains mainly respondents with a relatively high education level which is typical for SP choice experiments.

further general assumption of a linear in attributes specification, the systematic part of the utility function of alternative j is given by:

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

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):

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

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

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

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).

3.3.2. 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, 2003). 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 foreigner groups together with native households²², 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 origin²³ of respondents, distinguishing between the disadvantaged foreigner group, the advantaged foreigner 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.

²² Advantaged foreigners and Swiss are found to have similar behavior in this regard and are thus clustered together.

²³ A preliminary analysis showed that education level did not have a significant impact on this variable.

3.3.3. 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 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:

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

where $x_{nj k(inc)} = \max(x_{nj k} - x_{nk(Ref)}, 0)$ and $x_{nj k(dec)} = \max(x_{nk(Ref)} - x_{nj k}, 0)$, 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:

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

$$\begin{aligned}
V_{(A)} &= ASC_A \\
&+ \beta_{(NatCon,inc)} * \max(NatCon_A - NatCon_{Ref}, 0) + \beta_{(NatCon,dec)} \\
&\quad * \max(NatCon_{Ref} - NatCon_A, 0) \\
&+ \beta_{(ForgCon,inc)} * \max(ForgCon_A - ForgCon_{Ref}, 0) + \beta_{(ForgCon,dec)} \\
&\quad * \max(ForgCon_{Ref} - ForgCon_A, 0) \\
&+ \beta_{(Time,inc)} * \max(Time_A - Time_{Ref}, 0) + \beta_{(Time,dec)} \\
&\quad * \max(Time_{Ref} - Time_A, 0) \\
&+ \beta_{(Cost,inc)} * \max(Cost_A - Cost_{Ref}, 0) + \beta_{(Cost,dec)} * \max(Cost_{Ref} - Cost_A, 0) \\
\\
V_{(B)} &= \\
&\quad \beta_{(NatCon,inc)} * \max(NatCon_B - NatCon_{Ref}, 0) + \beta_{(NatCon,dec)} \\
&\quad * \max(NatCon_{Ref} - NatCon_B, 0) \\
&+ \beta_{(ForgCon,inc)} * \max(ForgCon_B - ForgCon_{Ref}, 0) + \beta_{(ForgCon,dec)} \\
&\quad * \max(ForgCon_{Ref} - ForgCon_B, 0) \\
&+ \beta_{(Time,inc)} * \max(Time_B - Time_{Ref}, 0) + \beta_{(Time,dec)} \\
&\quad * \max(Time_{Ref} - Time_B, 0) \\
&+ \beta_{(Cost,inc)} * \max(Cost_B - Cost_{Ref}, 0) + \beta_{(Cost,dec)} * \max(Cost_{Ref} - Cost_B, 0)
\end{aligned}$$

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.

3.4. Model results

As outlined in Section 3, our analysis made 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.

3.4.1. 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 immigrant share, which might be 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 foreigners group, dissimilar tastes exist for highly educated households when compared to the ones with a lower education level. In fact, households belonging to the disadvantaged foreigner communities 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 foreigner groups and native Swiss households also show preferences for a higher presence of their ethnic community, highlighted by a positive and significant coefficient estimate. The estimated coefficient for this population segment is equal for higher and lower education households, 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 foreigner households. However, when comparing the propensities for living with co-nationals, the self-concentration preferences of advantaged foreigner households and natives are twice as strong as the ones of disadvantaged foreigner households. Such findings might indicate that the voluntary segregation preferences of the advantaged foreigner groups and the native population could be indirectly influencing the residential concentrations of disadvantaged foreigner communities in specific neighbourhoods.

When considering the coefficient associated with the share of foreigners in the neighbourhood of residence, the results of 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 foreigner 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^a

	Model 1 (base)		Model 2 (heterogeneity)	
	Coeff.	robust <i>t</i> -ratio	Coeff.	robust <i>t</i> -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 ^b			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

^a Dependent variable is represented by the choice among three alternative neighbourhoods: present neighbourhood of residence, hypothetical neighbourhood A and hypothetical neighbourhood B.

^b YearsN = Variable indicating the number of years lived in the present neighbourhood of residence.

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 the value of a desirable attribute, and on other hand, the monetary compensation that they would request for an increase in the value of an undesirable attribute.

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	Lower Income	WTP Higher Income	Lower Income	WTA 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 = 1.02; CHF/EUR = 0.83 (on 10 July 2012)

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 foreigner 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 foreigner 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).

3.4.2. Testing the asymmetric preference 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.²⁴ The adjusted ρ^2 measure indicates that model M3 outperforms both base models (M1 and M2), supporting the notion that there exist asymmetries in the preference structure. 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. 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. Such results would constitute a partial deviation from the “traditional” *loss aversion hypothesis* as formulated by Kahneman and Tversky (1979), in which the individuals tend to exhibit preferences for both decreases and increases, yet are more sensitive to losses than to gains.

A possible interpretation is that even if individuals do not exhibit (strong) self-segregation preferences, they show high adversity to reside in a neighbourhood where they would constitute a large minority among other ethnic groups. This is in line with the mainstream literature on ethnic segregation which states that the majority of ethnic groups does 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). This could provide a possible explanation to the results of Schelling’s model of segregation dynamics which shows how weak ethnic preferences are able to generate strong residential segregation

²⁴ 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.

outcomes (Schelling, 1971). In fact, people could react to tipping points not because they are strongly averse to members of other ethnic groups, but because they are averse to being the minority in their neighbourhood of residence.

Indeed, according to the segregation 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). These arguments are also supported by Farley et al. (1993) and Charles (2001, referred to in Van der Laan Bouma-Doff, 2007), who found that “areas perceived as open to minorities, that is, neighbourhoods with a higher minority percentage and with lower perceived hostility to minorities, are far more often regarded as being more desirable to minorities than to whites” (Van der Laan Bouma-Doff, 2007).

Given this premise, we continue our analysis in considering the heterogeneity in residential location choice behaviour. The signs of coefficient estimates for different population segments indicate that among all different household segments, disadvantaged immigrants 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 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 natives 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, i.e. the share of foreigners 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 the coefficients associated with increases are of low statistical significance. In particular, disadvantaged foreigners and Swiss households tend to dislike increases in the share of foreigners (even with a low statistical significance level), while advantaged foreigners tend to value such increases. For decreases in this variable instead, only disadvantaged foreigners and Swiss nationals significantly value a diminishing share of foreigners. 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^a

	Deviation from reference value	Model 3 (asymmetries)	
		Coeff.	robust <i>t</i> -ratio
Concentration of co-nationals			
Disadvantaged high 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 ^b		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

^aDependent variable is represented by the choice among three alternative neighbourhoods: present neighbourhood of residence, hypothetical neighbourhood A and hypothetical neighbourhood B.

^bYearsN = Variable indicating the number of years lived in the present neighbourhood of residence.

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)

	1% deviation from ref. value	WTP ^a		WTA ^a		WTA ^a	
		All Incomes		Lower Income		Higher Income	
		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)	-	-	-	-

^aWTP = Willingness-to-pay; WTA = Willingness-to-accept

^bExchange rate CHF/USD = 1.02; CHF/EUR = 0.83 (on 10 July 2012)

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.

