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**How discriminatory is the housing market in  
Slovakia: experimental investigation.**

*Bachelor thesis*

Prague 2016

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Academic Year: **2015/2016**

## **Declaration of Authorship**

I hereby declare that I wrote this thesis independently under the leadership of my supervisor and that the references include all resources and literature I have used.

I hereby proclaim that the thesis has not been used to obtain a different or the same degree.

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Prague, May 13, 2016

Kristína Sacherová

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Signature

## **Acknowledgments**

I would like to thank my supervisor, Mgr. Barbara Pertold-Gebicka, M.A., Ph.D., for sharing her time, expertise and willingness to provide highly-valued assistance at any time. I am also indebted to Vojtěch Batoš for helping me with the choice of topic for this thesis. Finally, I would like to express sincere gratitude to my family, colleagues and friends for their endless support and patience.

## **Abstract**

Housing discrimination is a widespread, but markedly underrated issue that is associated with diverse treatment of applicants for real estate's sale or rent based on their affiliation to some minority in society. Although there have been many experiments and studies conducted to uncover and measure the presence of discrimination mostly for African Americans in the US and Arabs in several European countries, such extensive researches for the Europe's largest ethnic minority, Roma, are lacking. This thesis presents an Internet field experiment on discrimination of Roma in the Slovak housing market which uses matched-pair method and four fictitious male applicants to request for a flat or house showing based on an online advert. In total, 396 requests were sent from email addresses with specific names signaling ethnicity of applicants and the response rate was examined. Data shows that the applicants with Roma-sounding email addresses are 8 to 9.5% less likely to get an invitation for a showing compared to the applicants with the Slovak sounding email addresses. My analysis also suggests that the highest level of discrimination is found in the districts with median Roma contribution (specifically from 3 to 11%). Considering all my findings, it can be eventually concluded that in the Slovak housing market the discrimination of Roma minority as well as the discrimination of the second applicant are present.

## **Keywords**

Housing discrimination; Ethnic minorities; Roma; Response rate; Experimental investigation; Internet; Correspondence audits; Matched-pair method

## **Abstrakt**

Diskriminácia v bývaní je rozšírený, ale značne podceňovaný problém, ktorý je spojený s rozdielnym zaobchádzaním s uchádzačmi o kúpu alebo prenájom nehnuteľnosti na základe ich príslušnosti k určitej menšine v danej spoločnosti. Hoci už prebehlo viacero experimentov a štúdií zameraných na odhalenie a zmeranie diskriminácie najmä Afroameričanov v USA a Arabov v niekoľkých európskych krajinách, podobné rozsiahlejšie výskumy pre európsku najpočetnejšiu etnickú menšinu, Rómov, chýbajú. Táto práca predstavuje internetový experiment skúmajúci diskrimináciu Rómov na trhu s nehnuteľnosťami na Slovensku používajúc metódu navzájom si odpovedajúcich kontrolných respondentov a štyri fiktívne identity mužského pohlavia žiadajúce na základe online inzerátu o prehliadku bytu alebo domu. Celkovo 396 žiadostí bolo poslaných z emailových adries vytvorených na základe špecifických mien signalizujúcich etnicitu uchádzačov, pričom predmetom skúmania bola miera odozvy. Dáta ukazujú, že pre žiadateľa s rómsky znejúcou emailovou adresou bolo o 8 až 9.5% menej pravdepodobné, že dostane pozvanie na prehliadku v porovnaní so žiadateľom so slovensky znejúcou emailovou adresou. Moja analýza tiež naznačuje, že najvyššiu úroveň diskriminácie je možné nájsť v okresoch s priemerným zastúpením Rómov (konkrétne 3-11%). Na základe všetkých mojich odpozorovaných javov je možné na koniec vyvodiť záver, že na slovenskom trhu s bývaním je prítomná nielen diskriminácia Rómov, ale aj diskriminácia žiadateľa, ktorý posiela email ako druhý v poradí.

## **Kľúčové slová**

diskriminácia v bývaní; etnické menšiny; Rómovia; miera odozvy; experimentálny výskum; Internet; korešpondenčné skúmanie; metóda navzájom si odpovedajúcich kontrolných respondentov

**Contents**

**List of Tables**

**List of Figures**

**Bachelor Thesis Proposal**

- 1. Introduction..... - 1 -**
  
- 2. Economics of Housing Discrimination ..... - 3 -**
  - 2.1. Methodologies Used to Study Discrimination ..... - 3 -**
  - 2.2. Economic Models of Discrimination ..... - 3 -**
  - 2.3. Measurement and Interpretation of Discrimination ..... - 4 -**
  
- 3. Literature Review ..... - 5 -**
  - 3.1. Field Experiments on Racial/Ethnic Housing Discrimination in America ..... - 5 -**
    - 3.1.1. In-person Paired Tests ..... - 5 -
    - 3.1.2. Written Requests Approach and Correspondence Audits ..... - 6 -
  - 3.2. Field Experiments on Racial/Ethnic Housing Discrimination in Europe ..... - 8 -**
  - 3.3. Other Field Experiments on Housing Discrimination..... - 10 -**
  
- 4. Roma Community in Slovakia ..... - 12 -**
  - 4.1. Distribution of Roma Community ..... - 12 -**
  - 4.2. Division of Districts ..... - 13 -**
    - 4.2.1. Exclusion of Bratislava from the Field Experiment..... - 14 -
  
- 5. Field Experiment..... - 15 -**
  - 5.1. Research Platform ..... - 15 -**
  - 5.2. Creation of Fictitious Identities..... - 15 -**
  - 5.3. Process of Approaching of Housing Agent and Applying for a Showing..... - 17 -**
    - 5.3.1. Source of Adverts ..... - 17 -
    - 5.3.2. Matched Application Method and Sending of Requests ..... - 17 -
    - 5.3.3. Possible Discrimination of the Second Applicant..... - 18 -
    - 5.3.4. Text of Applications..... - 18 -
    - 5.3.5. Characteristics of Interest and Their Tracking..... - 20 -

<b>6. Dataset and Statistical Analysis</b> .....	- 22 -
<b>6.1. Districts and Roma Contribution</b> .....	- 22 -
<b>6.2. Characteristics of Flats and Houses</b> .....	- 22 -
<b>6.3. Responses</b> .....	- 23 -
<b>6.4. Treatment of Missing Values and Converted Sample</b> .....	- 24 -
<b>6.5. Outcome of the Experiment (Statistical Analysis for Individual Offers)</b> .....	- 26 -
<b>7. Econometric Analysis of Data</b> .....	- 28 -
<b>7.1. Models</b> .....	- 28 -
7.1.1. Linear Probability and Probit Model.....	- 28 -
7.1.2. Model with County Group Interaction Terms.....	- 30 -
<b>7.2. Assumptions</b> .....	- 30 -
<b>7.3. Results</b> .....	- 31 -
7.3.1. Main Effects .....	- 31 -
7.3.2. Impact of Requests Order.....	- 34 -
7.3.3. Differential Discriminatory Practises on County Group Basis .....	- 36 -
<b>8. Conclusion</b> .....	- 39 -
References .....	- 42 -
Appendix A .....	- 46 -
Appendix B .....	- 48 -
Appendix C .....	- 51 -
Appendix D .....	- 52 -
Appendix E.....	- 55 -



## List of Figures

Figure 1 - <i>Map of Slovakia with the division of districts regarding the Roma contribution-</i>	13 -
Figure 2 - <i>Randomization table</i> .....	18 -
Figure 3 - <i>Distribution of types of real estates in the sample (in %)</i> .....	23 -
Figure 4 - <i>Graphical illustration of results - the choice of first names</i> .....	50 -
Figure 5 - <i>Graphical illustration of results - the choice of surnames</i> .....	50 -
Figure 6 - <i>Average marginal effects corresponding to "PROBIT1" estimates</i> .....	55 -
Figure 7 - <i>Average marginal effects corresponding to "PROBIT2" estimates</i> .....	55 -
Figure 8 - <i>Average marginal effects corresponding to "PROBIT3" estimates</i> .....	56 -

## List of Tables

Table 1- <i>Comparison of statistics related to responses in original and converted dataset</i>	24 -
Table 2 - <i>Sample averages of variables in the datasets</i> .....	25 -
Table 3 - <i>Sample averages of variables in the datasets (per identities)</i> .....	25 -
Table 4 – <i>Response trends based on publishing date of the offer</i> .....	26 -
Table 5 – <i>Main effects analysis (linear probability model, original sample)</i> .....	32 -
Table 6 – <i>Main effects analysis (linear probability and probit model, converted sample)</i>	33 -
Table 7 - <i>Linear probability estimates by time of sending the request (linear probability model, converted sample)</i> .....	35 -
Table 8 - <i>Linear probability estimates and the impact of ethnicity of the first applicant on the overall probability of receiving a positive response (extended LPM, converted sample) ..</i>	35 -
Table 9 - <i>Linear probability estimates by belongingness of districts to groups based on the division according to percentage contribution of Roma community (model with county group interaction terms, converted sample)</i> .....	37 -
Table 10 - <i>Division of districts based on its estimated percentage contributions of Roma (ascending order)</i> .....	46 -
Table 11 - <i>Monitored characteristics and variables and their description</i> .....	52 -

# **Bachelor Thesis Proposal**

Author: **Kristína Sacherová**  
Supervisor: **Mgr. Barbara Pertold-Gebicka, M.A., Ph.D.**  
Defence planned: **June 2015**  
Language of the work: **English**

## **Topic:**

How discriminatory is the housing market in Slovakia: experimental investigation.

## **Description:**

The housing market, together with public entertainment and the labour market, is considered to be one of the social fields which apparently suffer from some rate of discrimination. Based on the research “The Atlas of Roma Communities 2013” conducted mainly by the United Nations Development Programme in Europe and Central Asia in cooperation with the Ministry of Labour and University of Prešov, there live approximately 402 840 Roma people in Slovakia representing almost 7,46% of the country’s population<sup>1</sup>. According to this figure, they rank to the largest Slovak minorities besides Hungarians. However, in some regions of Slovakia they have virtually no presence at all. Are there some discriminatory barriers in the housing market which do not allow them to move everywhere they want? In my bachelor thesis I would like to investigate how discriminatory is the housing market in Slovakia.

The purpose of the introductory part of this thesis will be to briefly summarize existing theories, studies, and literature related to this area. Then, I will present a field experiment examining ethnic discrimination on the rental housing market in various parts of Slovakia which differ in the size of the Roma community. The study will be conducted over the Internet using fictitious e-mail addresses of candidates whose name signalizes their ethnic affiliation. The different response rates to individual groups will be the crucial factor for comparison and measurement of discriminatory behaviour toward Roma minority.

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<sup>1</sup> According to data of the Statistical Office, the population of Slovakia was 5 404 322 people on December 31st, 2011.

### **Research questions:**

1. Is there a significant difference in response rates to e-mail requests for a flat/house viewing of Slovaks in comparison with those of Roma?
2. Does the respond rate vary among the different parts of Slovakia? Is there any correlation between the number of Roma inhabitants and positive responses?
3. Does the likelihood of a positive response for the Roma minority depend on some other factors too? Are families discriminated more often than single people seeking a flat?
4. What are possible causes of this problem?

### **Outline:**

1. Introduction
2. Theoretical part
  - 1) Review of other research related to the topic
  - 2) Distribution of Roma minority in Slovakia
  - 3) Delineation of methods and model used in the following experimental part
3. Empirical part
  - 1) Data description, methods used to collect data, course of the experiment
  - 2) Econometric comparison of results for individual groups
4. Conclusion

### **Core references:**

AHMED, A.M. & Hammarstedt, M. *Discrimination in the Rental Housing Market*. Journal of Urban Economics, 2008. vol. 64, no. 2, pp. 362-372. [online]. Available at [http://ac.els-cdn.com/S0094119008000181/1-s2.0-S0094119008000181-main.pdf?\\_tid=89d6f706-f8db-11e4-8427-00000aab0f02&acdnat=1431458432\\_2374def942822b1ee35c7221e504db2e](http://ac.els-cdn.com/S0094119008000181/1-s2.0-S0094119008000181-main.pdf?_tid=89d6f706-f8db-11e4-8427-00000aab0f02&acdnat=1431458432_2374def942822b1ee35c7221e504db2e).

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## 1. Introduction

Becker (1957) defines discrimination as “a situation where an economic agent is prepared to incur a cost in order to refrain from an economic transaction, or from entering into an economic contract, with someone who is characterized by traits other than his/her own with respect to race or sex”. Hence from the economic point of view, discrimination can be likened to a “barrier” which creates unequal circumstances for several specific groups of people. Workplace, housing market and public entertainment are considered to be the most affected areas of everyday life where the differential treatment between members of different groups takes place. Frequently such practices occur at the very beginning of these processes causing difficulties for the victims of discrimination even to participate in them which leads to singling out of these groups, segregation and subsequent deepening of this problem.

