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Rental housing discrimination and the persistence of ethnic enclaves^{*}

Mariano Bosch, M. Ángeles Carnero and Lidia Farré^{**}

Abstract

We conduct a field experiment to show that discrimination in the rental market represents a significant obstacle for the geographical assimilation process by immigrants. We employ the Internet platform to identify vacant rental apartments in different areas of the two largest Spanish cities, Madrid and Barcelona. We send emails showing interest in the apartments and signal the applicants' ethnicity by using native and foreign-sounding names. We find that, in line with previous studies, immigrants face a differential treatment when trying to rent an apartment. Our results also indicate that this negative treatment varies considerably with the concentration of immigrants in the area. In neighbourhoods with a low presence of immigrants the response rate is 30 percentage points lower for immigrants than for natives, while this differential disappears when the immigration share reaches 50%. We conclude that discriminatory practices in the rental housing market contribute to perpetuate the ethnic spatial segregation observed in large cities.

Keywords: immigration, discrimination, spatial segregation.

JEL Classification: J15, J61.

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1 Introduction

Upon arrival to a new country immigrants often settle in segregated neighborhoods. Ethnic networks are useful to find a job and facilitate the adjustment to the new society (Bartel 1989; Zavodny 1997; Jaeger 2000; Bauer et al. 2002, 2005). As the newcomers or their descendants assimilate - find a steady job, accumulate some wealth and form families - they may be willing to move out of the ethnic enclave. A different address in a less segregated neighborhood may signal that the immigrant family has improved economically and socially. However, a well-established empirical regularity is that immigrants in advanced societies tend to live spatially concentrated within large cities (Bartel 1989; Borjas 1998).

The most common theories to explain the formation of ethnic enclaves are based on the fact that immigrants prefer living near people with similar tastes and who speak the same language (Cutler et al. 1999). Hence, the concentration of immigrants in particular areas is demand driven. However, it has also been suggested that the native's behavioral response towards immigration may contribute to the surge of ethnic enclaves (Card et al. 2008 and Saiz and Wachter 2011). The literature has identified two main mechanisms. First, natives may be willing to move to all-native neighborhoods and pay a premium to avoid immigrants (decentralized discrimination). Second, natives can find ways to effectively restrict immigrant location choices to certain areas (centralized discrimination).

This paper investigates the role of rental housing discrimination for the persistence of ethnic enclaves. To isolate the effect that discriminatory practices have in determining residential sorting we conduct a field experiment where native and immigrant candidates apply to vacant rental apartments announced on the Internet in the two largest Spanish cities, Madrid and Barcelona. We employ Moroccan and Spanish-sounding names in the applications to signal the ethnicity of the candidate.¹ We then compare the response rate differentials between the two groups across areas with different concentration of immigrants to identify the extent to which rental housing discrimination represents a barrier for the geographical assimilation process.

Our results uncover a significant negative correlation between the immigration share in a particular neighborhood and the degree of discrimination against Moroccan applicants. That

¹By nationality the most numerous groups of immigrants come from Romania (14.2%), Morocco (12.7%), Ecuador (7.4%) and Colombia (5.2%). Source: Spanish Statistical Office, Local Population Registry, 2009. We restrict our analysis to Moroccan immigrants as their names, as opposed to those of Ecuadorians and Rumanians, are clearly distinguishable from those of natives.

is, discrimination against immigrants is particularly intense in areas where there are very few immigrants. In particular, the response rate to applications signed with a Moroccan-sounding name is, on average, 18 percentage points lower than to those signed by natives. However, in all-natives neighborhoods this differential would increase up to 30 percentage points. As the share of immigrants increases the differential treatment decays. Accordingly where this share is around 50%, immigrants and natives have the same probability of being contacted.² This result is robust to the inclusion of flat and applicant's socioeconomic characteristics. While we do not claim that discriminatory practices are behind the creation of ethnic enclaves, our evidence strongly suggests that discrimination in the rental market can perpetuate the spatial ethnic segregation pattern observed in large cities.