3.5. Conclusions

When choosing their neighbourhood of residence, people often consider the ethnic composition of its inhabitants, and in particular, levels of concentrations of own co-nationals as well as foreign groups. Relating to their experience, households tend to value alternative neighbourhoods based on the ethnic characteristics of their current residential location, showing sensitivities to changes in the levels of co-ethnics or ethnic minorities from this reference point. This study uses a pivoted choice experiment to explore the reference-dependence and asymmetries in sensitivities to increases and decreases in ethnic concentration values for households with different socio-economic

characteristics. Three models are estimated on data gathered from a pivoted stated preference 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 preferences structure for positive and negative departures from the reference values.

In line with findings by Ibraimovic and Masiero (2013), 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 compensation for a higher share of foreign neighbours. These findings however vary substantially across different population segments. Moreover, when asymmetries in preferences are considered, our results suggest that the sensitivities to increases and decreases in these factors are not of the same magnitude. In fact, only decreases in the concentration of co-national neighbours affect the utility of a neighbourhood, while households are indifferent to increases in concentration rates. With respect to the presence of other foreign neighbours, some segments are sensitive to increases while others are sensitive to decreases. 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.

Given relatively moderate ethnic concentration levels across the city neighbourhoods, 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, it would not be self-segregation preferences, but a fear of staying alone which pushes people to

search the proximity to co-ethnics. In fact, as suggested by the mainstream literature on ethnic segregation, 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). This could provide a possible explanation to the results of Shelling’s model of segregation dynamics which shows how weak ethnic preferences are able to generate strong residential segregation outcomes (Shelling, 1971). People could react to tipping points not because they are strongly averse to members of other ethnic groups, but because they are averse to being the minority in their neighbourhood of residence. 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. On the other hand, 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 regards to the share of foreigners, 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 foreigner group is the only one not valuing such attributes negatively. Finally the result suggest that these

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asymmetries in preferences structure have fairly strong impacts on WTP/WTA measures, especially relating to the concentration of co-nationals.

Linking these results with the mainstream literature findings 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.

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 two main directions. Firstly, considering different reference points (see, e.g. Stathopoulos and Hess, 2012) would allow us to assess potential variations in preference asymmetries depending on a) different levels of ethnic concentrations, b) different urban dimensions and c) diverse urban settings. 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.

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Chapter 4

***Tell me who you are and I'll tell you who you live with:* A latent class model of residential choice behaviour and ethnic segregation preferences**

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Abstract

The nature of ethnic residential clustering involves different population segments which through their location decisions influence the spatial patterns of ethnic settlements. Understanding the differences in the residential behaviour of a heterogeneous population and, in particular, the tastes dissimilarities for ethnic composition of neighbourhoods becomes essential for analysing the dynamics of ethnic concentrations. However, the residential location choice (RLC) behaviour and especially the preferences for ethnic description of the neighbourhood are subject to heterogeneity in tastes that quite often depend on attitudes and other elements not directly observable by researchers. Employing a latent class choice modelling approach, we aim to examine the observed and unobserved heterogeneity in RLC behaviour across households of different ethnic and socio-economic background. Combining the results from the choice and class-membership model components and interpreting the sensitivities and probabilistic composition of the latent classes allows us to evaluate the impact that each attribute exercises for each typology of respondents. The results support the hypothesis of existence of three latent classes which differ in their housing choice behaviour and tastes for the ethnic residential environment. In particular, different ethnic attributes are considered as important choice drivers by households belonging to different latent clusters. We conclude the analysis by translating the resulting parameter estimates into the *willingness-to-pay* (WTP) measures for different residential location attributes. This allows us to compare the impact of location characteristics on choice decisions between the latent clusters. Also in this

case, the model indicates considerable differences in the WTP measures for the three resulting latent classes.

Keywords: Latent Class Choice Model; Residential Location Choice Behaviour; Observed and Unobserved Heterogeneity; Urban Segregation; Ethnic Preferences; Population Segments.

4.1. Introduction

Ethnic segregation dynamics can be driven by various factors, one of which is the voluntary preferences of households to reside in proximity to their community of origin, thus clustering in certain neighbourhoods or urban areas. Preferences for co-ethnic neighbours or for a certain ethnic composition of the residential environment can be revealed through the residential location choice behaviour analysis (McFadden, 1977) which assumes that households select the location providing them with the highest utility among the available alternatives. According to the random utility (RUM) framework underlying the models of choice decisions, utility assigned by each household to each of the available alternatives will depend on the characteristics of those alternatives and the preferences or sensitivities of households to such characteristics. While the homogeneity in preferences was the assumption followed by many pioneering choice modellers, the importance of analyzing differences in tastes for different individuals or population segments has been emphasized more recently (McFadden and Train, 2000). In the particular case of residential segregation, the nature of ethnic clustering involves different population segments which, through their location decisions, influence the spatial patterns of ethnic settlements. Understanding the differences in the residential behaviour of a heterogeneous population thus becomes essential for analyzing the dynamics of ethnic concentrations.

Main findings stemming from the segregation literature indicate that different ethnic groups exhibit different segregation behaviour, some being more prone to clustering among own ethnic community, others being open to ethnically mixed residential environments (see for example Farley *et al.*, 1978). The literature findings on ethnic segregation indicate that people generally prefer co-nationals and dislike foreigners (Ibraimovic and Masiero, 2013). Moreover, there might be a hierarchy among desirable and undesirable ethnic groups as suggested by Charles (2000). In fact, he argues that in US context “preferences vary by the ethnicity of the target group and demonstrate an

ethnic hierarchy in which whites are always the most desirable outgroup and blacks are always the least desirable". In our analysis we suppose that, other than general direction of preferences which sees co-nationals and native population as desired and foreigners as undesired, different groups might have different ethnic hierarchies, some showing predilection for co-national, others for natives, while some groups might not perceive foreigners negatively. Other than ethnicity, many individual-specific factors are found to affect the preferences for ethnic composition of the neighbourhood, comprehending the observed households' socio-economic characteristics, but also their attitudes and perceptions which are mostly unobserved factors for the researcher. These unobserved attitudinal factors can, in fact, be very strong in the particular context of studies regarding ethnic preferences. Thus, the need to account for such factors in the segregation preference analysis is of key importance.

In previous studies, one way of representing the taste heterogeneity across population clusters involved the deterministic segmentation of decision-makers based on relevant observed factors. However, as mentioned above, it has been argued that other latent effects (not directly observable to the researcher) might also contribute to variation in the households' choice behaviour. In fact, a growing body of literature analyzing individual choice decisions indicates both, the observed and latent factors, as guiding elements of taste variations, suggesting that the segmentation based on deterministic criteria might not be appropriate to describe fully the heterogeneity in sensitivities across different population clusters, especially if some latent factors underlie a specific choice behaviour (Walker and Li, 2006; Hoshino, 2011). Thus, various recent developments in choice modelling focused on addressing and incorporating the observed and latent heterogeneity in decision-makers' preferences as an integrant part of the analysis of choice behaviour. Among the most popular methodological extensions, the latent class choice model (LCCM) presents a framework for analyzing the choice behaviour guided by latent underlying factors at the segment level. Such model probabilistically assigns individuals to a finite number of classes which exhibit

different sensitivities to the set of alternatives' attributes. The probability of belonging to each of the classes is assumed dependant on unobservable or latent factors and modelled by the probabilistic class-allocation function. Being the individual-specific characteristics of decision-makers used as determinants of the class membership probabilities, the model allows characterizing different classes according to the socio-economic characteristics of individuals belonging to each class. Linking the preferences heterogeneity to individual-specific characteristics is the main advantage of LCCM, enabling the researcher to gain an important insight over the variables affecting the taste variations across latent population segments (Gopinath, 1995; Hess *et al.*, 2011).