Even during the European migrant crisis, social inclusion and efforts to mitigate prejudices towards the Roma community, which represents Europe’s largest ethnic minority, constitutes one of the most pressing social and human rights challenges for the European Union. This is stressed also within the framework of the Europe 2020 dialogue (European Commission, 2010 and 2016).

Although Slovakia accounts for only 1.07% of EU population, this country contributes to the overall number of EU citizens with affiliation to Roma community by approximately 8.4% (Eurostat, 2016). For better illustration of the current Roma situation in Slovakia, it is possible to look at some other statistics. For instance, the employment rate of the Roma 10 years ago was estimated to be around 10% and the unemployment rate around 46%, whereas the same figures for non-Roma people were equal to 60% and 10% respectively. In general, major part of these Roma was and still is dependent on the Slovak welfare system. (Marcinčin and Marcinčinová, 2009). Noteworthy is also the information regarding the distribution of Roma inhabitants in Slovakia. Though they rank among the largest Slovak minorities, there are some regions where they have virtually no presence at all. Besides, results of a recent survey of the UNP (2012) conducted in a number of EU countries showed, for example, that 86% of the people in the Czech Republic would not want to live next to Roma people. Is the opinion of Slovaks similar to the Czech one leading to a significant difference in treatment of Slovaks in comparison with those of Roma? Does it differ between districts whose percentage contribution of Roma minority is diverse?

In this thesis I have decided to look specifically at the presence of discrimination against Roma at the beginning of the process of searching for a new housing in Slovak districts. By conducting a field experiment in which requests for a real estate showing were sent from different email addresses specially designed and created in a way to signalize ethnicity of applicants, I analyse whether there are any differences between these email addresses in association with receiving a positive reply and what other factors in addition to the ethnic affiliation have an impact on the response rate.

The thesis is structured in the following way. Firstly, a brief theoretical introduction to the topic of discrimination is provided in Section 2. Then, Section 3 represents a summary of the most important studies and experiments highlighting the main points of their strategies and outcomes. Distribution of Roma community in Slovakia is discussed in Section 4. Section 5 is intended to introduce a strategy of my field experiment. Results obtained by statistical analysis of the data collected throughout the experiment are presented in Section 6, whereas more advanced econometric inference methods and their outcome is interpreted in Section 7. Eventually, all findings are summarized in Section 8. Supporting materials, such as tables and figures, can be found directly in the text or at the end of the thesis as appendices.

## **2. Economics of Housing Discrimination**

### **2.1. Methodologies Used to Study Discrimination**

There exist several methodologies which are used to study the phenomenon of discrimination. Some studies use law and legal records, surveys and interviews as non-experimental ways to discover to what extent this phenomenon is perceived by people who are discriminated (Schumann., 2001) and who discriminate (Holzer, 1996). However, virtually all recent studies which try to measure discrimination have experimental character. Selecting the right characteristics to signalize belongingness to examined minority group is essential part of the whole strategy of these experiments. Improperly selected signal can lead to selection bias and latter to distorted results since some participants of experiment do not need to be able to recognize it.

The main difference between non-experimental and experimental approach is in the form of outcome of these studies and purposes which given study is intended for. Whilst the first mentioned method better explains causes why and circumstances when such practices occur, the latter is focused more on estimation of the rate of occurrence of discriminatory behaviour. Thus, experiments are more preferred and more frequent way of conducting such studies from economic perspective, whereas non-experimental practises are more common for fields like sociology or law.

### **2.2. Economic Models of Discrimination**

The economic models of discrimination can be in general sorted into two groups: competitive and collective models. Whilst utility-maximizing individual is the subject of interest in competitive models, collective models deal with the interaction between groups. This class of models is commonly used in economic analyses on housing discrimination and the following division of such models has been adopted:

- Taste-based models (which are suitable for discrimination which is based on preferences);
- Statistical models (These are used if discrimination arises due to limited ability to observe some information; thus, in many cases some observed characteristic, such as gender or ethnicity, effects decision-making process.).

### **2.3. Measurement and Interpretation of Discrimination**

Besides various more complex statistical and econometric methods and models (which are presented and described in Section 7.), there are two different standards used for simple measurement and interpretation of discrimination occurring in the literature:

- Gross measures are defined as the proportion of cases in which the representative of the majority is preferred over the member of minority.
- Net measures, which better illustrate the “handicap” of minorities as an estimate of lower boundary of the occurrence of discriminatory practices, are calculated as the difference between the contribution of incidents in which the majority representative is favoured in the sample and the contribution of incidents in which the minority representative is favoured.



### **3. Literature Review**

Many researches have been conducted to study whether minority groups of different race, nationality or ethnicity are being discriminated against majority in the society when seeking a real estate for rent or purchase. This section provides an overview of relevant available literature presenting a variety of techniques, which have been applied to uncover and measure this phenomenon, as well as corresponding outcomes of these studies. This summary is organised chronologically to depict how these methods have been evolving throughout decades. Furthermore, American and European perspective on such experiments are being compared putting in contrast primarily two ways of approaching housing agents - in-person field experiments common especially for the US and written applications method which came hand-in-hand with the boom of Internet and e-mail correspondence and is considered to be more acceptable from ethical point of view in Europe.

#### **3.1. Field Experiments on Racial/Ethnic Housing Discrimination in America**

##### **3.1.1. In-person Paired Tests**

The beginning of field experiments testing for discriminatory behaviour in housing markets dates back to the 1950s to USA. When in two subsequent decades a legislation regarding fair housing came into force, the era of paired tests mainly under the auspices of the Urban Institute, which is a non-profit think-tank based in Washington DC that specializes on research and analysis of economic and social policy issues arising with speedy urbanization and aims for decreasing inequity in availability of opportunities among all citizens<sup>2</sup>, begun. This methodology involves approaching of housing agent for two times – i.e. housing agent is requested from pair of applicants which consists of representatives of two different examining races or ethnic groups acting independently when expressing interest in given real estate. The main advantage is that it enables to directly inspect the process of how owner/landlord/real estate agent acts and to see it as a complex picture. It is suitable not only for examining to what extent such a treatment occurs, but also for reasoning why it occurs by looking at conditions under which it appears (Oh and Yinger, 2015).

During the first 30 years of the activity of this institute, several rental and sales in-person or telephone correspondence paired tests oriented primarily on discrimination of African-

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<sup>2</sup> Based on the official LinkedIn profile of organization. Retrieved April 24 2016 from <https://www.linkedin.com/company/the-urban-institute>

Americans and the phenomenon of steering, which is “the process whereby builders, brokers, and rental property managers induce purchasers or lessees of real property to buy land or rent premises in neighbourhoods composed of persons of the same race”<sup>3</sup>, were conducted. At that time, a representative sample consisted of adverts on real estates from newspapers which were at first being chosen at once before the start of experiment. From year 1989, this technique was modified to draw a fresh-sample every week. (Turner and James, 2016) Outcomes of these experiments support the hypothesis that discriminatory practices were being used by housing agents (see, for example, Pearce, 1979; Roychoudhury and Goodman, 1996 or Purnell, Idsardi and Baugh, 1999).

In the period between 2000 and 2002, four major in-person matched-pair experiments have been carried out by Turner, Ross and other researchers of the Urban Institute to bring to light the advantage of “being white race” when enquiring about renting/buying real estates in contrast to belonging to one of four selected ethnic minorities living in the US. Tests resulted in statistically significant evidence<sup>4</sup> in favour of the presence of discrimination against Hispanic and Native Americans in case of renting of a real estate and against African-Americans and Asian and Pacific Islanders on both - sales and rental - markets (Turner, Ross, Galster and Yinger, 2002; Turner and Ross, 2003 a, and b.). In addition, one of the findings of the study by Turner et al. (2002) directed on the discrimination of African-Americans proves the incidence of geographic steering. This feature might be one of the reasons why many US cities remains residentially racially segregated (Bayer, McMillan and Rueben, 2004).

### **3.1.2. Written Requests Approach and Correspondence Audits**

Having in mind cons of in-person paired tests method (especially the fact that in-person audits are resource intensive<sup>5</sup>) there was a need to create alternative strategy for obtaining needed data. Thanks to “breakneck growth” of Internet, in-person visits were substituted with e-mail requests and telephone conversation; so-called correspondence audits have started to be carried out. By 2012, Internet advertisement websites became the only source for selection of offers to housing providers’ sample. (Turner and James, 2016)

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<sup>3</sup> Steering. (n.d.) West's Encyclopedia of American Law, edition 2. (2008). Retrieved April 24 2016 from <http://legal-dictionary.thefreedictionary.com/Steering>

<sup>4</sup> Statistically significant at 5% level of confidence

<sup>5</sup> By the word “resources”, time, money, people and management are meant.

This method has a number of advantages over data collection that uses personal contact. It is not only less costly and yields results that are more precise and objective due to greater ability of researchers to ensure equal conditions for each observation, but it also allows for higher degree of randomization and single enquiry approach. The most crucial difference between single enquiry and matched-pair testing is that each housing agent receives application only from one requestor whose ethnicity is assigned randomly (according to premeditated strategy). Moreover, techniques based on sending written requests address one of the most frequently discussed problems regarding ethical aspects of such experiments – a deception of participants that is needed to eliminate impression of experimental conditions and simulate circumstances approaching reality to the greatest extent possible. Thus, the creation of fictitious identities for the purposes of experiments is used to replace involvement of recruited testers.

On the other hand, using e-mail correspondence as a channel for communication decreases diversity of possible responses to application; therefore, the correspondence audits strategy truncates the choice of questions which could be answered using evidence from paired tests. Furthermore, this approach leads to higher standard errors - for the most part it is caused by reduced ability to observe some characteristics and aspects if being in touch with housing agent via e-mails only.

Experiments conducted by Carpusor and Loges (2006), Ewens, Tomlin and Wang (2014) or Hanson and Hawley (2011) are examples of such US studies where the written request method was applied. First two of them tested discrimination of Arabs and African-Americans using single enquiries, the field experiment mentioned at last consisted of matched-pair tests focusing on discriminatory behaviour against African-Americans. The presence of some kind of ethnic discrimination was confirmed in all of these studies.

Carpusor and Loges (2006) were interested, amongst other, in the correlation between differential treatment and amount to be paid for renting a flat/house and their research in LA showed that discrimination occurred more often with rising rent. Likewise in this study, Hanson and Hawley (2011) examined similar feature<sup>6</sup> – they included in the texts of applications information on social class of applicant and inspected on its impact on the response rate. Contrary to the finding of Carpusor and Loges (2006), they did not find any

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<sup>6</sup> I assumed similarity based on the following relation: high class enquires are associated with higher wage of applicants who then naturally tend to seek housing with higher level of standard and comfort which is more expensive; therefore high class enquires are considered to be comparable to rising rent.

difference between ethnicities in treatment of high class requests. In addition, they looked at the relationship between the white residents' contribution in the region and the discrimination rate and recognized the existence of geographic steering which is in line with the results of the Urban Institute.

The research of Ewens et al. (2014) with the biggest sample among mentioned experiments (They sent e-mail request to show interest in 14 237 units in total.) also examined how the content of the request and the amount of information provided effect the probability of response. They found out that in case of “basic” requests in which only neutral information were included, the response rate was by 16% lower for African-Americans. Although the applications with positive information had the rate of response higher than “basic” and “negative” requests, the differential treatment of various races remained practically unchanged. In contrast, revealing of negative information decreased not only the rate of response but at the same time the racial gap, too.

Another study originating at the American continent – from Canada by Hogan and Berry (2011) found the evidence of significant discrimination of Arabs and Asian men. Their discussion about non-response as a demonstration of so-called “opportunity denying” discrimination is particularly noteworthy. They figured out that this particular type of behaviour of housing agents was around 10 times more frequent than offering of other conditions or negative response.

### **3.2. Field Experiments on Racial/Ethnic Housing Discrimination in Europe**

Due to necessity to use deception of both - housing providers and testers - in in-person experiments, testing of housing discrimination in Europe was quite rare until the 2000s (for examples of studies from previous periods see e.g. Daniel, 1968 or McIntosh and Smith, 1974). When written request technique has started to be applied, the debate about dishonest treatment of participants was almost resolved thanks to possibility to use fictitious “testers”. Nowadays, most scholars worldwide consider the concealment of information to housing agents about their participation on experiment as acceptable prerequisite to collect the least unbiased data possible. The most important researches on housing discrimination in Europe were conducted in Sweden, UK, Greece, Italy, Norway, Spain and the Czech Republic (almost all of them are specialized on rental markets).

The only experiment that used some kind of personal contact was a study carried out in Athens. To express interest in offer, pairs of applicants with specific accents called newspaper advertisers of real estates by phone. Drydakís (2011) showed that the rate of discrimination of Albanians in Greece with rising rent increases. Ahmed and Hammarstedt (2008) came to the same conclusion by testing responding to e-mail applications for flat viewing sent from Swedish-sounding and Middle-east-sounding e-mail addresses. For illustration, Arabic males were approximately by 20% less likely to receive invitation to a showing than Swedish females and the differential treatment between genders with Swedish-sounding names was around 13%.