The bulk of previous studies on ethnic enclaves and segregation have been conducted in the US. A recent study by Cutler et al. (2008) examines the residential integration of the foreign born between 1910 and 2000. Using decennial census data they document that segregation declined in the first part of the century, but has been rising over the past few decades. They argue that the increase responds mainly to two forces: First, recent immigrants arrive from countries with greater cultural distinction from the US natives and thus a higher propensity to segregate. Second, the rise of low-density suburban residence and employment areas forces socially and economically marginalized groups to live close to the public transit grid or potential carpool-mates. In addition, Saiz and Wachter (2011) document that natives have preferences for avoiding immigrant areas and are willing to pay a premium to live in predominantly native neighborhoods.³ Card et al. (2008) provide further support for the view that segregation is driven at least in part by preferences of white families over the racial and ethnic composition of neighborhoods. They show that when the minority share in the neighborhoods exceeds a certain level, which ranges between 5% and 20% (i.e. the tipping point), all the white families leave.

Native preferences for spatial ethnic segregation or the so called "white flight" can be viewed as a form of discrimination in highly mobile societies where residents are willing to change neighborhood as the minority population increases. However, in societies less prone to geographical

²Similar results are obtained when the share of all immigrants is replaced by the share of only Moroccan immigrants.

³Saiz and Wachter (2011) find that within metropolitan areas increases in a neighborhood's immigrant share are associated with lower housing price appreciation.

mobility, like Spain, negative attitudes toward the minority group may lead to other discriminatory practices that range from charging immigrants higher housing prices to limiting their housing search to specific areas.

A number of papers have used housing price differentials to measure the extent of discrimination (see for example Bailey 1966, Yinger 1978 or Chambers 1992). While in the 1960s there was evidence that African-Americans paid more for equivalent housing in US cities and metropolitan areas, this premium had entirely disappeared by 1990. Another approach to quantify the extent of discrimination is based on experimental audit studies to test the behavior of real estate and rental agents. These studies suggest some degree of discrimination against Hispanics in terms of the quality, price and quantity of housing units offered (Yinger 1995).

In this paper we examine the extent to which natives are able to impose barriers to the geographical assimilation of immigrants by limiting the supply of rental housing units. The use of the Internet platform has become very popular to buy, sell or rent housing units. Advertising on the Internet is usually free of charge and candidates can contact the property owners by responding to the ad at no cost. Renters and sellers can then decide whether to provide additional information or invite the potential candidate to a showing. Note that discrimination in this context is costless as property owners are not obliged to respond emails and thus differential treatment cannot be proved or reported to the authorities.

The Internet platform has been employed in previous investigations to uncover the presence of discriminatory practices in the rental market (Ahmed and Hammarstedt 2008; Ahmed et al. 2010 and Bosch et al. 2010). These studies find evidence of a substantial amount of discrimination against immigrants, which does not disappear even when the candidates signal a high ability to pay the rent. Our contribution here is to show that rental housing discrimination complicates the geographical assimilation process of immigrants and thus contributes to the persistence of ethnic enclaves.

The paper is organized as follows. The next section describes the geographical concentration of immigrants in Spain, section 3 describes the experimental setup, section 4 discusses our main results and some conclusions follow in section 5.

2 The geographical concentration of immigrants

The immigration episode in Spain began in the late 1990's. Over a period of 10 years the share of foreign born population shifted from 3% to 14%. While the labor market impact of this supply shock has been found to be negligible, the immigration episode radically reshaped the ethnic composition of Spanish regions and cities.⁴

Immigrants are unevenly distributed across Spain. Regions in the Mediterranean coast, the Canary and Balearic Islands and the province of Madrid have received the bulk of immigration. Economic reasons and network effects seem to be responsible for this regional concentration (Farré et al. 2009). In those regions immigrants are more likely to be in urban than in rural areas and within cities the degree of geographical segregation is substantial (Fernández-Huertas et al. 2009).