In this study we employ the LCCM for studying the heterogeneity in residential location choice behaviour across households of different ethnic and socio-economic background. In particular, we explore if latent segments holding similar preferences for the ethnic description of the neighbourhood exist, which household characteristics explain variations in such preferences, and how do these effects translate into valuations of different ethnic and non-ethnic neighbourhood characteristics. Various socio-economic covariates affecting residential location choice decisions and, in particular, those potentially related to the tastes over ethnic neighbourhood characteristics, are tested as predictors of the class-membership model. For the empirical analysis we use a dataset stemming from the Stated Preferences (SP) neighbourhood choice experiment conducted in the Swiss city of Lugano in 2008.

The reminder of the paper is structured as follows. Literature overview is presented in the Section 2, followed by description of the data and the context of the study in the Section 3. Section 4 describes the methodological approach, while the model results are discussed in the Section 5. Finally, Section 6 draws conclusions and proposes recommendations for further research.

4.2. Literature overview

Since the importance of recognizing taste differences in choice behaviour models has been emphasised, several methods for incorporating observed and unobserved heterogeneity have been proposed. Accommodating the observed heterogeneity stemming from the differences in decision-makers' socio-economic and demographic characteristics, was the first step undertaken in several applications. In simple multinomial (MNL) choice models observed heterogeneity can be introduced in the systematic part of the utility and specified through interaction terms between the attributes and individual-specific variables representing different sensitivities for individuals with diverse characteristics. Alternatively, segmentation of population according to some relevant characteristic is another way for accounting for variations in tastes across population clusters (Train, 2003).

Yet, beyond the observed sources of heterogeneity, the literature on choice behaviour indicates that an important part of individual-level taste variations results from unobserved factors (Bhat, 2000). Similar conclusions have been drawn also in the residential location choice context (Walker and Li, 2006; Hoshino, 2011). According to such recommendations further model extensions were developed. Among more sophisticated and flexible models able to represent the latent heterogeneity, two most significant can be highlighted: the Random Coefficients Logit Model (RCL) and the Latent Class Choice Model (LCCM). Unlike the choice models with homogeneous preferences with a unique set of taste parameters for an average "representative" individual, the main assumption of the RCL model is that each decision-maker has its own parameters vector. Such individual-specific parameters differ from the average homogeneous preference parameters by some latent amount, which is thus modelled through random terms assumed to follow a certain distribution specified by the researcher. Even if being very flexible, the imposition of a distribution for random coefficients constitutes one of its important limitations (Hensher and Greene, 2003). However, the major drawback of this model is in

its scarce ability to identify and describe various heterogeneity sources (Hess et al., 2011).

Latent class choice model is a special case of RCL model where the parameters are distributed discretely across a certain number of population classes, each class having its own parameters vector. Such approach can be appropriate whenever the existence of latent effects underlying the choice behaviour of different population segments is assumed to play an important role in determining the heterogeneity in preferences. One of the first papers to address the latent heterogeneity in discrete choice models through the segmentation of population was by Swait (1994). He implemented a behaviour-based segmentation simultaneously estimating the market segmentation and product choice models using different individual-specific variables to categorize population segments with different sensitivities to product attributes. Such approach was further developed by Gopinath (1995) who presented a LCCM framework applying it to three case studies: The first exploring the impact of different attribute sensitivities on welfare measures, the second focusing on the heterogeneity in the decision protocols across individuals, and the third incorporating latent attitudes in the LCCM context. Another interesting application of the LCCM was the one by Ben-Akiva and Boccara (1995) who modelled the travel demand allowing for latent choice sets among travellers. They focused on the effects of stochastic constraints as well as individuals' attitudes and perceptions on the choice set generation process. The LCCM were incorporated within the Generalized Discrete Choice Framework by Walker and Ben-Akiva (2002). Empirical analysis of travel behaviour applying the extended modelling framework demonstrated advantages of different model components, with a significant improvement in terms of model fit and interpretability of results.

Even if largely applied in the fields of marketing and transport, so far only few studies used LCCM approach for analyzing the residential location choice decisions. One of these was by Walker and Li (2006) who tested the impact of

lifestyle preferences on the residential choice behaviour. Considering the concept of *lifestyle* as a latent driver of residential location decisions, they investigated its impact on the tastes for different location characteristics. The resulting model indicated the existence of three latent clusters described by various socio-economic characteristics related to lifestyle preferences and characterized as the suburban dwellers, the urban dwellers and the transit-riders. In another application of LCCM in the housing domain, Ettema (2008) studied the heterogeneity in preferences for residential location and, in particular, the valuation of commute distance across commuters and telecommuters. The main objective was to detect if the latent segmentation of the population with respect to residential choice behaviour is related to the effect of telecommuting. The findings suggested that although the telecommuting does not significantly impact the relocation choice in the simple MNL model, the distinction between different segments of telecommuters in LCCM can add to the explanation of the impact of telecommuting on residential location choice patterns.

The ability to link heterogeneity in preferences to observable individual-specific characteristics is one of the characteristics of latent cluster choice models that could greatly benefit the analysis of ethnic segregation patterns. Several socio-economic and demographic variables have been indicated as potential determinants of the differences in tastes for ethnic description of the neighbourhood. However, to the best of our knowledge, there are no existing studies employing such methodological framework in the ethnic segregation domain. Our goal is therefore to exploit the potential of the LCCM for exploring the sources of heterogeneity affecting the residential location choice behaviour of different population subgroups.

4.3. Data

The main dataset used for the analysis is based on the stated preferences experiment of neighbourhood choice conducted in the Swiss city of Lugano in 2008. Lugano is among the cities with the major share of foreign citizens in Switzerland, highly differing in their countries of provenance. The inhabitants' base was stratified by neighbourhoods of residence and nationality groups. Such stratification strategy allowed households from diverse national background to take part in the experiment. Thus, a sample of 130 households of different origins and socio-economic status participated in a stated preferences (SP) choice experiment and a household survey which collected information about their present residential location and their individual-specific characteristics.

4.3.1. Description of the stated preference choice experiment

The experiment was conducted through face-to-face computer assisted interviews where the respondents were asked to select their favourite neighbourhood of residence among three alternative options. The first neighbourhood option was represented by the respondent's actual area of residence, where the attribute values corresponded to real observed values. Given the pivoted experimental settings, the present neighbourhood of residence constituted the reference alternative in the choice experiment design. The second and the third neighbourhood were two hypothetical alternatives with attribute levels pivoted around the values of the reference neighbourhood. Such settings permitted the respondents to recognize a familiar choice situation, thus making the choice experiment more realistic and reliable.

Table 1 presents the summary details of the experiment. Each neighbourhood attribute contained the reference value level (the observed value in the residential location of respondents) and four additional levels expressed as positive and negative percentage deviations from the reference

value. The range of percentage deviations was established according to the urban context under exam. Based on fractional factorial orthogonal design strategy the experiment contained 25 choice tasks, which were divided in two blocks of 12 or 13 choice tasks. Each individual was assigned one of the two blocks. A total of 1626 valid observations were collected and used for the empirical analysis.