On the contrary, Bosch, Carnero and Farré (2010) in Spain and Ahmed, Anderson and Hammarstedt (2010) in Sweden recognized the pattern similar to outcome of several US experiments – requests including details signaling higher ability to pay (e.g. information on occupation, education, reliability, fortune etc.) were associated with lower gap between ethnicities. Amongst this, the Spanish study found the evidence for statistically significant discrimination of Moroccan immigrants as well as gender discrimination. Bosch et al. (2010) figured out that discrimination practises are more common for male than female applicants (22% and 10% respectively). Analogous findings are present also in the conclusion of Italian research by Baldini and Federici (2011).

In addition to matched-pair method, single enquiry approach appears in a number of European experiments. Studies carried out by Andersson, Jakobsson and Kotsadam (2012), Bengtsson, Iverman and Hinnerich (2012) or Carlsson and Eriksson (2014) were all successful in proving the incidence of discrimination of Arabs requesting for real estate rental in Scandinavian countries. Moreover, Bengtsson et al. (2012) and Carlsson et al. (2014) were consistent in the discovery that discriminatory behaviour occurs more often in neighbourhoods outside city centres than directly in hearts of cities. In another study, Carlsson and Eriksson (2013) examined discrimination of various UK minorities applying for shared housing opportunities. They concluded that not-UK-based accommodation seekers have 13% lower chances to be offered a flat showing, while the substantial role plays amongst ethnicity also information about employment.

For the purposes of my thesis, the research on Czech housing market and related Roma and Vietnamese discrimination by Bartoš, Bauer, Chytilová and Matějka (2013) is particularly interesting. By using correspondence tests with names signaling ethnicity, their experiment resulted in the finding that Roma applicants would have to double the number of applications

sent to achieve the same response rate as Czech requestors. Although similar approach – written applications with ethnic specific names - is used and Czech and Slovak people and their attitude to ethnic minorities, especially Roma, are much alike, there are several relevant differences between this study and my work. Bartoš et al. (2013) are primarily focused on so-called attention discrimination<sup>7</sup>, whilst in my experiment responses and their character are the main subjects of interest. Another major difference is the contribution of Roma population in the Czech Republic. This figure is estimated to be around 2% (European Commission, 2014) which is almost four times less than in Slovakia.

### **3.3. Other Field Experiments on Housing Discrimination**

As summarised in the sections above, most of the conducted studies specialize on racial or ethnic discrimination in housing markets. However, several field experiments studying discriminatory behaviour on a different basis, such as sexual preference and disability, have also been carried out. Although the samples used for analyses in such papers are naturally smaller, they provided statistically significant results, too. In the near future, an extension of the “set” of studied discriminated minority groups by families with children or old people is anticipated. (Ahmed, 2015)

Inequality in the treatment of homosexual pairs have been studied in Sweden and USA using matched-pair method combined with requests sending via e-mail in all cases. Whilst response rate to applications from Swedish male couples was significantly lower than in case of heterosexual couples, there was not found any evidence for discrimination of lesbians in Sweden (Ahmed, Anderson and Hammarstedt, 2008; Ahmed and Hammarstedt, 2009).

To test for discrimination of handicapped people represented by individuals in a wheelchair or deaf applicants in the US, Turner et al. (2005) relied on in-person approach. For both of these disabilities, net discrimination rates were around 30% (Turner, Herbig, Kaye, Fenderson and Levy, 2005). On the contrary, a similar more up-to-date study conducted in Europe by Fumarco (2015) used single inquiry method to apply for an offering real estate. Fumarco (2015) was examining possible discrimination of blind requestors moving to a new place with the guide dog by comparing of responds to applications from a married couple, a married couple with a dog and a married couple in which the blind wife had a guide dog. In many

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<sup>7</sup> It is a theory of discrimination in which Bartoš et al. (2013) specify the extent to which information on ethnicity effects decision about how much attention is focused on additional details in the request and how the outcome of this decision-making process is impacted by these imbalances.

cases, it was not disability, but the possession of dog that caused discrimination of these people.

## **4. Roma Community in Slovakia**

The population of Slovakia is 5 413 393 (Statistical Office of the Slovak Republic, 2013) with the share of Slovaks approximately 80.7 %. According to official census from 2011 (Statistical Office of the Slovak Republic, 2012), the largest minorities living in Slovakia are Hungarians who are reported to make up 8.5 % of the population and Roma totalling to 2 %. Other minorities include Czechs, Ruthenians, Ukrainians, Germans and Poles and various smaller ethnical groups that together account for 1.8 %. Remaining 7 % was not identified.

On the contrary, based on the research “The Atlas of Roma Communities 2013” conducted mainly by the UN Development Programme in Europe and Central Asia in cooperation with the Ministry of Labour and the University of Prešov, there live approximately 402 656 Roma people in Slovakia representing slightly less than 7.44% of the country’s population. The most relevant reason why Roma population is officially underreported and the percentage varies across sources is that the ethnic affiliation for this group is not as straightforward as for the others. In fact, many Roma have Slovak, Hungarian or Czech nationality, therefore the actual number of members of this minority can be only estimated and depends on the assumptions of a particular study.

For the purposes of this thesis, the data from the above mentioned “The Atlas of Roma Communities 2013” (Mušinka, Škobla, Hurrle, Matlovičová and Kling , 2013) are used since the most crucial examined factor is belongingness to a certain ethnic group based on available information (in this case signalled by respondent’s name) not on an official person detail such as nationality.

### **4.1. Distribution of Roma Community**

In contrast to Hungarians, the distribution of Roma population is scattered around the country and not so apparent (Hungarians reside naturally mainly in districts located near borders with Hungary, but Roma do not have their own state or region where they traditionally appertain to). Roma live mostly in the southern and eastern part of the country, but there are also some localities where they, as it was mentioned in the introduction, have virtually no presence at all.

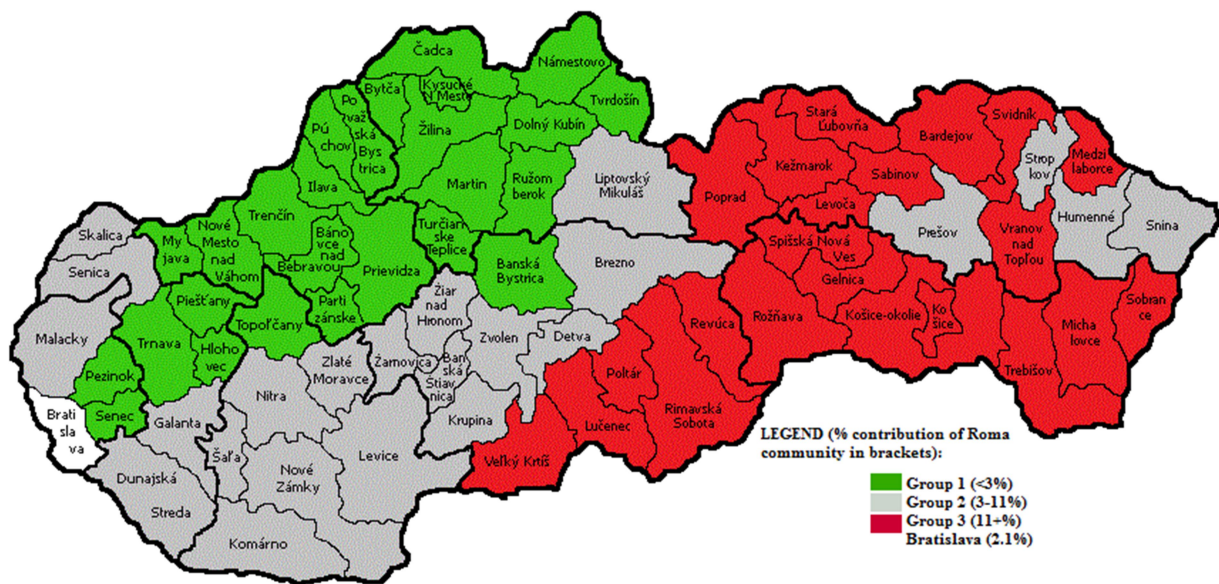


## 4.2. Division of Districts

Slovakia is administratively divided into 79 districts, which are grouped into 8 superior territorial units – regions, including five districts constituting the capital city Bratislava and 4 districts located within the area of the second biggest Slovak city Košice (and district “Košice – okolie” which is counted separately). In this analysis, a division into 71 “districts” is applied where Bratislava and Košice are considered as one large “district” each.

Based on the percentage contribution of Roma population in individual districts, another division into 4 artificial groups was created (see Figure 1 for the map of Slovak districts or Appendix A for table with detailed data regarding estimated percentage contributions of Roma in districts and its subsequent division). The goal was not only to divide districts according to the share of Roma population but also to set threshold in a way to create groups of roughly the same size regarding the total number of inhabitants leaving Bratislava because of its uniqueness as a separate group.

Figure 1 - Map of Slovakia with the division of districts regarding the Roma contribution



Individual groups can be specified as follows:

- Group 1 contains districts with no or small population of Roma inhabitants (less than 3%). In total, the districts fulfilling this condition represent 33% of all inhabitants of Slovakia and are located mostly in the western and north-western part of the country.

- Group 2 includes districts with Roma contribution between 3 and 11%, representing 29% of the population of Slovakia.
- Group 3 consists of districts with the highest percentage share of Roma to all inhabitants (more than 11%). Representing 30% of the population of Slovakia, this group covers only districts in the regions Banskobystrický, Prešovský and Košický i.e. the south-middle and eastern part of the country.
- The capital city Bratislava with 2.1 % contribution of Roma minority is considered to be a special category (Group 4) representing approximately 8% of the country's population.

#### **4.2.1. Exclusion of Bratislava from the Field Experiment**

Bratislava as a “district” should according to its percentage contribution of Roma inhabitants belong to Group 1. However, because of its specific characteristics the capital city is excluded from the experiment as well as the following analysis.

Considering the size of its area – 367.6 km<sup>2</sup> - there is a relatively high percentage of the Roma minority whose members are concentrated in its several specific parts. Roma people are perceived to be a substantial component of the capital city's population as opposed to more spacious districts like Hlohovec or Topoľčany. In these districts Roma community is rather separated in special villages and not integrated with the majority to the same extent as in Bratislava (both mentioned districts are from Group 1, but in each of them there is a commune with more than 10% contribution of Roma inhabitants which are separated and form a substantial part of the Roma community in this district – see the table in Appendix A). For this reason, Bratislava as a whole cannot be included in the first group just as a consequence of percentage contribution of this ethnicity. Taking into consideration not only comparability of remaining districts in characteristic “population/area”, but also the size of housing market in Slovakia and scope of this thesis, Group 4 is omitted in order to obtain more relevant conclusion.

## **5. Field Experiment**

To be able to determine the rate of discrimination in the housing market in Slovakia, I conducted a field experiment in various parts of Slovakia, which differ in the size of the Roma community. During period from 24<sup>th</sup> November 2015 to 18<sup>th</sup> January 2016, I sent out 396 e-mail requests for house/flat viewing to 198 different online ads offering real estates for sale or rent via 4 fictitious e-mail addresses of candidates whose name signalizes their ethnic affiliation. I was mainly focused on the rate of positive responses for individual groups – Slovaks as the majority and Roma as a representative of an ethnic minority. In addition, some other factors, such as location of corresponding real estate and its Roma population, its size or type of offer, were monitored and tracked as well.

### **5.1. Research Platform**

The design of this experiment was based on a practice used by Ahmed and Hammarstedt in their paper “Discrimination in the rental housing market: A field experiment on the Internet” (2008). The same research platform – Internet - was used for all communication. Nowadays, it is even more relevant than it was eight years ago since Internet, thanks to its availability, costs and impacts, has become the most often used source of everyday information among Slovak households. Likewise, in my experiment, the interest in a real estate is demonstrated by sending a written e-mail application. This method is applied in order to decrease possible bias caused by deeper personal contact and ensure objectivity of results.

Although the most frequently used e-mail domain in Slovakia is G-mail (Bílá, 2014), the fictitious e-mail addresses for the purposes of this experiments were created using two other important Slovak free-mail providers – azet.sk and zoznam.sk. The reason is my intention to work with simple and typical names common for the country that signalizes investigated ethnic affiliations. Unfortunately, these are not normally available in Gmail anymore since they are already apparently occupied by somebody else.

### **5.2. Creation of Fictitious Identities**

The preparation phase started with the choice of names for my fictitious identities which was the most essential part of the whole experiment. At first, some general decisions had had to be made to be able to initiate e-mail addresses creation. To avoid undesired effects of potential gender differences and related discrimination, which could possibly harm my analysis and its

results, I had decided for male representatives only. Instead of one representative for each group like in most similar studies, two identities with Slovak sounding name and two other for the ethnic minority were created to mitigate potential bias caused by preferences towards specific names. This approach was used to show that the difference between response rates is not just by chance, i.e. there should be observed no or minimal difference between the two Slovak sounding names or the two Roma sounding names, but the difference between the response rates to different ethnicities is expected to be significant and noticeable.