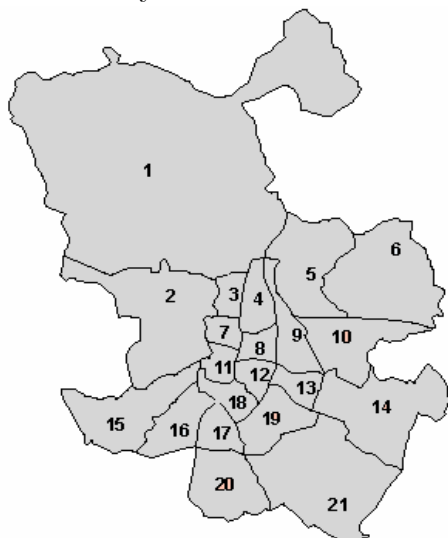
In this paper we study the concentration of immigrants in the two major Spanish cities, Madrid and Barcelona. These cities concentrate the 16% of the foreign born population in Spain in 2008. Further both cities have experienced a large increase in the share of immigrants (i.e. from 5% in 2000 to 20% in 2008). Interestingly, within cities there are large variations in immigrant concentration across neighborhoods. Figures 1 and 2 display the immigration share in the different census districts in Madrid and Barcelona for 2000 and 2008.⁵ Immigrants are substantially overrepresented in some areas. For example, in downtown Madrid the share of immigrants in 2008 was 31%, while it was less than 15% in the residential areas located in the north of the city (see Figure 1). Differences in immigrant concentration across districts are even more pronounced in Barcelona (see Figure 2).

Spain hosts immigrants from a variety of ethnic origins. The bulk of the immigration flow, however, comes from Latin America (30%), Eastern Europe (20%) and North Africa (13%). Because we employ the soundness of the name to signal ethnicity, our experimental study focuses only on Moroccan immigrants whose names are clearly distinguishable from those of natives. Given the geographical proximity between Morocco and Spain, this group already represented

⁴Several studies analyze the economic impact of immigration in Spain and find no significant effect on the wages and employment opportunities of natives (González and Ortega 2011; Carrasco et al. 2008).

⁵There are 10 census districts in Barcelona and 21 in Madrid. The census districts are geographical subdivisions created for the collection of statistical data. Their average population size is 155,780 inhabitants, with a standard deviation of 56,569, a minimum of 43,951 and a maximum of 265,866. Source: Spanish Local Population Registry.

Figure 1: Immigrant share by census districts in Madrid (2000-2008)



	All immigrants 2000	All immigrants 2008	Moroccan immigrants 2008	Rental prices (m^2) 2008
(1) Fuencarral	4.92	13.05	1.71	10.5
(2) Moncloa	5.98	16.09	0.74	12.3
(3) Tetuán	7.65	25.39	0.57	13.0
(4) Chamartín	7.20	16.07	0.60	14.2
(5) Hortaleza	4.82	15.14	0.66	12.3
(6) Barajas	5.09	15.39	1.63	11.2
(7) Chamberí	6.86	18.33	0.68	15.2
(8) Salamanca	6.88	17.89	0.84	15.9
(9) Ciudad Lineal	5.78	21.06	0.64	12.3
(10) San Blas	3.33	16.36	0.94	11.7
(11) Centro	11.92	31.43	1.08	16.8
(12) Retiro	4.73	12.58	0.84	13.9
(13) Moratalaz	3.20	13.18	1.36	10.4
(14) Vicálvaro	3.62	17.87	0.55	9.7
(15) Latina	4.37	21.17	0.70	11.0
(16) Carabanchel	4.89	25.22	0.64	11.3
(17) Usera	4.15	25.47	2.39	10.5
(18) Arganzuela	5.95	19.08	1.75	13.1
(19) Puente de Vallecas	3.60	20.89	1.14	11.1
(20) Villaverde	3.76	25.34	0.52	10.3
(21) Villa de Vallecas	2.94	17.77	1.11	10.6