Table 1. Summary of the stated choice experiment

Attributes	Levels
<i>Concentration of co-nationals (%)</i>	-80%, -40%, Reference Value, +40%, +80%
<i>Share of foreigners (%)</i>	-25%, -50%, Reference Value, +25%, +50%
<i>Travel time to work (MIN)</i>	-25%, -50%, Reference Value, +25%, +50%
<i>Dwelling monthly rent (CHF)</i>	-10%, -20%, Reference Value, +10%, +20%
Experimental design	
<i>Design approach</i>	Fractional factorial orthogonal design
<i>Alternatives</i>	Reference alternative (Ref) and two hypothetical alternatives (A, B)
<i>Blocks</i>	2
<i>Choice tasks per block</i>	12 or 13

4.3.2. Choice experiment variables and study hypothesis

The experiment primarily aimed at analyzing the preferences for ethnic neighbourhood characteristics, particularly exploring the self-segregation propensity among the own community of origin – modelled by the concentration of co-nationals - and the sensitivity to different levels of foreign population in the neighbourhood – modelled by the share of foreigners. Moreover, the experiment included variables indicating the travel time to work and the monthly dwelling rent, which are, according to the literature, among the main drivers of the residential location choice decisions. The relative

impact of ethnic attributes against other two main location choice drivers is therefore assessed.

Co-nationals concentration (defined as the number of co-national inhabitants in the neighbourhood over the total number of co-nationals in the city) is employed to study the households' self-segregation preferences, i.e. tendencies of ethnic clustering in specific neighbourhoods. The vast literature on residential segregation shows that the presence of co-ethnic or co-national neighbours is one of the major determinants of the residential location choices of immigrants as well as of the native population. While we expect this attribute to be contributing positively on the probability of selecting a particular neighbourhood of residence, some taste heterogeneity is to be supposed for households from different origins and socio-economic status.

Foreigners share (defined as the number of non-Swiss residents over the total number of residents in the neighbourhood) tests the hypothesis that a higher presence of foreign population is related to an unfavourable perception of the location environment in terms of quality and safety thus impacting negatively on the choice probabilities. According to such hypothesis, households would be willing to pay a premium in order to live in the neighbourhoods with a greater share of natives and minor share of foreigners. However, such attribute is likely to exhibit heterogeneity across population clusters, with major expected determinants being the origins, the income and the education level of respondents. In fact, the empirical evidence suggests that natives are the ones to hold the strongest preferences for neighbourhoods with a predominant native population, while same but weaker preferences are found to exist also for ethnic minorities.

Travel time to work denotes the commuting time by the habitually used mode type, expressed in minutes. We expect a negative contribution of longer commuting time on the utilities of alternative locations. Moreover, as an important determinant of location choice we compare the impact of this

variable against the two ethnic neighbourhood characteristics in terms of relative *willingness-to-pay* (WTP) measures for such attributes.

Monthly dwelling rent in this study represents the cost variable based on which the WTPs are computed for the residential location attributes. Income is supposed to be the major driver of variation in sensitivity towards the dwelling price, thus its impact is expected to play a role not only in determining the ethnic preferences but also the price sensitivities of households.

4.3.3. Individual variables as determinants of the latent class membership model

For the heterogeneity analysis, a set of socio-economic and demographic variables were collected in a previously conducted household survey on the same set of respondents. The data included information on the origin, income, education, religion, national language proficiency, language used in free time, years lived in Switzerland, occupational status, age, and other characteristics, all of which were tested as potential determinants of class membership probabilities in the latent class choice model.

Figure 1. 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 **NEXT**

Note: In a context where the reference alternative is part of the choice set it is a common practice to allow a second choice among hypothetical alternatives only. Such procedure generates two distinct datasets (including and excluding the reference alternative). In this study the dataset being considered is the one allowing the reference alternative among the choice set.

4.4. Modelling framework

Following the methodological framework presented by Gopinath (1995) and Walker and Ben-Akiva (2002) we employ the Latent Class Choice Model for analyzing the underlying latent segmentation of the population according to their residential location choice behaviour with the emphasis on the heterogeneity in preferences for ethnic neighbourhood description. The main assumption of LCCM is that the population can be classified in S latent classes, where the decision-makers belonging to the same class exhibit homogeneous preferences, whereas tastes are allowed to vary across different classes revealing different sensitivities to alternatives' attributes for each population segment. Decision-makers are not deterministically segmented into defined classes, but are assumed to belong to each latent class with some membership probability. Such membership probabilities are estimated on the basis of a class membership model component which probabilistically assigns individuals to different classes according to their individual-specific characteristics and/or attitudinal variables. Each household is then allocated to a class for which it has the major probability of membership. Since the individual-specific characteristics of decision-makers are used as determinants of the class membership probabilities, it is possible to describe and characterize different classes adding insight into the interpretation of model results.

For the class membership model we define a multinomial logit model where the probability of individual n to belong to a class s , given a set of the individual-specific variables Z_n , can be expressed as follows:

$$P(s|X_n; \gamma) = \frac{\exp(\gamma'_s Z_n)}{\sum_s \exp(\gamma'_s Z_n)}$$

where γ is a set of parameters to be estimated, representing the impact of socio-economic characteristics Z_n on the latent class membership probabilities.

The class-specific choice model component represents the choice behaviour specific to each latent class. It can incorporate different types of heterogeneity across the classes including differences in sensitivities to alternatives and their attributes, choice sets and constraints, decision protocols and model structures (Gopinath, 1995; Ben-Akiva *et al.*, 2002). This analysis focuses on the sensitivities or taste variations for ethnic and non-ethnic neighbourhood attributes. Assuming the MNL form for the class-specific choice model, the conditional probability of individual n belonging to a class s to choose the alternative j is given by:

$$P(j|X_n, s; \beta_s) = \frac{\exp(\beta'_s \mathbf{X}_{nj})}{\sum_j \exp(\beta'_s \mathbf{X}_{nj})}$$

where β_s are the coefficients indicating sensitivities to alternatives' attributes for each of the s classes, and \mathbf{X} is the vector of the relative attributes k of alternative j for individual n .

The two model components are combined and estimated simultaneously forming a Latent Class Choice Model, where the probability of individual n selecting alternative j is given by the sum over classes s of the product between the probabilities of the class-specific choice model and the class membership model:

$$P(j|X_n; \beta_s, \gamma) = \sum_{s=1}^S P(j|X_n, s; \beta_s) P(s|X_n; \gamma)$$

The estimation is based on the maximum likelihood principle by means of the adapted OX code.

The number of latent classes is not estimated, but determined exogenously by the researcher. For this purpose some information criteria such as the Bayesian Information Criterion (BIC) or the Akaike Information Criterion (AIC) are widely used. However, due to a degree of biasness of such criteria (as

discussed in Scarpa and Thiene, 2005), as well as issues of parameter significance for larger number of classes, many researchers opt for selecting the model that offers the most meaningful and interpretable results. Such approach is followed also in this study.

4.5. Model results

We report and compare results for two residential location choice models, the base multinomial logit model (MNL, referred as model M1) and Latent Class Choice Model (LCCM, referred as M2). Both models involve the estimation of a choice between three alternative neighbourhoods (present neighbourhood of residence and two hypothetical neighbourhoods, A and B), each described by four attributes as defined by the choice experiment. With no sample segmentation, model M1 represents homogeneous preferences for residential location alternatives and attributes. Instead, the LCCM shows differences in choice behaviour, with respondents probabilistically assigned to different latent clusters. This class allocation is a function of their socio-economic and demographic characteristics as a random component. The model results are presented in the Table 2, where the first columns of the table show the MNL parameter estimates and the second set of columns present the LCCM parameter estimates.