Particular names were chosen based on results of online questionnaire created via Internet application available at website [mojeanketa.cz](http://mojeanketa.cz) (for its structure and results see Appendix B). Its content was formulated in Slovak because it was intended only for people living in Slovakia (it did not make any sense to collect such a data in a different country, since the experiment and analysis was to be carried out only for Slovak districts and the decision-makers were randomly chosen Slovak flat/house owners selected based on Internet offers in corresponding districts). Names and surnames in the options of 3<sup>rd</sup> and 4<sup>th</sup> question of the questionnaire<sup>8</sup> were selected in accordance with official statistics of Ministry of Internal Affairs (2014) and Ľudovít Štúr's Linguistics Institute (1995).

The choice of surname was particularly fundamental – it was a needed to select surnames which are at the same time:

- typical and casual in Slovakia;
- specific for given ethnicity (Slovak/Roma).

Finally, two typical Roma sounding surnames and two typical Slovak sounding surnames were chosen. The questionnaire was filled by 165 anonymous respondents (the link was posted to some FB pages on 12th November 2015 and the details about its outcome in Appendix B is up-to-date to 21th November 2015). The results showed that people, if asked, were able to distinguish ethnicity based on surname, since obtained conclusion was in line with my expected outcome.

The decision regarding first names was also quite straightforward. Thus, four following identities (each representative of ethnic group uses different e-mail domain) were created:

- Martin Slovák (S1) - [slovak.martin@azet.sk](mailto:slovak.martin@azet.sk)

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<sup>8</sup> “Which name/surname from the options below signalizes the most that a person has Slovak not Roma ethnic affiliation? Which one the least?”

- Peter Kováč (S2) - kovac.p@centrum.sk
- Jozef Balog (R1) - jozefbalog@centrum.sk
- Milan Lakatoš (R2) - lakatos.milan@azet.sk

### **5.3. Process of Approaching of Housing Agent and Applying for a Showing**

#### **5.3.1. Source of Adverts**

As the source of contacts of participants for the experiment (in my case, these are people or real estate agents offering a flat or a house for sale or rent), I used two important Slovak websites specialising in real estate advertisement. Ad selection was conducted randomly with respect to the coverage of all districts. Another necessary condition was a way of contacting participants. The first option - [www.nehnutenosti.sk](http://www.nehnutenosti.sk) - uses for sending the application mostly a web form directly on the webpage of given ad, but some randomly opened offers had to be ruled out because of a telephone number as the only displayed contact information. From the other one - [www.reality.sk](http://www.reality.sk), offers with e-mail address provided were randomly selected in order to be able to contact responsible person by written e-mail request as required by the design of the experiment. These were sent from personal e-mail boxes of fictitious identities.

#### **5.3.2. Matched Application Method and Sending of Requests**

All 198 chosen owners/landlords received 2 requests for flat/house viewing – each from a representative of different ethnicity. The goal of the experiment was to measure response rates to requests from each ethnicity. This technique, so-called matched applications method, reflects an individual choice of landlords and their discriminatory/non-discriminatory behaviour in a clearer way more suitable for comparison than randomly assigned applications method used in some studies. Moreover, it is more convenient for me considering the size of sample needed and the amount of current offers on Slovak housing market since this method naturally doubles the number of observations.

Both requests were sent to participants the same day but not at the same time in order to eliminate any potential connection between them. To determine which fictitious identity replies to which ad, I used the following randomization table with 8 different variations:

Figure 2 - *Randomization table*

	Morning	Afternoon		Morning	Afternoon
<b>1</b>	R1	S1	<b>5</b>	S1	R1
<b>2</b>	R1	S2	<b>6</b>	S1	R2
<b>3</b>	R2	S1	<b>7</b>	S2	R1
<b>4</b>	R2	S2	<b>8</b>	S2	R2

Each line corresponds to one possibility of how to reply to an offer. To each offer, I randomly assigned a number from 1 to 8 to specify which situation from the table above to use to contact the owner/landlord/real estate agency in this individual case. The first column represents a sender who requests for a flat/house viewing in the morning; while the second column gives me an identity to use for sending the application during afternoon. For instance, line 1 means: send first the request from R1 identity (Jozef Balog) in the morning hours and then from S1 (Martin Slovák) during afternoon; line 8 says: send first the application from S2 e-mail address (lakatos.milan@azet.sk) and then later from R2 e-mail box (kovac.p@centrum.sk).

### **5.3.3. Possible Discrimination of the Second Applicant**

The first request sent has instinctively better chance of response which is one of the most serious disadvantages of such a treatment. To decrease at least to some extent potential discrimination of the second applicant, most “afternoon” e-mails were sent around 3 PM to have the highest probability to reach the addressee on the same day. In case of real estate agencies it was desired to send the request before usual time of leaving work what is in Slovakia typically at 5 PM. In case of personal e-mail account, I expect controlling e-mail box for one more time either before the end of workday or after coming home in the evening.

In addition, to treat for “first will win” tendency Roma representative was the first one to send a request in 50% of cases (i.e. options 1 – 4 were used for responding to 99 ads). Applications to the rest of offers were sent according to options 5 – 8 where one of identities with Slovak sounding name contacts owner before Roma representative.

### **5.3.4. Text of Applications**

Eventually, a text of requests – a short message containing only crucial information such as applicant’s name (also already included in the e-mail address) and a sentence signaling

interest of flat/house viewing - was prepared. To ensure equal conditions, it would be ideal to use the same template for every request and to alter only specific information – i.e. name of the requestor and information about link where corresponding ad is available. However, since I chose to use matched applications method it was necessary to create two slightly different versions with preserved basic structure in order to minimize suspicion of owners/landlords that these two applicants can be somehow related to each other.

These text requests were randomly assigned to senders regardless ethnicity or order. The only condition had to be fulfilled – one participant could not receive two requests with the same text. Therefore, when sending the first application the version of text was randomly generated (1 or 2); the second requestor then used the other template. In my experiment, the following text requests were used (for original Slovak wording see Appendix C):

- Version 1:

*(greeting),*

*My name is ... . I have seen your ad on the following website: ... and I am really interested in your offer. Is it still available? Would it be possible to schedule a date for viewing of your flat/house?*

*Thank you for your answer in advance.*

*Have a nice day!*

*... (name and surname)*

- Version 2:

*(greeting),*

*I am ... and I am interested in your real estate whose offer is advertised on the following website: ... . If the ad is still up-to-date, is there a possibility to agree on a date of the flat/house viewing?*

*Thank you.*

*Best regards and have a successful day!*

*... (name and surname)*

### **5.3.5. Characteristics of Interest and Their Tracking**

Data related to each observation of the experiment were tracked in MS Excel continuously during the whole experiment and also several weeks after its end because of time delay in response to flat/apartment view requests in case of some advertisements. The summary below outlines main characteristics of interest, its descriptions and how they were monitored (for complete list of all tracked characteristics with their descriptions see table in Appendix D):

- Details of offer contain the date when given ad was published (variables corresponding to these values are *Current*, *Month*, *Older*), a link to website where it is/was available, information about location of the real estate (including variables related to Roma contribution - namely *Romacontrib*, *Group1*, *Group2* and *Group3*) and additional important details of the offer (type of the ad, type and condition of the real estate and its price tracked using variables *Rent*, *House*, *Oldst* and *Msqprice*).
- The information about owner/landlord/real estate agency, who offers/offered the real estate, include his/her/its name, “nature” (meaning if it is a person or a real estate agency determined by variable *Owner\_person*) and sex and ethnicity if possible to determine.
- Size of the real estate is expressed numerically in squared meters as well as indicated by number of rooms using binary variables, specifically *1room*, *2rooms*, *3rooms* and *4+rooms*.
- Details about the request and response consist of name of the applicant and his ethnicity (binary variables *Roma*), information about how and when the request was sent (including order of request, specification of how and when it was sent and which version was used expressed using binary variables *Email* and *Version*) and report about response as the main object of interest in the experiment identified by variable *Response* (in case of a response, also the received date and time is tracked).

Throughout the data tracking, following values of characteristic *response* were used to indicate status of the response: characteristic takes the value “1” in case of positive response, “0” in case of negative response and "." for no response. At the end of data collection, it was



crucial to decide how to treat observations in the sample with "." value of *response* to be able to use them in econometric analysis. Since this characteristic is intended to reflect the attitude of participant to receiving a request for real estate viewing from one of four fictional identities, I applied below described technique based on the publishing date of the ad to convert such a notation of *response* to binary variable taking only values "0" and "1":

- Regarding offers which were online for more than a month, in case of no response to both requests I decided to treat them as invalid attempt to contact the participant (since matched application method is used). It means that these observations were not included in the subsequent analysis. The reason was that there was a possibility that the ad is out of date. Besides, in case of selling/renting a flat/house for more than a month I expected faster response if still up-to-date since the owners/landlords/real estate agents wish to close "the deal" as soon as possible (with increasing time the number of requests commonly decreases).<sup>9</sup>
- If tracked value for variable *response* was "." for more current offer (i.e. ones taking value "0" for variable older), it was treated as negative response, which means that its value was set to zero and this observation was included in the final sample. The idea behind this approach is that the ad was considered to be up-to-date and the owners/landlords/real estate agencies were expected to be more selective and willing to close the best "deal" possible. Moreover, there is higher probability of the presence of discriminatory behaviour against chosen ethnicity.

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<sup>9</sup> The validity and correctness of this method is supported by the evidence of corresponding trends in responses with regard to publishing dates of offers (described in Section 6.4.). Moreover, sensitivity check (see Section 7.3.1. for details) is successfully conducted.

## 6. Dataset and Statistical Analysis

During the experiment, I sent in total 396 applications - 220 out of them were replying to offers for sale; the rest was interested in renting a flat/house. In 74% of cases, application was sent directly from the webpage where the ad was published by filling the web form; the rest of requests had e-mail message format. According to my strategy, each version of the text was used 198 times.

### 6.1. Districts and Roma Contribution

In every district, I responded at least to one ad (i.e. two or more email requests were written and sent in any district). The highest number of requests sent for one district was 14 – specifically it happened in district Košice (mesto and okolie) where I replied to 7 different real estate offers. To other districts with at least 10 sent applications belong for instance Trenčín, Žilina or Banská Bystrica from Group 1, Senica and Prešov included in Group 2 and Poprad and Lučenec as examples of districts with the highest contribution of Roma.

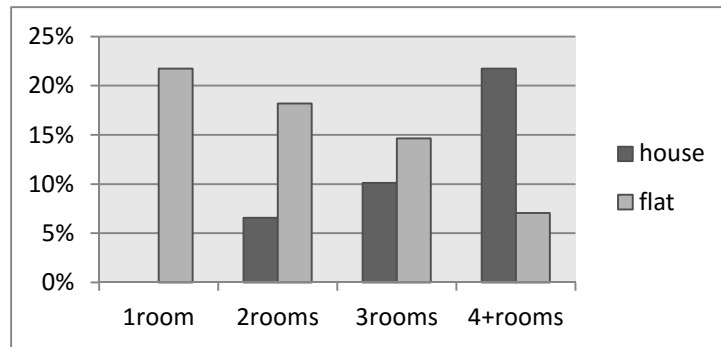
In my case, sample average of variable *Romacontrib*, which represents the relative number of Roma inhabitants in given district, is 7.73%. This value is quite comparable to corresponding real statistic which accounts for 7.44%. Regarding the division of districts into 3 groups based on the share of Roma population, distribution of offers in the dataset is also almost consistent, since sample average of all related variables amounts around 30%.

### 6.2. Characteristics of Flats and Houses

Concerning the characteristics of real estates in the sample, 38.38% of offers used in the experiment were advertising a house. Approximately in 1 out of 3 cases was corresponding real estate being offered in original state. Sample mean size is 102.05 m<sup>2</sup>; however, the average flat in the sample has an area of slightly more than 60 m<sup>2</sup>.

The following bar chart shows the distribution of types of real estates included in the dataset with regard to the number of rooms as the other indicator of the size (expressed in % as relative frequency in the sample):

Figure 3 - *Distribution of types of real estates in the sample (in %)*



### 6.3. Responses

I received a direct email reply to 192 applications which gives the response rate slightly less than 48.5%. Exactly 20 responses from participants were evaluated as negative, 12 of them being sent to Roma identities. Collected data show that in 47.47% cases a holder of e-mail address created based on Slovak sounding name was invited for flat/house viewing (94 out of 198 requests are associated with positive reply). In contrast, identity with Roma sounding name was offered a possibility to see flat/house 16 times less which lead to 39.39% contribution of positive responses.