Figure 2: Immigrant share by census districts in Barcelona (2000-2008)



	All immigrants 2000	All immigrants 2008	Moroccan immigrants 2008	Rental prices (m^2) 2008
(1) Ciutat Vella	14.81	47.26	3.55	15.3
(2) Eixample	5.71	20.59	0.56	15.1
(3) Sants-Montjuïc	4.82	21.73	1.42	13.2
(4) Les Corts	5.20	14.73	0.46	14.3
(5) Sarrià-Sant Gervasi	6.25	15.08	0.34	14.1
(6) Gràcia	5.08	18.20	0.54	13.3
(7) Horta-Guinardó	3.26	14.92	0.62	12.1
(8) Nou Barris	2.86	18.10	1.01	11.3
(9) Sant Andreu	3.17	15.21	1.01	11.9
(10) Sant Martí	3.62	17.01	0.92	14.7

a substantial share of the foreign born population at the beginning of the immigration boom. By 2008, they were still one of the most popular minority groups accounting for almost the 13% of all immigrants. Their spatial distribution pattern does not exhibit important differences relative to that of other groups. According to the results in Fernández-Huertas et al. (2009) the dissimilarity index at the metropolitan area level oscillates between 0.3 and 0.5 for Moroccans, Ecuadorians and Rumanians during the whole immigration episode. The tables accompanying Figures 1 and 2 also display the share of Moroccan immigrants by census districts in 2008. While their concentration pattern seems to follow that of other groups, they are overrepresented in downtown Barcelona and the Usera district in Madrid.

The literature has identified several factors that may be responsible for the existence of ethnic enclaves. Recent immigrants choose to live in areas with a larger concentration of people from their same country of origin. If the supply of houses in those areas is limited, rental prices will raise in response to an immigration shock (Saiz 2007). Column (4) in the tables below Figures 1 and 2 suggests that immigrants are indeed concentrated in expensive neighborhoods.⁶ As immigrants assimilate and become less dependent of their ethnic network, they could move to cheaper neighborhoods. In the absence of geographical barriers one would expect a negative relationship between rental prices and years since arrival to the country (Cutler et al. 2008). Figure 3 examines this possibility using data from the Spanish National Immigrant Survey, 2007.⁷ The figure displays the coefficients obtained from regressing the monthly rent on a set of dummy variables indicating years of residence in the country. Most of those coefficients are not statistically significant, suggesting that immigrants do not tend to move to cheaper neighborhoods.⁸