Table 2. Model results: MNL and Latent Class Choice Model (LCCM)

	M1		M2					
	Multinomial		Latent Class Choice Model (3 classes)					
	Logit (MNL)		(LCCM)					
	Base	t-ratio	LC1	t-ratio	LC2	t-ratio	LC3	t-ratio
<i>Choice model parameters</i>								
NATCON	0.0200	(2.93)	0.0469	(1.57)	-0.0021	(-0.11)	0.0291	(1.99)
FORGCON	-0.0085	(-2.50)	-0.0060	(-0.34)	-0.0320	(-3.32)	-0.0027	(-0.53)
TIME	-0.0445	(-4.87)	-0.0129	(-0.37)	-0.0507	(-2.19)	-0.0762	(-3.34)
COST	-0.0049	(-8.59)	-0.0041	(-1.99)	-0.0022	(-2.42)	-0.0142	(-8.99)
INCOME								
ELASTICITY OF								
COST ^a	-0.9455	(-3.24)	-0.4216	(-1.44)	-0.4216	(-1.44)	-0.4216	(-1.44)
ASC neighb. ref	1.1177	(7.55)	4.7436	(11.05)	-0.3431	(-0.89)	1.1937	(5.85)
ASC neighb. A	-0.0001	(-0.00)	0.3015	(0.69)	0.0086	(0.06)	-0.0473	(-0.26)
<i>Class membership model parameters</i>								
Swiss			0	-	0.3931	(0.64)	0.1131	(0.17)
Disadvantaged for.			0	-	-0.2281	(-0.65)	0.3308	(1.19)
Advantaged for.			0	-	-1.2393	(-1.51)	1.1914	(2.74)
Sample level class allocation probabilities			28.52%		22.62%		48.86%	
<i>Model fits</i>								
Observations	1,626		1,626					
Respondents	130		130					
Zero log-likelihood	-1786.34		-1786.34					
Log-L at conv.	-1346.50		-928.25					
Num. of Par.	7		25					
McFadden pseudop ²	0.2423		0.4663					

^a Class invariant parameter.

All parameters of the base MNL model (M1) have the expected sign and are statistically significant. The concentration of co-national neighbours positively affects the probability of choosing a specific neighbourhood, while the share of

[125]

foreigners has the opposite effect, exercising a negative impact on the utilities. Thus, the households prefer residential environments with a larger presence of their co-nationals, yet a lower presence of (other) foreign communities. The travel time to work and the monthly dwelling rent both exhibit negative coefficient estimates which indicate disutility associated with such attributes. In fact, the longer commuting distance and the higher cost of housing is expected to decrease the probability of choosing a particular residential location. Positive and significant alternative specific constant for the reference alternative (ASC neighb. ref) indicates the preference of households for staying in the present neighbourhood of residence. Since no relocation costs are assumed in the experiment, such result shows the existence of positive utility effects related to the current residential location (such as social ties, habits or attachment to the territory). On the other hand, the ASC of the first alternative neighbourhood A (ASC neighb. A) is not significantly different from zero, indicating that individuals show no preference for one of the two unlabelled hypothetical alternatives, considering them equally throughout the choice experiment. The only socio-demographic characteristic which was included in the MNL model following preliminary testing was a continuous income elasticity on rent, in this case showing decreasing sensitivity to rent with increasing income, with an almost 1% decrease in sensitivity for a 1% increase in income.

For the definition and selection of the LCCM (M2), models with different number of classes were estimated and compared. Finally, based on the goodness of fit and interpretability of result, the model consisting of three latent clusters was selected and its results presented in the Table 2. Since the LCCM is composed of the choice and class-membership model components we obtain two sets of estimates related to each of these components. Thus, we define three latent clusters based on their specific tastes for neighbourhood attributes (see the first set of seven coefficient estimates relative to the choice model component). Each respondent in the data has a non-zero probability of belonging to each of the three clusters, where the probability varies across

respondents as a function of socio-demographic characteristics. (see the second set of three coefficient estimates relative to the class-membership model component). In addition, Table 2 also shows the sample level class allocation probabilities for the three clusters.

Comparing the M1 and M2 models, significant gains in the model fit obtained for the LCCM (M2) over the base MNL model (M1) indicate improvement in explanatory power when accounting for observed and unobserved sources of heterogeneity across population clusters. The existence of diverse segments is also supported by dissimilar parameter estimates across classes, suggesting that individuals belonging to three different latent classes exhibit substantial differences in tastes for all attributes under exam.

While the choice model estimates indicate the attributes which represent the key drivers of the neighbourhood choice, examination of the class-membership model estimates defines which typologies of households, described by their socio-economic characteristics, tend to belong to each latent class thus exhibiting similar tastes for residential location characteristics. In preliminary analysis, a wide range of individual-specific variables were tested as determinants of the class-membership probabilities. Among these the education, religion, age and variables measuring the integration level of foreigners did not contribute in explaining the heterogeneity in the attribute preferences. Thus, the final model specification only comprehends covariates that have shown a statistically significant impact on the probabilistic class allocation. This resulted in the inclusion of the respondent origin - distinguishing between the natives, advantaged and disadvantaged foreigners.

Table 3. Posterior values for key socio-demographic characteristics in three latent clusters

	Posterior probabilities			Posterior income
	Swiss	Disadvantaged	Advantaged	
class 1	13.48%	67.68%	18.84%	CHF 70,480.10
class 2	25.18%	67.94%	6.88%	CHF 54,637.45
class 3	8.81%	54.99%	36.20%	CHF 57,073.60

To aid us in the interpretation of the results of the LCM, Table 3 shows the most likely values for four key socio-demographic characteristics in the three latent clusters, obtained on the basis of the posterior class allocation probabilities for each person. Given the specific sampling approach used, across classes, respondents are most likely to belong to the disadvantaged foreigners group. However, subtle differences arise, where, while the probability of capturing disadvantaged respondents is almost equal in classes 2 and 3, it is lower in class 3, where respondents are proportionally more likely to be of advantaged origins, compared to class 1 and especially class 2. Similarly, a respondent captured in class 3 is very unlikely to be Swiss, while the probability is much higher in class 2.

Before looking in detail at the class specific estimates, it should be mentioned that the income effect was kept constant across the three classes. The effect of income was reduced substantially compared to the MNL model, arguably due to the LCM model allowing for additional random heterogeneity in the cost sensitivity. The estimates in the first latent cluster (LC1) indicate that respondents value positively the proximity to co-nationals and negatively the higher rent price of the dwelling, but are indifferent to the concentration of foreigners in the neighbourhood as well as to the travel time to work changes²⁵. However, the main characteristic of this cluster of respondents is that they show a strong attachment to their present neighbourhood of

²⁵ Changes are intended as those in the range of deviations from the reference value as defined by the experiment and illustrated in Table 1.

residence, being this. The posterior probabilities indicate that this cluster is likely to comprise mainly respondents of more respondents of disadvantaged foreign communities, along with the highest posterior income across classes. The estimates for the second latent class (LC2) show households negatively valuing the share of foreign neighbours, travel time to work and cost of the dwelling. However, the results show indifference to changes in the concentration of their co-nationals and also suggested that respondents are not attached to their present neighbourhood of residence. This class is substantially less likely to comprehend advantaged foreigner communities, and more likely to comprehend Swiss nationals as well as disadvantaged foreigners. Finally, the third latent class shows that respondents value positively the presence of co-nationals, while the travel time to work and the rent prices exercise negative impact on their choice probabilities for a specific neighbourhood alternative. Similarly to the first class, they disregard the share of foreigners in the neighbourhood as a choice driver, but value the reference alternative, i.e. the present neighbourhood of residence among the three neighbourhood alternatives. This cluster is more likely defined by the inclusion of advantaged foreigners with a lower overall share of disadvantaged foreign communities and also Swiss nationals.