The most preferred applicant throughout the experiment was Martin Slovák who was offered to see a real estate in 49.49% cases as opposed to Milan Lakatoš with the smallest contribution of positive responses (only 35.71%). Particularly interesting is the comparison of percentage contributions of positive responses between representatives of the same ethnicity. While the difference in this indicator between Slovak sounding e-mail addresses is only around 4% (which corresponds to 4 flat/house viewing invitations), the Roma sounding e-mail address owned by Jozef Balog received 7.29% more positive answers (which is equal to 8 email invitations for a showing) in comparison with the email box owned by the other Roma representative – Milan Lakatoš. However, both of these differences within ethnic groups are statistically insignificant.<sup>10</sup> This supports my predictions stated in Section 5.2. regarding no or minimal distinction in response rates between the two Slovak sounding names or the two Roma sounding names. I also conducted tests analysing the difference between response rates to different ethnicities. Some of these resulted in considerably lower p-values signaling

<sup>10</sup> T-tests examining if there is a difference “in means” for variable *response* in my dataset for two Slovak and two Roma sounding names resulted in p-values equal to 0.6805 and 0.3657, respectively.

possibility of the presence of discrimination against Roma sounding applicants (for instance, statistically significant difference in treatment of requests coming from Martin Slovák and Milan Lakatoš at any level greater than 10%).

#### 6.4. Treatment of Missing Values and Converted Sample

After treating for missing values as specified in the strategy of the experiment in Section 5.3.5., a new set of data with 336 observations was created to be then used for econometric analysis. By the design of this technique, descriptive statistics for response rate and publishing date were mostly affected. Instinctively, response rates increased having 60 less observations (since all dropped observations were cases without response from participants). In contrast, the mean for variable *older* significantly decreased since the conversion of variable *response* was aimed mainly on retaining only up-to-date offers in the sample. The tables below summarize data structure of both samples and can be easily used for their comparison:

Table 1- *Comparison of statistics related to responses in original and converted dataset*

	Slovak		Roma					
	Original	Converted	Original	Converted				
Number of requests sent	198	168	198	168				
Nr. of requests as 1st applicant	99	81	99	87				
Number of responses	102	102	90	90				
Number of positive responses	94	94	78	78				
<b>% contribution of positive responses</b>	<b>47.47%</b>	<b>55.95%</b>	<b>39.39%</b>	<b>46.43%</b>				
	Martin Slovák		Peter Kováč		Milan Lakatoš		Jozef Balog	
	Original	Converted	Original	Converted	Original	Converted	Original	Converted
Number of requests sent	99	83	99	85	98	76	100	92
Nr. of requests as 1st applicant	49	40	50	41	50	40	49	47
Number of responses	52	52	50	50	40	40	50	50
Number of positive responses	49	49	45	45	35	35	43	43
<b>% contribution of positive responses</b>	<b>49.49%</b>	<b>59.04%</b>	<b>45.45%</b>	<b>52.94%</b>	<b>35.71%</b>	<b>46.05%</b>	<b>43.00%</b>	<b>46.74%</b>

Table 2 - Sample averages of variables in the datasets

	Original	Converted		Original	Converted
Current	44.44%	52.38%	Oldst	32.32%	32.14%
Month	25.25%	29.76%	Person	63.64%	58.33%
Older	30.30%	17.86%	Size	102.05	101.09
Romacontrib	7.73%	7.53%	1room	21.72%	20.24%
Group1	36.87%	34.52%	2rooms	24.75%	22.02%
Group2	33.33%	36.31%	3rooms	24.75%	27.98%
Group3	29.80%	29.17%	4+rooms	28.79%	29.76%
Sale	55.56%	59.52%	Email	25.76%	29.17%
House	38.38%	38.10%	Version	1.5	1.5
			<b>Response</b>	<b>43.43%</b>	<b>51.19%</b>

Table 3 - Sample averages of variables in the datasets (per identities)

	Martin Slovák		Peter Kováč		Milan Lakatoš		Jozef Balog	
	Original	Converted	Original	Converted	Original	Converted	Original	Converted
Current	<b>47.48%</b>	56.63%	<b>41.41%</b>	48.24%	<b>42.86%</b>	55.26%	<b>46%</b>	50%
Month	<b>21.21%</b>	25.30%	<b>29.29%</b>	34.11%	<b>22.45%</b>	28.95%	<b>28%</b>	30.43%
Older	<b>31.31%</b>	18.07%	<b>29.30%</b>	17.65%	<b>34.69%</b>	15.79%	<b>26%</b>	19.57%
Romacontrib	<b>7.97%</b>	8.16%	<b>7.50%</b>	6.93%	<b>7.96%</b>	7.82%	<b>7.51%</b>	7.30%
Group1	<b>32.32%</b>	28.92%	<b>41.41%</b>	40%	<b>35.72%</b>	31.58%	<b>38%</b>	36.96%
Group2	<b>36.37%</b>	38.56%	<b>30.30%</b>	34.12%	<b>32.65%</b>	35.53%	<b>34%</b>	36.95%
Group3	<b>31.31%</b>	32.52%	<b>28.29%</b>	25.88%	<b>31.63%</b>	32.89%	<b>28%</b>	26.09%
Sale	<b>54.55%</b>	59.04%	<b>56.57%</b>	60%	<b>53.06%</b>	59.21%	<b>58%</b>	59.78%
House	<b>38.38%</b>	36.14%	<b>38.38%</b>	40%	<b>45.91%</b>	43.42%	<b>31%</b>	33.70%
Oldst	<b>32.32%</b>	30.12%	<b>32.32%</b>	34.12%	<b>32.65%</b>	32.89%	<b>32%</b>	31.52%
Person	<b>62.63%</b>	56.63%	<b>64.65%</b>	60%	<b>68.37%</b>	61.84%	<b>59%</b>	55.43%
Size	<b>102.21</b>	98.14	<b>101.88</b>	103.96	<b>112.55</b>	107.21	<b>91.75</b>	96.03
1room	<b>24.24%</b>	20.48%	<b>19.19%</b>	20%	<b>18.37%</b>	18.42%	<b>25%</b>	21.74%
2rooms	<b>26.26%</b>	27.71%	<b>23.23%</b>	16.47%	<b>23.47%</b>	18.42%	<b>26%</b>	25%
3rooms	<b>19.19%</b>	28.69%	<b>30.31%</b>	34.12%	<b>29.59%</b>	35.53%	<b>20%</b>	21.74%
4+rooms	<b>30.31%</b>	30.12%	<b>27.27%</b>	29.41%	<b>28.57%</b>	27.63%	<b>29%</b>	31.52%
Email	<b>22.22%</b>	25.30%	<b>29.29%</b>	32.94%	<b>21.43%</b>	25%	<b>30%</b>	32.61%

To show why such a treatment of missing values seems to be relevant, it is possible to look at two factors in the original sample – the contribution of positive responses and the relative number of cases where there was no response from given owner/landlord/real estate agent at all (i.e. the combination of values “?” and “?” for variable *response* for some offer in the dataset) – and assess them both with regard to variables indicating “age” of advertisements. From Table 4, which provides values of these indicators for each of 3 dummy advertisement variables based on publishing dates, two tendencies are evident:

- The contribution of positive responses considerably declines with advertisements available for a longer time.
- The occurrence of phenomenon “No response for both applicants” is significantly lower for recently posted offers. In fact, in my experiment this situation was almost twice as frequent for advertisements which were online for more than a month as for these which were posted not more than 7 days before sending the requests from my fictitious applicants.

Both of these trends support my decisions about the approach to missing values and their conversion to binary values stated in Section 5.3.5.

Table 4 – *Response trends based on publishing date of the offer*

		Positive responses trend			"No response for both applicants" trend		
		Number of applications sent	Number of positive responses	% contribution of positive responses	Number of offers in the sample	Absolute frequency of the event	Occurrence of the event
State of offer	Current	176	94	53.4%	88	25	28.4%
	Month	100	39	39.0%	50	19	38.0%
	Older	120	39	32.5%	60	30	50.0%

**6.5. Outcome of the Experiment (Statistical Analysis for Individual Offers)**

As the result of matched applications method, the analysis of requests on individual basis provides a preliminary overview of outcome of the experiment. In the end, 74 out of 198 offers remained without any response to both applicants, whilst the opposite phenomenon (a reply to both applications) occurred 68 times. Special case of such an option – positive response to both applicants - is associated with 58 offers. In 33 cases, I noticed possible

discrimination to the second applicant since the positive response was received only by the first applicant (in fact, only two of these owners/landlords refused a request for flat viewing directly by sending negative response).

For the purposes of this thesis, the cases with positive response sent to Slovak sounding e-mail address combined with no or negative reply to Roma representative are particularly concerning. Such a situation happened 36 times throughout the experiment (which leads to the gross discrimination rate of 18.18%), while in 20 cases Roma applicant applied for real estate viewing as the first one. It is possible to consider these 20 cases as outright examples of discrimination against Roma ethnicity – an owner/landlord/real estate agent either refused or ignored request sent from Roma sounding e-mail address but responded positively to subsequent application from Slovak representative. 3 of these cases can be also labelled as so-called “dishonest concealments of rejection”. These are the situations in which requested real estate showing to minority applicant is literally rejected, while the majority prospect receives positive reply either the same day or any time after this rejection. (Rich, 2014) Alike behaviour towards requestors with Slovak-sounding e-mail address did not occur during the whole experiment at all.

On the other side, there are 20 such cases in the dataset that the Roma applicant received positive response, whereas the Slovak requestor was not invited to a viewing. Taking into account this figure, net discrimination corresponds approximately to the rate of 8.08%.

## 7. Econometric Analysis of Data

This section is dedicated for further analysis of data collected during the experiment using more advanced methods than in the previous data description and statistical analysis part. In most studies reviewed in Section 3, authors use linear probability model (see e.g. Bosch, Carnero and Farré, 2010) and probit estimation (for instance, in Ahmed and Hammarstedt, 2008 or Andersson, Jakobsson and Kotsadam, 2012) to identify whether ethnic discrimination is present in housing markets. Alike approaches are applied in this thesis as well.

Although the dataset created by the conversion of variable  $Response_i$  is used as the basis in this analysis, some of the tests and estimations in this section are to be carried out on both - original and converted - samples. The incentive for doing so is to conduct so-called sensitivity check. This is necessary in order to be able to support my predictions about reasons why some offers remain without any response which results in missing values in datasets and to prove the relevance of my approach about the way how to deal with this, in such experiments, frequently occurring phenomenon.

### 7.1. Models

As mentioned a couple of times before, the main purpose of this analysis is to examine how the ethnicity of sender of application signaled by specific name of his email address affects the rate of positive responses from housing agents. Therefore, in all used models the following variables are included:

- $Response_i$  which is the dependent dummy variable that equals one in case of receiving a direct positive response with invitation for a real estate showing and zero otherwise;
- $Roma_i$  which is the dummy where  $i$  is an applicant with Roma-sounding email address.

#### 7.1.1. Linear Probability and Probit Model

In order to obtain the most precise results possible, the outcome variable  $Response_i$  is also regressed on a vector of control variables,  $X_i$ , and a vector of county group fixed effects,  $F_i$ .



The group of control variables contains these advertisement and real estate characteristics<sup>11</sup>: a dummy for the flat/house being in old state; a dummy for the real estate being offered for rent; a dummy for the housing agent “nature” (which indicates whether the advertiser is a person or a real estate agency); a dummy for the request being sent directly from applicants email box (otherwise, when the web form is used, it equals zero) ; and dummies for the age of advert (namely  $Current_i$  and  $Month_i$ ; adverts which were published more than a month ago being the base group). The vector of county group fixed effects signalizes Roma contribution in district where corresponding real estate is situated using binary variables  $Group1_i$  and  $Group2_i$ ; offers being located in the districts from Group 3 belong to the reference group. This all leads to the linear probability model (LPM) with the following form:

$$Response_i = \beta_0 + \beta_1 * Roma_i + \beta * X_i + \beta * F_i + \varepsilon_i \quad (1),$$

where  $\beta_0, \beta_1$  and other  $\beta$ s are the population intercept and slope parameters, respectively, and  $\varepsilon_i$  represents an error term.

In the second part of analysis regarding the effect of the combination of senders on the probability of receiving a direct positive response, this version of equation (1) extended by variable  $Roma\_first_i$  (a dummy that equals one in case that the first email request in the morning was sent from Roma-sounding email address and zero otherwise) is used:

$$Response_i = \beta_0 + \beta_1 * Roma_i + \beta_2 * Roma\_first_i + \beta * X_i + \beta * F_i + \varepsilon_i \quad (1*).$$

Although the linear probability model and OLS estimation are convenient for interpretation of the estimates representing likelihood of some event, this method commonly generates biased and inconsistent results (Horace and Oaxaca, 2006). In addition, the model assumes continuous character of the output variable. This is, unfortunately, not the case of my variable  $Response_i$  which takes the values 0 and 1 only. Due to this assumption, such estimation can result in nonsense values of probability outside of the <0%; 100%> range. To address this problem, it is possible to modify this model and carry out the probit estimation. The

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<sup>11</sup> It was decided for this specific combination of control variables based on the significancy of results, the relevance of outcomes and variance inflation factors indicating multicollinearity obtained by running a number of estimations with various  $X_i$ s (using characteristics described in Appendix D and based on them generated variables).

corresponding probability of getting a positive response after conducting the probit transformation can be expressed as follows:

$$\Pr(\text{Response}_i = 1 | \text{Roma}_i, \mathbf{X}_i, \mathbf{F}_i) = \Phi(\beta_0 + \beta_1 * \text{Roma}_i + \boldsymbol{\beta} * \mathbf{X}_i + \boldsymbol{\beta} * \mathbf{F}_i) \quad (2),$$

where  $\Phi$  stands for the cumulative standard normal distribution function.