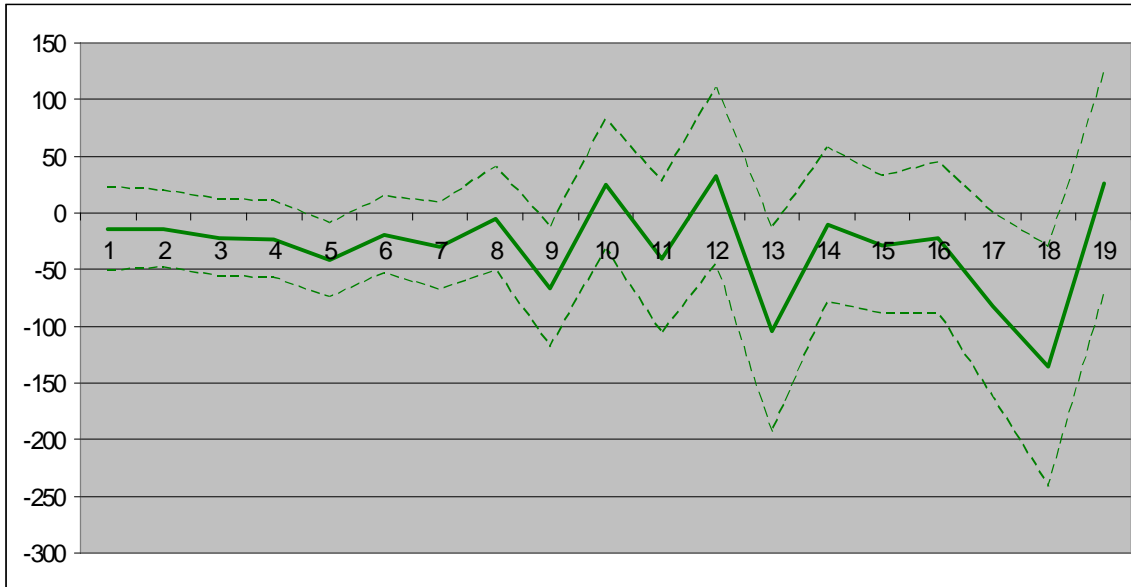
The high concentration of immigrants in certain areas and the high premium they seem to pay for it may respond to the existence of natives' preferences for non-integrated neighborhoods. Some studies suggest that natives' animosity against immigration goes beyond its economic impact (Dustman and Preston 2007; Mayda 2006). After all, most of the effects of immigration can also be attributed to international trade, outsourcing or off-shoring. The singularity of

⁶Rental prices in 2008 are obtained from the website used to conduct our experiment (www.idealista.com).

⁷The Spanish National Immigrant Survey collects information about the socioeconomic characteristics of a representative sample of immigrants living in Spain in 2007. The survey is conducted by the Spanish Statistical Office (INE, www.ine.es).

⁸We run the same regression using only the sample of Moroccans in the National Immigration Survey and obtain similar results.

Figure 3: Rental price and years in the country



Source: Spanish National Immigrant Survey (2007). The figure displays the coefficients obtained from regressing the monthly rent on a set of dummy variables indicating years of residence in the country. The dashed lines represent the confidence interval at 5% level of significance. The dependent variable of the regression is rental price per month, other regressors included are a set of socioeconomic variables regarding the household head (gender, age, Spanish nationality, region of birth), numbers of rooms, number of people in the household and province of residence.

immigration is the physical presence of foreigners in the host country. Accordingly natives may view immigrants not only as a threat to their labor market prospects but also to the country's cultural and social life. We find support for this conjecture in the "Attitudes towards Immigration" supplement of the European Social Survey, 2008. Figure 4 plots the distribution of natives' opinions towards immigrants in terms of their economic (short dashed line) and cultural (long dashed line) impact. The distribution of responses suggests that a substantial fraction of the population fears the economic consequences of immigration, but also that a non negligible one thinks that immigration tends to undermine a country's cultural life. The solid line indicates that natives' support to immigration is limited as a non-trivial fraction of them thinks that immigrants have made of Spain a worse rather than a better place to live.

By reducing the supply of rental housing units available to immigrants natives can effectively block their entrance to certain areas. Next we examine the presence of this type of discrimination and its contribution to the persistence of ethnically segregated neighborhoods.