The resulting parameter estimates can be translated into *willingness-to-pay* (WTP) measures for different residential location attributes, so that the impact of location characteristics on choice decisions can be compared between the latent clusters. The model indicates considerable differences in the WTP measures for the three latent classes, showing that different clusters exhibit diverse attributes as their main choice drivers. In particular, the first latent class is the one that values the present neighbourhood and the concentration of co-nationals, being their probability to choose a specific neighbourhood higher with the increase of the presence of their community of origin. On the contrary, the second cluster is very sensitive to the travel time to work as well as to the concentration of foreigners, exhibiting strong aversion to increases in

these attributes. The third class also dislikes travel time to work increases, however valuing the concentration of co-nationals, even if to a weaker extent.

Table 4. Willingness-to-pay measures

WTPs/WTAs	M1	M2			
	MNL	Latent Class Choice Model (3 classes) (LCCM)			
	Base	Latent Class 1	Latent Class 2	Latent Class 3	Weighted average
NatCon (1% increase)	4.11	11.48	(0.98)	2.05	4.05
ForgCon (1% increase)	(1.75)	(1.48)	(14.66)	(0.19)	(3.74)
Time (1 minute increase)	(9.15)	(3.15)	(23.20)	(5.35)	(8.69)

Note: Statistically significant WTPs/WTAs are presented in bold. WTAs are presented in brackets.

We now consider individually each of the attributes and monetary values given to the changes in such attributes (Table 4). Respondents assigned to the first class and exhibiting sensibility only to the proximity to their group of origin - are willing to pay a premium of 115 Chf of the monthly dwelling rent for a 10% increase of the concentration of co-national neighbours. Similarly, respondents belonging to the third class - mainly composed of advantaged foreign groups which value the presence of their co-nationals and dislike the commuting time - are also willing to pay a premium for this ethnic attribute, however such premium is much smaller amounting to 20 Chf per month, while a 10 minute commuting time is valued 54 Chf monthly. The same cluster is indifferent about the presence of co-nationals. On the other hand, households belonging to the second class, the only which dislike foreigners presence, require a compensation of 147 Chf for a 10% increase of the share of foreigners in the neighbourhood. This cluster also exhibits the greatest aversion to travel time to work increases, requiring 232 Chf monthly compensation for 10 minute increase in commuting time.

4.6. Conclusions

Homogeneity in preferences was the assumption followed by many pioneering choice modellers. However, the importance of analysing differences in tastes for different individuals or population segments has been emphasized more recently (McFadden and Train, 2000). In the particular case of residential segregation, the nature of ethnic clustering involves different population segments which, through their location decisions, influence the spatial patterns of ethnic settlements. Understanding the differences in the residential behaviour of a heterogeneous population thus becomes essential for analysing the dynamics of ethnic concentrations. In residential location choice models, heterogeneity is mainly represented by introducing various observed socio-economic and demographic characteristics of individuals. Nevertheless, new research trends indicate the unobserved sources of heterogeneity (as for example attitudes and perceptions) as the other most important element of heterogeneity analysis. With the intention to model the observed and unobserved heterogeneity components, Latent Class Choice Model (LCCM) was developed and applied to RLCM and other research domains (see for e.g. Walker and Lee, 2006).

Since the residential location choice behaviour and particularly the preferences for ethnic description of the neighbourhood are subject to heterogeneity in tastes that quite often depend on attitudes and other socio-psychological behavioural elements, in this study we use a LCCM to explore the latent heterogeneity in neighbourhood choice and ethnic segregation preferences. For the empirical analysis we use a dataset collected from a specifically designed Stated Preference Experiment of Neighbourhood Choice, conducted in the Swiss city of Lugano in 2010. Such experiment permits us to uncover the impact of preferences for ethnic neighbourhood composition, free from the constraints component usually existing in the real housing markets (such as access barriers to some urban areas, shortage of accommodation options or discrimination effects), by implying a hypothetically free choice

among alternative neighbourhoods. Pivoted design of the choice experiment, i.e. design based on the present values of attributes describing the residential location of each respondent, ensures the matching between the real housing situation of individuals and the choice situations they face throughout the experiment.

The results support the hypothesis of existence of three latent classes which differ in their housing choice behaviour and tastes for the ethnic residential environment. In particular, different ethnic attributes are considered as important choice drivers by households belonging to different latent clusters. We conclude the analysis by translating the resulting parameter estimates into the *willingness-to-pay* (WTP) measures for different residential location attributes. This allows us to compare the impact of location characteristics on choice decisions between the latent clusters. Also in this case, the model indicates considerable differences in the WTP measures for the three resulting latent classes.

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Conclusions

Many stakeholders in the urban context - from politicians, academics, urbanists, investors to city inhabitants - all have shown a great interest on the phenomenon that has been developing in Europe only recently respect to the North American counterpart. All agree that the segregation phenomenon is a very complex one, urging for studies that could give an insight over its causes, dynamics and effects on the urban and socio-economic development. The core point of an ongoing debate among such stakeholders is the question of voluntary or involuntary nature of ethnic residential segregation. Five questions dominate in such discourse:

- i) Is ethnic clustering good or bad for the socio-economic integration of immigrants?
- ii) What are the consequences of this phenomenon for the hosting society, local population and urban development?
- iii) Is segregation due to preferences or constrains in the residential location choices of (foreign and native) households?
- iv) Should the state intervene to correct the segregation dynamics?
- v) How should the state intervene: Socio-economic, housing or urban measures?

In this thesis I focus on the third question, being this the essential issue to understand in order to gain a better insight on the segregation itself and therefore be able to build up an answer to other four open questions.

The main objectives of this thesis were thus to address to following set of research questions:

1. Do preferences for ethnic neighbourhood composition exist? In particular, I look to the preferences for co-nationals (self-segregation) and those for other foreign communities.
2. What is the impact of such preferences on the residential location choice: are they principal or marginal choice determinants?
3. Do preferences vary across households from different origins or socio-economic background?
4. Are there unobserved components (such as attitudes or perceptions) which influence the residential location choice behaviour and ethnic preferences?
5. What is the response of households to changes in ethnic concentration in their neighbourhood of residence? Are ethnic preferences asymmetric with respect to the reference point, so that the gains are less valued than losses?

Summary of main results

Several relevant results were obtained from the analyses carried out in three research papers composing this thesis. The results described in the first paper (Ibraimovic and Masiero, 2013) indicate the existence of preferences for ethnic neighbourhood composition as well as variations in such preferences according to the educational attainment and the origins of households. Generally, a higher concentration of co-national neighbours and a lower share of other foreign groups are preferred. However, such preferences are stronger in terms of monetary valuations for the Swiss and privileged foreign groups

respectively to the disadvantaged immigrant communities, but they result weaker with the increase of the educational level of respondents.