### 7.1.2. Model with County Group Interaction Terms

For being able to give some answer to the set research question regarding the differences in discriminatory behaviour practises among districts stemming from varying share of Roma inhabitants, the following model, which contains interaction terms between ethnicity of sender and dummies for belongingness of district to a group, is applied:

$$\text{Response}_i = \beta_0 + \beta_1 * \text{Roma}_i + \beta_2 * \text{Group1}_i + \beta_3 * \text{Group2}_i + \beta_4 * \text{Roma}_i * \text{Group1}_i + \beta_5 * \text{Roma}_i * \text{Group2}_i + \beta_6 * \text{Roma\_first}_i + \boldsymbol{\beta} * \mathbf{X}_i + \varepsilon_i \quad (3).$$

## 7.2. Assumptions

Hand-in-hand with performing of any econometric inference related procedures, it is important to look at the dataset and selected models and check whether crucial assumptions for multiple regression analysis – i.e. linearity in parameters, random sampling, no perfect collinearity, zero conditional mean and homoskedasticity (Wooldridge, 2009) - are being fulfilled and the estimations will result in satisfactory outcome. In my case, first three listed assumptions are obviously satisfied thanks to the experimental design and by the definition and choice of variables which are included in models.<sup>12</sup>

Taking into account the size of original and converted samples (396 and 336 respectively), it may be assumed that asymptotic validity of these assumptions is sufficient. Therefore, it is possible to relax the zero conditional mean assumption and substitute it with weaker condition – zero correlation between any explanatory variable in the model and the error term (Wooldridge, 2009). Thanks primarily to the design of my experiment, this assumption is

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<sup>12</sup> For instance, for illustration of satisfied random sampling assumptions Table 3 in Section 6.4. can be used. This can be concluded thanks to small fluctuations in means of all characteristics between identities in original sample

fulfilled. To show it, it is possible to think about factors which are not identified by variables included in the model and whether they can be related to ones which are, on the contrary, present in the model. For example, provided that the candidates applying for the same offer differ only in ethnicity, it can be concluded that for variable  $Roma_i$  this assumption holds. The validity of this condition for all other independent variables can be illustrated similarly.

By the definition of outcome variable which has binary character, the variance of the error term given the explanatory variables is not necessarily constant – there is a possibility that heteroskedasticity<sup>13</sup> is present (Wooldridge, 2009). In order to resolve this issue in large samples, it is possible to use heteroskedasticity-robust inference to return standard errors and t, F and LM statistic which are valid also in cases that homoscedasticity assumption is violated. Thanks to the assumption made in previous paragraph regarding my sample size, this problem can be considered as fixed.

In addition to these assumptions, for probit estimation it is also necessary to check the normality assumption for distribution of errors. Analysing distributions of residuals of corresponding regressions suggest that this condition is not perfectly met. However, having in mind the purpose why probit estimation is in my case carried out<sup>14</sup> and findings by Wooldridge (2002) about irrelevance of this inconsistency, the estimates of the partial effects can be considered as very good and sufficient.

### **7.3. Results**

#### **7.3.1. Main Effects**

In the beginning, a series of tests, which are focused on estimating the main effects of ethnicity and other included factors on the positive response rate, is carried out. Because of the necessity to do sensitivity check, these estimations are conducted on original and also converted sample. Moreover, the coefficients for converted sample are estimated not only for LPM but for probit model as well.

This procedure has three phases. The first phase is based on simple regression of the outcome variable on the ethnicity dummy as the main variable of interest (Note: A column is labelled as “LPM1” in case of estimating corresponding modification of model expressed in the

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<sup>13</sup> To detect any linear kind of heteroskedasticity, I used the Breusch-Pagan/Cook-Weisberg test.

<sup>14</sup> It is intended mainly for rough check of LPM results.

equation (1);” PROBIT1” for a column dedicated to results of estimation of corresponding modification of model expressed in the equation (2) – see Section 7.1.1.). During the second and third phase vectors of control variables and county group fixed effects were added (Note: Columns are labelled in a similar way - for estimations in the second phase “LPM2” and “PROBIT2” applicable; for third “LPM3” and “PROBIT3”). The results are summarized in tables below (see Table 5 for estimation conducted on original sample; the estimates of the coefficients for converted sample are reported in Table 6):

Table 5 – Main effects analysis (linear probability model, original sample)

	<b>LPM1</b> <i>Response</i>	<b>LPM2</b> <i>Response</i>	<b>LPM3</b> <i>Response</i>
<i>Roma</i>	-0.0808 (-1.62)	-0.0808 <sup>+</sup> (-1.75)	-0.0808 <sup>+</sup> (-1.77)
<i>Oldst</i>		-0.0844 (-1.26)	-0.108 (-1.64)
<i>Rent</i>		-0.231 <sup>***</sup> (-4.14)	-0.222 <sup>***</sup> (-3.98)
<i>Rent*Oldst</i>		0.144 (1.27)	0.185 (1.62)
<i>Owner_person</i>		-0.104 <sup>+</sup> (-1.80)	-0.122 <sup>*</sup> (-2.15)
<i>Email</i>		0.314 <sup>***</sup> (5.93)	0.309 <sup>***</sup> (5.80)
<i>Current</i>		0.135 <sup>*</sup> (2.22)	0.125 <sup>*</sup> (2.12)
<i>Month</i>		0.0563 (0.94)	0.0335 (0.57)
<i>Group1</i>			-0.108 <sup>+</sup> (-1.89)
<i>Group2</i>			0.0609 (1.00)
Constant	0.475 <sup>***</sup> (13.34)	0.505 <sup>***</sup> (5.98)	0.548 <sup>***</sup> (6.32)
<i>N</i>	396	396	396
<i>adj. R<sup>2</sup></i>	0.004	0.145	0.161

Note: **Robust** *t* statistics in parentheses; <sup>+</sup>  $p < 0.10$ , <sup>\*</sup>  $p < 0.05$ , <sup>\*\*</sup>  $p < 0.01$ , <sup>\*\*\*</sup>  $p < 0.001$

Table 6 – Main effects analysis (linear probability and probit model, converted sample)

	LPM1 <i>Response</i>	PROBIT1 <i>Response</i>	LPM2 <i>Response</i>	PROBIT2 <i>Response</i>	LPM3 <i>Response</i>	PROBIT3 <i>Response</i>
<i>Roma</i>	-0.0952 <sup>+</sup> (-1.75)	-0.239 <sup>+</sup> (-1.75)	-0.0952 <sup>+</sup> (-1.83)	-0.260 <sup>+</sup> (-1.83)	-0.0952 <sup>+</sup> (-1.85)	-0.266 <sup>+</sup> (-1.86)
<i>Oldst</i>			-0.0549 (-0.77)	-0.159 (-0.83)	-0.0824 (-1.15)	-0.244 (-1.25)
<i>Rent</i>			-0.168** (-2.65)	-0.467** (-2.62)	-0.157* (-2.49)	-0.443* (-2.45)
<i>Rent*Oldst</i>			0.0456 (0.33)	0.119 (0.32)	0.114 (0.81)	0.318 (0.83)
<i>Owner_person</i>			-0.0796 (-1.32)	-0.220 (-1.32)	-0.0923 (-1.56)	-0.259 (-1.50)
<i>Email</i>			0.253*** (4.44)	0.690*** (4.26)	0.256*** (4.46)	0.706*** (4.33)
<i>Current</i>			-0.103 (-1.34)	-0.291 (-1.34)	-0.101 (-1.34)	-0.312 (-1.41)
<i>Month</i>			-0.195* (-2.43)	-0.542* (-2.45)	-0.212** (-2.69)	-0.616** (-2.71)
<i>Group1</i>					-0.162* (-2.42)	-0.455* (-2.39)
<i>Group2</i>					-0.0120 (-0.18)	-0.0280 (-0.15)
Constant	0.560*** (14.56)	0.150 (1.54)	0.727*** (7.81)	0.637* (2.35)	0.798*** (8.03)	0.861** (2.90)
<i>N</i>	336	336	336	336	336	336
adj. <i>R</i> <sup>2</sup>	0.006		0.095		0.110	
pseudo <i>R</i> <sup>2</sup>		0.007		0.089		0.105

Note: T statistics (**robust** in case of LPM) in parentheses; + p < 0.10, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

Overall, the outcome is in line with previously calculated descriptive statistics. Most regressions (except the simple regression model estimation conducted on original sample, which can be considered as the least precise one taking into account corresponding  $R^2$ ) give statistically significant estimates of the parameter  $\beta_1$  showing evidence in favour of the presence of housing discrimination in Slovakia. Negative signs of these estimates indicate that receiving positive response to the request sent from Roma-sounding email address is less likely than to Slovak-sounding ones. Specifically, this difference is estimated within range of 8 to 9.5%.

Both samples also provide evidence for these additional phenomena:

- The rate of positive responses to applications for rental offers is on average by approximately 16 to 23% lower than in case of real estate adverts for sale.
- Sending direct requests from email box seems to be substantially more effective way for applying for a showing increasing the probability of receiving a positive response with invitation by 25 – 31%.

By examining estimates obtained from regressions conducted on original and converted samples, it is possible to justify that the treatment of missing values for responses based on the technique, which is specified in the strategy of experiment in Section 5.3.5., was reasonable. The main reason is an increase in the evidence in favour of the distinct behaviour for responding to applicants with Slovak-sounding email addresses compared to ones with Roma-sounding email addresses. Moreover, the estimates for most variables are almost unchanged regarding not only their signs but significance as well. The only considerable difference is in the estimates of parameters for variables specifying the publishing date of offer, explicitly *Current* and *Month*. Although the estimates differ for some cases also in signs, this issue can be neglected thanks to loss of significance and lower priority resulting from explanatory power of these variables.

Average marginal effects for probit regression (for detailed results see figures in Appendix E) which are similar in value to LPM parameters' estimates and identical levels of significance related to corresponding variables suggests that the linear probability model reflects and approximates the relationship between outcome and explanatory variables in a way which can be considered as adequate and suitable for overall interpretation of results.

### **7.3.2. Impact of Requests Order**

Other particularly interesting conclusions can be derived from estimations studying more closely the impact which has the order of requests on the response rate. At first, I divide my converted dataset into two separate subsamples: applications sent as the first ones in morning hours and applications sent the same day with some time delay, i.e. during afternoon. Then similarly to the main effects analysis, the three-phase regression using modification of equation (1) for each subsample is conducted (Note: Columns are labelled by numbers 1-3 identifying phases discussed before and subsamples are distinguished using abbreviations

“MORN” and “AFTER”. For example, results of the simple regression of  $Response_i$  on  $Roma_i$  (i.e. the first phase) for second applicants are in the column “AFTER1”). The overview of obtained estimates of the parameter for ethnicity dummy for each combination of subsample and modification of equation (1) can be found in the following table:

Table 7 - *Linear probability estimates by time of sending the request (linear probability model, converted sample)*

	<b>MORN1</b> <i>Response</i>	<b>AFTER1</b> <i>Response</i>	<b>MORN2</b> <i>Response</i>	<b>AFTER2</b> <i>Response</i>	<b>MORN3</b> <i>Response</i>	<b>AFTER3</b> <i>Response</i>
<i>Roma</i>	-0.241** (-3.22)	0.0464 (0.60)	-0.230** (-3.14)	0.0208 (0.28)	-0.246*** (-3.40)	0.0317 (0.42)
Control variables	No	No	Yes	Yes	Yes	Yes
County Group FE	No	No	No	No	Yes	Yes
Constant	0.667*** (12.65)	0.460*** (8.55)	0.907*** (7.12)	0.542*** (3.95)	1.029*** (7.84)	0.578*** (3.94)
<i>N</i>	168	168	168	168	168	168
adj. $R^2$	0.053	-0.004	0.126	0.076	0.151	0.082

Note: **Robust**  $t$  statistics in parentheses; <sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Furthermore, I carried out another three-phase regression on the whole converted sample using different modifications of model expressed by equation (1\*). For the results, see Table 8 (Note: Labelling convention is as in previous tables differing only in abbreviation “LPM\*”).):

Table 8 - *Linear probability estimates and the impact of ethnicity of the first applicant on the overall probability of receiving a positive response (extended LPM, converted sample)*

	<b>LPM*1</b> <i>Response</i>	<b>LPM*2</b> <i>Response</i>	<b>LPM*3</b> <i>Response</i>
<i>Roma</i>	-0.0952 <sup>+</sup> (-1.76)	-0.0952 <sup>+</sup> (-1.85)	-0.0952 <sup>+</sup> (-1.86)
<i>Roma_first</i>	-0.144** (-2.67)	-0.125* (-2.39)	-0.139** (-2.67)
Control variables	No	Yes	Yes
County group FE	No	No	Yes
Constant	0.634*** (13.76)	0.783*** (8.16)	0.867*** (8.50)
<i>N</i>	336	336	336
adj. $R^2$	0.024	0.107	0.126

Note: **Robust**  $t$  statistics in parentheses; <sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

The results in Table 6 and 7 show the presence of differential treatment of requests according to sending time and ethnicity of requestor. For morning requests, the probability of receiving positive response by Roma is estimated to be on average 24% lower than the probability of receiving invitation for a showing in case of Slovak-sounding applicant sending the request as the first one from pair. Moreover, all of these estimates are highly significant (even at 1% confidence level). In contrast, the analysis for applications sent during afternoon hours suggest absence of any discriminatory practices based on ethnic affiliation of applicants. According to Table 7, the inclusion of variable *Roma\_first<sub>i</sub>* in the model does not dramatically change the estimate of the parameter for ethnicity dummy. In fact, the results of regressions give statistically significant estimate of the ethnicity gap in receiving positive reply being around 9.5%. The results also suggest that sending request firstly from Roma-sounding email address decreases the overall positive response rate by 12.5 - 14.4%.