3 Experimental Design

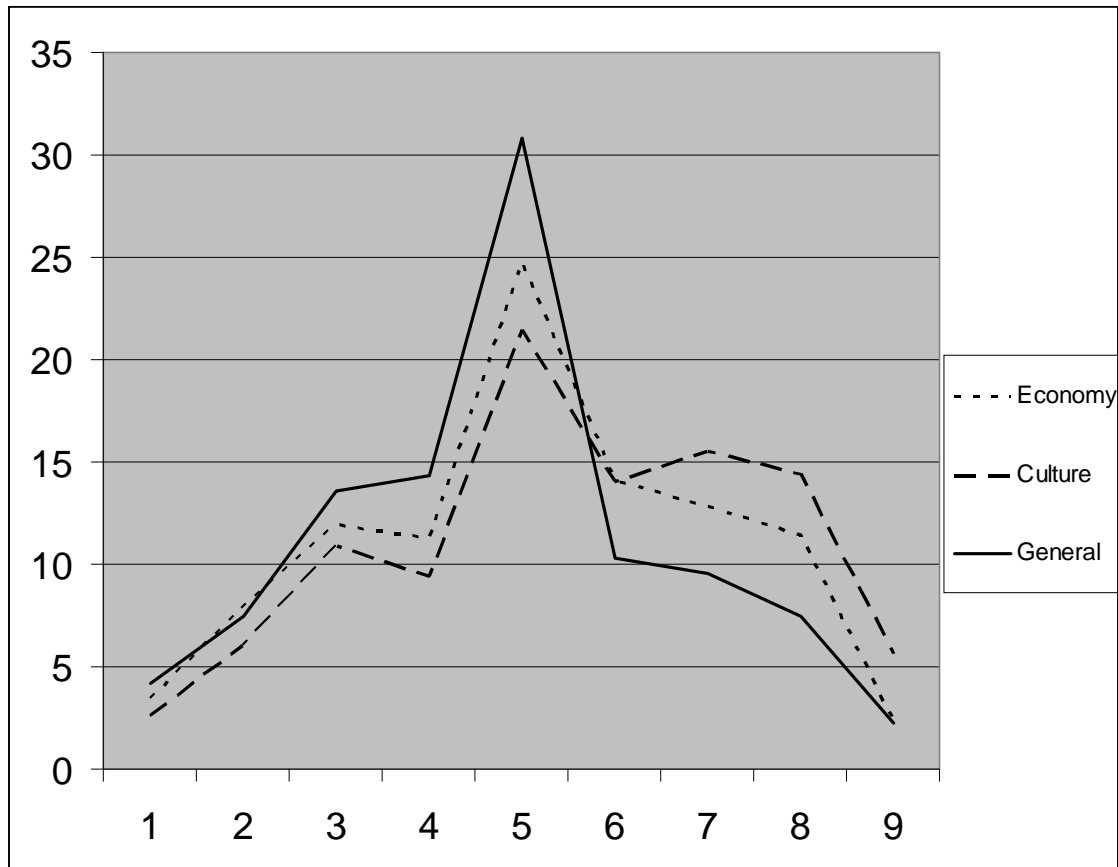
Our experimental approach is similar to that in other studies that have attempted to identify discrimination in the rental housing market (Ahmed and Hammarstedt 2008; Ahmed et al. 2010 and Bosch et al. 2010). Next we briefly summarize our strategy and highlight the main differences with respect to previous studies.

We use the email correspondence testing method to examine the chances of natives and immigrants to rent a flat in areas with different concentration of foreign born population. Written applications are sent to rental vacant apartments advertised on *www.idealista.com*, which is the leading real estate website in Spain.⁹ On this platform, private owners and real estate agencies can advertise properties for sell or rent. For private owners, the first ad is free of charge. Fees for agencies start at a minimum of 79 Euros per month. In contrast, individuals interested in a particular housing unit can send an electronic application containing the name, email address and a short message at no cost.

In our experimental setup, the potential tenants applied to all rental ads published by

⁹According to this website almost 50% of people in Spain use the Internet to search for housing. Popular press such as The New York Times, The Telegraph, The Wall Street Journal and The Washington Post, identifies *idealista.com* as the biggest Spanish online property advertising site (<http://www.idealista.com/pagina/ranking>).