The findings of the second paper (Ibraimovic and Hess, 2013.a) reveal the existence of asymmetries in response to changes in present levels of ethnic concentrations which vary according to the ethnic attribute under inspection and some households' socio-demographic characteristics. In fact, households result to be sensitive only to decreases in the current values of their co-nationals, while they are indifferent to any increases. This might suggest that different ethnic communities do not wish to segregate to a larger extent, but they neither want to be alone in their residential environment. With respect to the presence of other foreign neighbours, however, households are sensitive to increases as well as to decreases with different appraisals for different population segments.

Finally, the findings described in the third paper (Ibraimovic and Hess, 2013.b) support the hypothesis of existence of three latent classes which differ in their housing choice behaviour and tastes for the ethnic residential environment. In particular, different ethnic and non-ethnic attributes are considered as important choice drivers by households belonging to different latent clusters. On one hand, Swiss nationals and disadvantaged foreigners share similar tastes being mainly concerned about the foreigners' concentration in the neighbourhood, both showing disutility associated to this ethnic attribute. Advantaged foreign communities, conversely, generally value the residential proximity to their co-nationals. Another interesting result is on the attachment to the present neighbourhood of residence which also plays an important role for some population segments and constitutes the choice driving factor for one latent segment in the sample of respondents. Adding to the analysis of latent heterogeneity, assessment of the influence of socio-psychological factors (indicator of experience of community) on choice behaviour using latent variables method was performed. Since no significant impact of such indicator was found, other variables suitable as latent

constructs have been identified and will be employed for similar analysis in future research.

Conclusions and discussion of main findings

These results were commented in the respective research papers, whereas here I report only the discussion of main findings of such papers, focusing on their use for policy indications. The main finding of the first paper (Ibraimovic and Masiero, 2013) is that the ethnic preferences exist, but do not constitute the main residential location choice driver for the urban context under analysis (City of Lugano in Switzerland). However, different nationality groups exhibit different choice behaviour, distinguishing between the natives, advantaged foreigners and disadvantaged foreigners and the education level of individuals which impacts directly on their ethnic preferences towards a greater residential integrations. The conclusion of this paper thus points to the voluntary nature of concentration among co-nationals for natives and advantaged foreign communities, and involuntary nature of that for disadvantaged foreign groups.

The second paper (Ibraimovic and Hess, 2013.a) points to the result that only decreases in the concentration of co-nationals matter. A possible interpretation of such result could be that even if individuals do not exhibit (strong) self-segregation preferences, they show high adversity to reside in a neighbourhood where they would constitute a large minority among other ethnic groups. This is in line with mainstream literature on ethnic segregation stating 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).” Moreover, connecting such result with the Schelling’s theory of tipping points, it could provide a possible explanation to the results of Schelling’s model of segregation dynamics which shows how weak ethnic preferences are able to

generate strong residential segregation outcomes (Schelling, 1971, 1972). In fact, people might react to tipping points not because they are strongly averse to members of other ethnic groups, but because they are averse to being the minority in their neighbourhood of residence. Thus, even weak preferences for ethnic segregation 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.

The main finding of the third paper (Ibraimovic and Hess, 2013.b) is that observed and unobserved heterogeneity could impact the ethnic preferences, and in general the residential location choice behaviour. In fact, different latent clusters in the households sample were identified by means of a Latent Class Choice Model, where the observed socio-economic characteristics as well as individual choice behaviour contribute to a probabilistic repartition of the population in a set of latent clusters. In this way the latent heterogeneity is captured by the class-allocation model component which assigns a non-zero probability of belonging to different latent clusters to each respondent. Very interesting insights over the heterogeneity across latent clusters are found. One of these is that different choice drivers are at the basis of the residential location choice behaviour for households belonging to different latent clusters. The main conclusion and indication is that in order to better understand the choice behaviour and differences in preferences for different population segments it is highly advisable to model not only deterministic but also latent component of the heterogeneity in preferences.

Policy indications

Given such results I here present some policy indications relevant for effectively addressing the segregation phenomenon. First and foremost policy indication is the need for a diversified intervention for different segments of the population. In particular, the policies tailored for the native population and foreign advantaged communities should be the intervention on preferences and attractiveness; while for the foreign disadvantaged communities causes of involuntary segregation should be addressed through the empowerment of their free choice of neighbourhood of residence, as well as through the access to education. The following figure, presented to the Swiss Government, reports main policy measures which, based on the results exposed in this thesis, apply to diverse population segments through different objectives and effects.

Figure 1. Policy indications for different population segments

Population Segment	Objective	Policy measure
Native population and Advantaged foreign communities	<ul style="list-style-type: none"> ➤ Modify the negative perception of multiethnic neighbourhoods ➤ Appraise the potential of a multicultural society ➤ Enhance the attractiveness of neighbourhoods with large share of foreign inhabitants 	<ul style="list-style-type: none"> ✓ Awareness campaigns to the topic of residential integration ✓ Requalification of neighborhoods (regeneration of housing stock, services and infrastructure) ✓ Supporting measures for price stability (increase of supply, moderated rents)
Disadvantaged foreign population	<ul style="list-style-type: none"> ➤ Favour and facilitate the access to the more attractive neighbourhoods to all population segments ➤ Empower the choice of residential location ➤ Stimulate and incentivate the education for foreign youths ➤ Facilitate the social and residential mobility 	<ul style="list-style-type: none"> ✓ Offer of lower rents dwellings ✓ Measures against discrimination in the residential market but also in employment and education ✓ Access and support for training and integration into the labor market ✓ Socio-economic support and accompanying social measures for particularly sensitive population segments

In conclusion, I present some requirements for an effective intervention on ethnic residential segregation departing from some of the main problematic points in today's anti-segregation policies.

1. Firstly: Lack of comprehension or consideration of the underlying segregation causes.
 - Instead, in-depth knowledge of the dynamics, causes and effects.
2. Secondly: Importing models from other dissimilar contexts and consider a homogeneous population with same preference structures
 - Instead, devising or adapting intervention models to the underlying context and to different fractions of the population.
3. Thirdly: Operating on a single element (social, economic or urban) without considering potential effects on other interdependent elements
 - Instead, defining specific and general effects of an intervention and correcting it through other supporting measures.

Future research

Diverse are the indications for further research on these topics. Here I list some of the most important ones.

1. How do ethnic preferences vary according to:
 - a. different levels of ethnic concentrations (possible “tipping points”?),
 - b. different urban dimensions, and
 - c. diverse urban and country contexts.

In relation to this point, it would be interesting to consider different reference points (see, e.g. Stathopoulos and Hess, 2012) that would allow us to assess potential variations in preference asymmetries.

2. Other than in neighbourhoods: what concentrations exist in zones, streets, buildings?
3. Other than preferences: what is the impact of constraints on segregation dynamics (accessibility, congestion/capacity constraints, discrimination, white flight)?
4. Inclusion of other attitudinal factors as latent constructs (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.
5. Estimating the tipping points in ethnic concentrations for diverse population segments.
6. Modelling the residential behaviour on revealed preferences disaggregated data, taking into account both choice and constraint components.

7. Agent-based simulation models of ethnic segregation in urban environment for forecasting purposes and tests of postulated of the mainstream segregation literature.