### **7.3.3. Differential Discriminatory Practises on County Group Basis**

Finally, I examined whether the behaviour of owners/landlords/real estate agents offering real estates in districts where Roma community is minimal differs from that of housing agents advertng flat/houses located in districts with higher share of Roma inhabitants. By the design of this model where dummies specifying districts are already included in the basic version as main variables of interest, the three-phase procedure needs to be slightly modified. Thus instead of adding the vector of fixed effects in the phase three, the inclusion of variable *Roma\_first<sub>i</sub>* is executed. The estimates for regression on each modification of model expressed by equation (3) are provided below in Table 9 (Note: The way of labelling is preserved like in previous parts, but specific abbreviation “GROUPS” is used.). Due to the arbitrary division of districts designed by myself only for the purposes of this thesis, the outcome of the group analysis should not to be considered as completely binding.



Table 9 - Linear probability estimates by belongingness of districts to groups based on the division according to percentage contribution of Roma community (model with county group interaction terms, converted sample)

	<b>GROUPS1</b>	<b>GROUPS2</b>	<b>GROUPS3</b>
	<i>Response</i>	<i>Response</i>	<i>Response</i>
<i>Roma</i>	0.0612 (0.61)	0.0612 (0.61)	0.0612 (0.62)
<i>Group1</i>	-0.0479 (-0.49)	-0.0712 (-0.76)	-0.0858 (-0.94)
<i>Group2</i>	0.125 (1.32)	0.117 (1.28)	0.114 (1.27)
<i>Group1*Roma</i>	-0.182 (-1.33)	-0.182 (-1.38)	-0.182 (-1.40)
<i>Group2*Roma</i>	-0.258 <sup>+</sup> (-1.92)	-0.258 <sup>+</sup> (-1.97)	-0.258* (-2.00)
Control variables	No	Yes	Yes
<i>Roma_first</i>	No	No	-0.139** (-2.68)
Constant	0.531*** (7.38)	0.720*** (6.71)	0.789*** (7.25)
<i>N</i>	336	336	336
adj. <i>R</i> <sup>2</sup>	0.023	0.116	0.132

Note: **Robust** *t* statistics in parentheses; <sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Though the estimates for coefficients of county group variables are insignificant, thanks to the significance of the estimate of the parameter of interaction term between variables *Group2<sub>i</sub>* and *Roma<sub>i</sub>* it is possible to come to these conclusions:

- Roma applications sent to offers located in districts from Group 2 are less likely to get a positive response in comparison with Roma applications requesting a showing of real estate in Group 3.<sup>15</sup>

<sup>15</sup> This is possible to conclude based on the values in the table, in this case the estimates of slope parameters for terms *Group2* and *Group2\*Roma*. Their sum can be interpreted as the difference between treatments of Roma applications in Group 2 compared to ones which belong to the reference group – sent to express interest in offers in Group 3. Since the second mentioned estimate is significant and considerably higher in value in contrast to slightly insignificant first estimate (the “beta” for *Group2\*Roma*), its negative effect certainly outweighs the positive effect of *Group2* estimate leading finally to evidence for differential treatment of Roma applicants in these two groups.

- For Group 2, data gives us noticeable evidence for discrimination of Roma applicants. According to the results from Table 9, the ethnic gap is estimated to be more than 20%.<sup>16</sup>

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<sup>16</sup> This finding can be derived from the estimates of the coefficients before terms *Roma* and *Group2\*Roma*. Sum of these two figures gives us the estimate of the ethnic gap in treatment of housing agents applicable for Group 2. Similarly to the discussion about the final effect in Footnote 16, it can be showed why this phenomenon is significant, negative and higher than 20% in value.

## 8. Conclusion

In this thesis I examined the impact of applicants' ethnicity requesting for a real estate showing on their chances to get involved in the process of housing searching and ensuring at all. For this purpose, data obtained by field experiment are used. The mentioned probability is identified primarily by the "character" of responses from housing agents to applicants' requests sent via Internet. The experiment was conducted in Slovakia with the following groups of interest: Slovaks, as the representatives of the majority, and Roma, who had the role of minority applicants. Alongside the response rate, other factors, such as locations of real estates, Roma contribution of corresponding districts, additional characteristics of real estates and type and further conditions of adverts, are taken into account in order to be able to give better explanation of this relationship.

To reach the final conclusion, it is needed at first to summarize the results obtained throughout previous sections. This is accomplished by linking of this outcome to corresponding research questions stated in the introduction. Afterwards, the validity and limitations of applied research design are discussed in connection to the obtained results. Finally, some suggestions for a follow-up study to my research are stated.

To answer the main research question, whether there is a significant difference in response rates to email requests for a real estate viewing of Slovaks in comparison with those of Roma, I used different approaches based on elementary statistical inference and more sophisticated econometric models with varying combinations of included fixed effects characteristics and control variables specific for each observation. Initial analysis of responses to individual requests in the sample collected by sending matched pairs of email inquiries indicated 8.08% level of net discrimination against Roma. Specifically, 20 out of 198 pair observations could be identified as outright examples of ethnic discrimination, since in these cases housing agent either ignored or answered negatively to the first inquiry sent by Roma representative, whilst subsequent application from Slovak-sounding email address was associated with an invitation for a showing. Analogous pattern for applicant with Slovak sounding email address occurred during the experiment only 3 times having no such a case in which only Slovak received a direct negative answer. Similarly, evidence in favour of the presence of discrimination against Roma applicants in the Slovak housing market was also found by applying various linear probability models. These resulted in the ethnicity gap which was significantly estimated within the range from 8 to 9.5% depending on specification of model. Average partial effects

of the main effects acquired by probit estimation appeared to be consistent in values and significance levels with the LPM outcome.

The second research question was related to the percentage contribution of Roma community in district where given real estate is located and offered for rent or sale and its effect on the differential treatment of various ethnic groups. Using OLS estimation of models with dummy interaction terms for county group affiliation, there was not found any linear relationship between these factors. In fact, Group 2, which included districts with median share of Roma community (to be exact, these are the districts with 3 to 11% contribution of this minority), seemed to be the most common group where such practices occurred. These districts were associated with the greatest ethnicity gap which was estimated to be slightly more than 20%.

As delineated in Section 5.3.3., one of the most deciding limitations of my experimental design was the possibility that the discrimination can arise due to different timing when the applications were sent. Despite countermeasures and efforts conducted to prevent this kind of discrimination, which resulted from matched-pair method, my findings showed that this shortcoming remained present in the sample. This was supported by the analysis of requests sent as the second ones, which resulted in no evidence for any discriminatory practices against members of any group. However, the discrimination rate of Roma in the “opposite” subsample consisting of morning requests was estimated to be around 24%. Furthermore, I found out that the combinations of requestors where the first inquiry is sent from Roma-sounding email address reduced the overall rate of positive responses on average by 13.5%. Thus, taking into consideration all these observations and results, it can be suggested that the order of requests had appreciable impact on the positive response rate, but there is still enough evidence to conclude that ethnicity played the crucial role in the decision-making of housing agents whether to respond to request or not.

The choice of names and surnames can be considered as another factor which could seriously harm the outcome of my experiment. As it was already mentioned, it is not possible to be sure whether all housing agents, who participated in the experiment, were able to recognize the signal and realize the ethnical difference between two applicants during their decision-making process, as I expected in my experimental strategy. This issue could also have an impact on the results of analysis of the differential treatment between districts with distinct shares of Roma inhabitants. For example, it is not difficult to imagine that many people living in areas with no or minimal presence of Roma community did not have any personal experience with

Roma yet. Therefore, there is a possibility that they were not able to distinguish between two specific email address of applicants simply because they are not familiar with Roma-sounding names and surnames. This issue can be left as a recommendation for further research.

Methodology regarding treatment of cases with no response is a next suggestion I would propose for a follow-up study related to such experimental investigations. Solving this problem would, in my opinion, definitely help to get rid of invalid values and adjust sample to reflect only behaviour of participants who has actually taken part in research.

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## Appendix A

### Distribution of Roma Community in Slovakia

In Table 10, detailed data regarding estimated percentage contributions of Roma in districts and its subsequent division can be found (Note: Group 1 districts are highlighted in green, Group 2 in grey, Group 3 in red. Bratislava is not highlighted since it forms a separate group.).

Table 10 - *Division of districts based on its estimated percentage contributions of Roma (ascending order)*

District	Region	Number of inhabitants of the district (30.6.2013)	Absolute number of Roma in the region (estimated)	Percentage contribution of Roma inhabitants
Bytča	Žilinský	30 641,50	-	0%
Námestovo	Žilinský	60 450,50	-	0%
Tvrdošín	Žilinský	36 023,50	-	0%
Trenčín	Trenčiansky	113 551,50	320,00	0%
Pezinok	Bratislavský	59 149,00	187,00	0%
Považská Bystrica	Trenčiansky	63 313,00	248,00	0%
Čadca	Žilinský	91 392,00	497,00	1%
Púchov	Trenčiansky	44 594,00	273,00	1%
Žilina	Žilinský	155 329,00	1 231,00	1%
Kysucké Nové Mesto	Žilinský	33 250,50	290,00	1%
Dolný Kubín	Žilinský	39 514,50	421,00	1,07%
Topoľčany	Nitriansky	71 942,50	996,00	1,38%
Piešťany	Trnavský	63 115,50	879,00	1,39%
Trnava	Trnavský	129 470,50	1 838,00	1,42%
Ružomberok	Žilinský	57 652,50	829,00	1,44%
Senec	Bratislavský	71 023,50	1 038,00	1,46%
Turčianske Teplice	Žilinský	16 275,00	264,00	1,62%
Banská Bystrica	Banskobystrický	111 130,00	1 806,00	1,63%
Partizánske	Trenčiansky	46 814,00	805,00	1,72%
Prievidza	Trenčiansky	137 215,00	2 411,00	1,76%
Ilava	Trenčiansky	60 460,50	1 115,00	1,84%
Martin	Žilinský	97 149,50	2 027,00	2,09%
Bratislava	Bratislavský	416 489,00	8 702,00	2,09%
Myjava	Trenčiansky	27 291,00	678,00	2,48%
Hlohovec	Trnavský	45 722,00	1 207,00	2,64%
Nové Mesto nad Váhom	Trenčiansky	62 522,50	1 688,00	2,70%
Bánovce nad Bebravou	Trenčiansky	37 015,00	1 008,00	2,72%