Finally, I hope to be able to carry out the research on at least some of these points in my future work, nevertheless a collaborative help of my colleagues around the world would be my agreeable and welcomed desire.

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Biography

Tatjana Ibraimovic (1979), born in Belgrade from a Bosnian mother and Serbian-Macedonian father, lives in Serbia until the elementary school, after in the city of Bugojno in Bosnia and Herzegovina. In 1992, a war obliges Tatjana to escape from her home country in search of refuge, firstly in Croatia, than in Portugal, Italy and Switzerland. Once back to her homeland just after the Dayton Agreements, she finishes her college studies in Bugojno and returns to Switzerland to pursue academic education at the University of Lugano. She obtains the degree of MSc in Economics in 2004 and Msc in Finance in 2007 from the same University and starts her Ph.D. in Political Economics in 2008. In May 2013, she successfully defends her Ph.D. thesis entitled "*Investigating the role of ethnic preferences in residential location decisions: Choice analysis on Stated Preferences data*" obtaining a Ph.D. degree with mention Summa Cum Laude. She worked on several interdisciplinary research projects financed by the Swiss National Science Foundation. In 2011-2012 she was a visiting fellow at the Institute for Transport Studies, University of Leeds, UK, where she has developed models of residential location choice applied to the City of Lugano, Switzerland. Prior to her academic positions, she worked in the field of Finance and Management in corporation and banking area. She currently works for the Institute of Economic Research, University of Lugano, Switzerland. Married, mother of Ahmed (3 year old boy), she obtained the Swiss citizenship in 2010.

Being herself a daughter of a mixed marriage and having lived the experience of exile from her country of origin, she shows a particular sensitivity and interest to the question of integration of immigrants into the hosting societies. About her personal experience of exile, she published a book: "*Writing not to forget*" (Eds. Giampiero Casagrande, 2011). The passion she holds for this field of studies particularly related to Urban Economics guided her throughout her Ph.D. studies. She hopes to be able to pursue the path of academic career studying this crucial issue for all European cities touched by the increasingly important phenomenon of international migration.

Appendix A: Household survey (2008)



January 2008

QUESTIONNAIRE

Enquiry: Housing and neighbourhood in the city of Lugano

Good evening! It is _____ on the phone, from the Institute of Economic Research, University of Lugano. Can I speak with Mr./Ms _____?

The institute is doing an enquiry about the housing and neighbourhood in the city of Lugano. Do you have some time to answer to our questions? The interview should not last for more than 10–15 minutes and your data will be treated strictly anonymously and used only for scientific purposes.

In the case you interview a person **not** from your list:

1. Do you live at this address?
Yes No
2. What is your year of birth?
- Year.....|_|_|_|_|
3. What is your nationality?
- _____
4. Indicate the sex (without asking):
- Male
- Female

I will now ask you some questions about your house or apartment:

5. What type of property do you live in?
- Apartment
- House
- Other
↳ Indicate _____
6. **If you live in apartment:**
- What floor do you live on?
(Groundfloor = 0)|_|_|
- How many apartments are there in your building?
.....|_|_|
7. How many rooms do you have? (Excluding kitchen, bathrooms, other utility rooms).....|_|
8. How many balconies do you have?.....|_|
9. How many bathrooms/WC do you have?|_|
10. At your home, do you have...:
- Separate kitchen
- Kitchen corner
- Chimney
- Central heating
- Private garden
- Lake view
- Garage (in the building).....
11. Can you indicate me approximately the square meters of your apartment/house:|_|_|_| m²

12. When was your building/house built?
- Before 1970
- Between 1970 and 1980
- Between 1980 and 1990
- Between 1990 and 2000
- After 2000
- I don't know

13. When was your building/house last renewed?
- Before 1970
- Between 1970 and 1980
- Between 1980 and 1990
- Between 1990 and 2000
- After 2000
- It was never renewed
- I don't know

14. Do you own or rent your home?
- **Own**
- **Rent**
- **Other**
↳ Indicate _____

15. **From whom do you rent your home?**
- Private individual
- Private company/bank
- Cassa Pensioni
- Other public owner
- Other
↳ Indicate _____

16. **Do you have a housing subvention (subsidy)?**
Yes No

17. **For renters:** What is the monthly rent of the apartment/house (**expenses included, garage excluded**)?
CHF |_|_|_|_|_|

18. **For owners:** What is the annual rental value of your home (expenses included)?
CHF |_|_|_|_|_|

19. Approximately what percentage of your household's gross monthly income is spent on your apartment/house?
- Less than 20%
- 20%
- 30%
- 40%
- 50%
- More than 50%

Now some questions about your neighbourhood:

1. Do you agree or disagree with the following statements? (agree = 1, disagree = 0)
- I think my block is a good place for me to live.
 - People on this block do not share the same values. ...
 - My neighbors and I want the same things from the block.
 - I can recognize most of the people who live on my block.....
 - I feel at home on this block.
 - Very few of my neighbors know me.
 - I care about what my neighbors think of my actions. ...
 - I have no influence over what this block is like.
 - If there is a problem on this block people who live her can get it solved.
 - It is very important to me to live on this particular block.....
 - People on this block generally don't get along with each other.
 - I expect to live on this block for a long time.

As last, I make you some questions about your household:

2. Indicate the age and sex of all the people living in your household (excluding yourself)?
- | | <u>Age</u> | <u>Sex</u> |
|------------------|----------------------------------|---|
| - Person 1 | <input type="text"/> years..... | M <input type="checkbox"/> F <input type="checkbox"/> |
| - Person 2..... | <input type="text"/> years | M <input type="checkbox"/> F <input type="checkbox"/> |
| - Person 3..... | <input type="text"/> years | M <input type="checkbox"/> F <input type="checkbox"/> |
| - Person 4..... | <input type="text"/> years | M <input type="checkbox"/> F <input type="checkbox"/> |
| - Person 5..... | <input type="text"/> years | M <input type="checkbox"/> F <input type="checkbox"/> |
| - Person 6..... | <input type="text"/> years | M <input type="checkbox"/> F <input type="checkbox"/> |
| - Person 7..... | <input type="text"/> years | M <input type="checkbox"/> F <input type="checkbox"/> |
| - Person 8..... | <input type="text"/> years | M <input type="checkbox"/> F <input type="checkbox"/> |
3. How many people in your household...? (*indicate the number*)
- Work full time
 - Work part time.....
 - Work temporarily
 - Are housewives/housemen
 - Are retired
 - Are unemployed
 - Benefit of AI (disabled), social assistance, etc.
4. What is the range of your household's gross annual income (in CHF)? (*you included*)
- Less than 20'000 CHF
 - Between 20'000 and 60'000 CHF
 - Between 60'000 and 100'000 CHF
 - Between 100'000 and 150'000 CHF
 - Between 150'000 and 200'000 CHF
 - Between 200'000 and 500'000 CHF
 - More than 500'000 CHF

This research continues with a second part, would you be willing to participate to another interview in some months?

Yes No

This is the end of our interview. Thank you very much for your availability and have a nice evening.

Figure 1. 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 Present neighbourhood	"YOUR HOUSE" Neighbourhood A	"YOUR HOUSE" 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 **NEXT**

Note: In a context where the reference alternative is part of the choice set it is a common practice to allow a second choice among hypothetical alternatives only. Such procedure generates two distinct datasets (including and excluding the reference alternative). In this study the dataset being considered is the one allowing the reference alternative among the choice set.