District	Region	Number of inhabitants of the district (30.6.2013)	Absolute number of Roma in the region (estimated)	Percentage contribution of Roma inhabitants
Zlaté Moravce	Nitriansky	41 295,00	1 382,00	3,35%
Nitra	Nitriansky	159 900,50	5 361,00	3,35%
Žarnovica	Banskobystrický	26 860,00	966,00	3,60%
Banská Štiavnica	Banskobystrický	16 461,50	614,00	3,73%
Detva	Banskobystrický	32 796,50	1 277,00	3,89%
Nové Zámky	Nitriansky	143 300,00	5 715,00	3,99%
Senica	Trnavský	60 688,00	2 636,00	4,34%
Liptovský Mikuláš	Žilinský	72 592,00	3 244,00	4,47%
Skalica	Trnavský	46 828,00	2 327,00	4,97%
Galanta	Trnavský	93 625,50	4 668,00	4,99%
Humenné	Prešovský	64 007,00	3 381,00	5,28%
Žiar nad Hronom	Banskobystrický	47 964,00	2 702,00	5,63%
Malacky	Bratislavský	68 869,50	4 109,00	5,97%
Levice	Nitriansky	114 232,50	6 894,00	6,04%
Komárno	Nitriansky	103 841,00	6 404,00	6,17%
Dunajská Streda	Trnavský	117 643,00	7 415,00	6,30%
Snina	Prešovský	37 829,50	2 463,00	6,51%
Zvolen	Banskobystrický	68 991,50	4 533,00	6,57%
Šaľa	Nitriansky	53 019,50	3 757,00	7,09%
Stropkov	Prešovský	20 805,50	2 089,00	10,04%
Prešov	Prešovský	170 867,00	17 163,00	10,04%
Brezno	Banskobystrický	63 511,00	6 394,00	10,07%
Krupina	Banskobystrický	22 744,50	2 462,00	10,82%
Poprad	Prešovský	104 354,00	11 542,00	11,06%
Poltár	Banskobystrický	22 313,00	2 495,00	11,18%
Košice (mesto a okres okolie)	Košický	361 698,00	42 633,00	11,79%
Sobrance	Košický	22 839,50	2 730,00	11,95%
Veľký Krtíš	Banskobystrický	45 183,00	5 600,00	12,39%
Medzilaborce	Prešovský	12 314,50	1 530,00	12,42%
Svidník	Prešovský	33 118,50	4 412,00	13,32%
Bardejov	Prešovský	77 849,50	10 782,00	13,85%
Stará Ľubovňa	Prešovský	53 205,50	7 792,00	14,65%
Trebišov	Košický	106 113,50	18 173,00	17,13%
Michalovce	Košický	110 833,50	19 623,00	17,70%
Lučenec	Banskobystrický	74 614,50	13 339,00	17,88%
Levoča	Prešovský	33 408,00	6 000,00	17,96%
Sabinov	Prešovský	58 585,50	11 153,00	19,04%
Spišská Nová Ves	Košický	98 381,00	21 212,00	21,56%
Vranov nad Topľou	Prešovský	80 136,50	17 302,00	21,59%
Rožňava	Košický	63 130,50	14 337,00	22,71%
Gelnica	Košický	31 394,50	8 045,00	25,63%
Kežmarok	Prešovský	71 668,00	18 554,00	25,89%
Rimavská Sobota	Banskobystrický	84 800,50	23 970,00	28,27%
Revúca	Banskobystrický	40 281,50	12 718,00	31,57%
<b>Total</b>		<b>5 413 392,50</b>	<b>402 656,00</b>	<b>7,44%</b>

## Appendix B

### Questionnaire (structure and results)

The structure of questionnaire and its questions looked as follows:

*Dear Sir/Madam,*

*I would like to kindly ask you to fill out this questionnaire which serves the needs of my bachelor thesis which examines presence of discriminatory behaviour in housing markets in Slovakia.*

*The questionnaire is anonymous and the obtained data will be used only for the purpose of the thesis. In individual questions always check only one option that describes in best way your attitude.*

*Thank you in advance for time spent by filling it!*

1) *Your sex:*

- a) *Female*
- b) *Male*

2) *Your ethnic affiliation – nationality:*

- a) *Slovak*
- b) *Hungarian*
- c) *Roma*
- d) *Other*

3) *Which name from the options below signalizes the most that a person has Slovak not Roma ethnic affiliation? Which one the least? (Assign numbers from 1 to 4 to the options in the following way – the value „1“ is for the most Slovak sounding name, on the other side the value „4“ belongs to the name which you consider to be the most Roma sounding.)*

- a) *Milan*
- b) *Jozef*
- c) *Peter*
- d) *Martin*

- 4) Which surname from the options below signalizes the most that a person has Slovak not Roma ethnic affiliation? Which one the least? (Assign numbers from 1 to 4 to the options in the following way – the value „1“ is for the most Slovak sounding surname, on the other side the value „4“ belongs to the surname which you consider to be the most Roma sounding.)
- a) Balog
  - b) Kováč
  - c) Lakatoš
  - d) Slovák

Additional details regarding the questionnaire are summarized in bullet points below:

- Online available at <http://www.mojeanketa.cz/pruzkum/244969684/> (Slovak version)
- Filled by 165 anonymous respondents (the link was posted to some FB pages on 12th November 2015 and the results below are up-to-date to 21th November 2015)
- Results regarding ethnic affiliation of respondents:
  - 85,5% with Slovak nationality
  - 7,3% with Hungarian nationality
  - 3,6% with Roma nationality
  - 3,6% with other nationality
- Results regarding residence of respondents:
  - 20% of respondents comes from western part of Slovakia
  - 63,6% of respondents comes from middle part of Slovakia
  - 16,4% of respondents comes from eastern part of Slovakia
- Results regarding first name (3rd question) given preferences of respondents:
  - Martin (297 pts.)
  - Peter (363 pts.)
  - Milan (396 pts.)
  - Jozef (594 pts.)
- Results regarding surname (4th question) based on choice of respondents:
  - Slovák (219 pts.)
  - Kováč (342 pts.)
  - Balog (465 pts.)
  - Lakatoš (537 pts.)

Figure 4 - Graphical illustration of results - the choice of first names



Figure 5 - Graphical illustration of results - the choice of surnames



## Appendix C

### Version of texts of e-mail requests in original Slovak wording

In my experiment, the following text requests were used (original Slovak wording):

- Version 1:

*Dobrý deň,*

*Moje meno je ... . Na stránkach ... som objavil Váš inzerát, ktorý ma veľmi zaujal. Je táto ponuka stále aktuálna? Bolo by možné dohodnúť si deň prehliadky?*

*Vopred ďakujem za odpoveď.*

*Pekný deň!*

*...(meno a priezvisko)*

- Version 2:

*Dobrý deň,*

*Volám sa ... a mal by som záujem o Vašu nehnuteľnosť inzerovanú na webe ... . Ak je ponuka ešte stále aktuálna, je možnosť dohodnúť sa na dátume prehliadky?*

*Ďakujem.*

*S pozdravom a práním úspešného dňa!*

*...(meno a priezvisko)*

## Appendix D

### Description of all characteristics monitored throughout the experiment

In Table 11, all characteristics with their definition/description, which were monitored throughout the experiment and tracked to MS Excel, are summarized:

Table 11 - *Monitored characteristics and variables and their description*

Variable/Characteristics	Description
<i>Who should apply for? In which order?</i>	A number from 1 to 8 randomly generated by Excel (by function "RANDBETWEEN") to choose the senders of requests and their order (each number signalizes one line in the randomization table)
<i>Serial number</i>	A serial number of given ad ordered according to the time of request sent (every number appears twice since matched method is used)
<i>When was the offer added?</i>	Date when the offer was posted online
<i>Link</i>	Link to the website where the offer is (was) available
<i>Current</i>	Binary independent variable equal to 1 if the offer is up-to-date (the corresponding week - added/edited up to 7 days ago), 0 otherwise
<i>Month</i>	Binary independent variable equal to 1 if the offer is online for more than a week but less than 1 month, 0 otherwise
<i>Older</i>	Binary independent variable equal to 1 if the offer is online for more than 1 month, 0 otherwise
<i>Commune</i>	Name of a commune where the corresponding real estate is located
<i>District</i>	Name of a district where the corresponding real estate is located
<i>Romacontrib</i>	Contribution of Roma in the district (as a decimal value, not in %)
<i>Group1</i>	Binary independent variable equal to 1 if the corresponding real estate is located in a district from Group 1 (with Roma contribution less than 3% of the population of the district), 0 otherwise
<i>Group2</i>	Binary independent variable equal to 1 if the corresponding real estate is located in a district from Group 2 (with Roma contribution between 3% and 11%), 0 otherwise



<b>Variable/Characteristics</b>	<b>Description</b>
<i>Group3</i>	Binary independent variable equal to 1 if the corresponding real estate is located in a district from Group 3 (with Roma contribution more than 11% of the population of the district), 0 otherwise
<i>Rent</i>	Binary independent variable equal to 1 if the corresponding real estate is for rent, 0 otherwise (an ad intended to find a prospect for sale)
<i>House</i>	Binary independent variable equal to 1 if the corresponding real estate is a house, 0 otherwise (in case of a flat)
<i>Oldst</i>	Binary independent variable equal to 1 if it is a flat/house in old/original state, 0 otherwise (to some extent renovated or new)
<i>Msqprice</i>	Price for a square meter
<i>Owner_person</i>	Binary independent variable equal to 1 if the owner of the corresponding real estate is a private person, 0 otherwise (real estate agency)
<i>Owner's name</i>	Name of the owner/landlord if available
<i>Sex</i>	Sex of the owner/landlord if available (denoted by "F" or "M")
<i>Ethnicity (guessed if possible)</i>	Ethnic affiliation of the owner/landlord if available (if not, ".")
<i>Size</i>	Size of a flat/house in square meters
<i>1room</i>	Binary independent variable equal to 1 if it is a flat/house with 1 room, 0 otherwise
<i>2rooms</i>	Binary independent variable equal to 1 if it is a flat/house with 2 rooms, 0 otherwise
<i>3rooms</i>	Binary independent variable equal to 1 if it is a flat/house with 3 rooms, 0 otherwise
<i>4+rooms</i>	Binary independent variable equal to 1 if it is a flat/house with 4 and more rooms, 0 otherwise
<i>Roma</i>	Requesting identity (binary independent variable equal to 1 if the owner of e-mail address has a Roma sounding name (Jozef Balog/Milan Lakatoš), 0 otherwise (in case of the Slovak sounding name - if Martin Slovák/Peter Kováč is the sender of the request))
<i>Name of the applicant</i>	Name of the identity applying for a flat/house viewing
<i>Applicant_first</i>	Binary independent variable signaling the order of request using matched method of contacting owners/landlords - equals 1 if the request from corresponding sender was sent earlier/as the first one in given day (morning), 0 otherwise (the request sent later - afternoon/evening)

Variable/Characteristics	Description
<i>Email</i>	Binary independent variable equal to 1 if the request is sent directly from corresponding e-mail address, 0 otherwise (sent via specialized website)
<i>Version</i>	Binary independent variable equal to 1 if the version 1 of the email request for flat/house viewing is used, 0 otherwise (in case of the version 2)
<i>Date and time of sending the request</i>	Date and time when the request for flat/house viewing was sent
<i>Response</i>	Dependent variable characteristics equal to one in case of positive response, 0 in case of negative response and "." for missing values (no response - the choice between "0" and "." is made based on the factor <i>When was the offer added?</i> - see Section 5.3.5. for detail about conversion)
<i>Date and time of the response (in case of a response)</i>	Date and time when response to the request for flat/house viewing was sent

## Appendix E

### Average marginal effects for probit estimation (converted sample)

The STATA output of three-phase estimation of average marginal effects for probit regression (used for comparison with corresponding LPM parameters' estimates) based on estimating of modifications of equation (2) can be found below.

Figure 6 - Average marginal effects corresponding to "PROBIT1" estimates

```

Average marginal effects                Number of obs   =       336
Model VCE      : OIM

Expression   : Pr(response), predict()
dy/dx w.r.t. : roma
  
```

	Delta-method					
	dy/dx	Std. Err.	z	P> z	[95% Conf. Interval]	
roma	-.0947845	.0535137	-1.77	0.077	-.1996695	.0101005

Figure 7 - Average marginal effects corresponding to "PROBIT2" estimates

```

Average marginal effects                Number of obs   =       336
Model VCE      : OIM

Expression   : Pr(response), predict()
dy/dx w.r.t. : roma oldst rent rent_st owner_person email current month
  
```

	Delta-method					
	dy/dx	Std. Err.	z	P> z	[95% Conf. Interval]	
roma	-.0936779	.0505402	-1.85	0.064	-.1927349	.0053792
oldst	-.0572761	.0684761	-0.84	0.403	-.1914867	.0769345
rent	-.1683536	.0621069	-2.71	0.007	-.2900809	-.0466264
rent_st	.04303	.1347094	0.32	0.749	-.2209955	.3070556
owner_person	-.0792778	.0596956	-1.33	0.184	-.1962789	.0377234
email	.2488209	.0535118	4.65	0.000	.1439397	.3537022
current	-.10511	.0780695	-1.35	0.178	-.2581233	.0479034
month	-.1954188	.0776208	-2.52	0.012	-.3475527	-.0432849

Figure 8 - Average marginal effects corresponding to "PROBIT3" estimates

```

Average marginal effects          Number of obs   =       336
Model VCE      : OIM

Expression   : Pr(response), predict()
dy/dx w.r.t. : roma oldst rent rent_st owner_person email current month group1 group2
    
```

	Delta-method				[95% Conf. Interval]	
	dy/dx	Std. Err.	z	P> z		
roma	-.0941985	.0499277	-1.89	0.059	-.192055	.0036581
oldst	-.0862812	.0683376	-1.26	0.207	-.2202204	.047658
rent	-.1566441	.0621895	-2.52	0.012	-.2785333	-.034755
rent_st	.1126266	.1346826	0.84	0.403	-.1513465	.3765997
owner_person	-.0917217	.0605054	-1.52	0.130	-.2103101	.0268667
email	.2497292	.0528506	4.73	0.000	.146144	.3533144
current	-.1101863	.0776622	-1.42	0.156	-.2624015	.0420289
month	-.2178793	.0778299	-2.80	0.005	-.3704231	-.0653356
group1	-.1608584	.0655807	-2.45	0.014	-.2893941	-.0323226
group2	-.009889	.0651607	-0.15	0.879	-.1376016	.1178235