Figure 4: Attitudes toward immigration



Note: The figure plots the distribution of natives' opinions towards immigrants in terms of their economic and cultural impact. The data come from the "Attitudes towards Immigration" supplement of the European Social Survey 2008. The questions are:

- Economy: Would you say it is generally bad or good for Spain's economy that people come to live here from other countries? The answer is in a scale from 0 (Bad for the economy) to 10 (Good for the economy)

- Culture: Would you say that Spain's cultural life is generally undermined or enriched by people coming to live here from other countries? The answer is in a scale from 0 (Cultural life undermined) to 10 (Cultural life enriched)

- General: Is Spain made a worse or a better place to live by people coming to live here from other countries? The answer is in a scale from 0 (Worse place to live) to 10 (Better place to live)

private owners on *idealista.com* between December 2009 and June 2010. For each housing unit, the site contains information on the rental price per month, the exact address, the number of rooms, the size in squared meters and, in most cases, the name and, therefore, the gender of the person placing the ad. Each week, we collected information on available flats on Tuesdays and sent the applications on the next day. One week later we recorded whether emails sent by the fictitious applicants received a response. Those candidates invited to visit the apartment or to provide additional information politely declined the invitation.

Common native and Moroccan-sounding names are used to signal the ethnicity of the candidate. Based on name frequency data provided by the Spanish National Statistics Office (*www.ine.es*), we select the most popular Spanish male names (Manuel, Antonio, José and Juan) and female names (Ana, Isabel, Carmen and María) and the four most common Spanish surnames (García, González, Fernández and Rodríguez). We also use the most common Moroccan names for males in Spain (Mohamed, Ahmed, Rachid and Youssef), the most common for females (Rachida, Aicha, Naima and Khadija) and the four most common Moroccan surnames (El Idrissi, Mohamed, Saidi and Serroukh).

Applicants use email accounts which have been created from 3 different providers: gmail, hotmail and yahoo. For example: *carmen.garcia1969@yahoo.com*; *mohamed_ahmed@gmail.com* or *rachidamohamed22@hotmail.com*.

Previous studies show that information about the socioeconomic characteristics of the candidates affect discriminatory practices. Accordingly, we send emails containing different amount of information about the occupation of the candidate. We consider two types of candidates: (1) an applicant who sends an email showing interest in the flat and without any information other the name; (2) an applicant whose email contains information about his/her highly reliable job and therefore represents the ideal tenant for property owners (i.e. university professor or banking clerk).

Our fictitious applicants sent the Spanish version of the following emails:

No information

“Hello,

I am interested in renting this apartment. I would be very grateful if you contacted me.

Thank you. NAME”

High-paying occupation

“Hello,

I am interested in this flat. I work as a financial analyst for a bank (La Caixa/Caja Madrid). I have recently moved to the city (Barcelona/Madrid) and I am looking for a flat where to live for at least a couple of years. I would be happy to provide a financial guarantee. Please contact me if interested. Many thanks. NAME”

Or alternatively:

“Hello,

I am a Professor at the Department of Political Science of the University (Pompeu Fabra/Carlos III de Madrid). I have been living in the city (Barcelona/Madrid) for a couple of years and I would like to find a new apartment. I have a permanent contract with the University. I am very interested in your flat and I would be very grateful if you could contact me. Best regards. NAME”.

We create eight types of fictitious applicants: a Moroccan and a native, male and female, candidates who do not provide information about their socioeconomic status, and four more candidates (Moroccan and native, male and female) with information about their occupations. We use a random assignment procedure, where each vacant apartment is contacted by only one of the eight applicants.¹⁰ We apply to 1186 apartments, and each type of applicant applied, approximately, to 150 apartments.

The focus of this paper however is not on the average discrimination that immigrants are subject to, but on how discrimination varies across neighborhoods with different concentration of immigrant population. From the Internet platform we obtain the complete address where each vacant flat is located.¹¹ We match this information with the geographical concentration of immigrants obtained from the Spanish Local Population Registry.¹² In particular, we employ

¹⁰Hence we follow the methodology used by Ahmed et al. (2010). Alternatively, we could have used a matching procedure as in Bosch et al. (2010), where all property owners receive inquiries from all applicants.

¹¹The websites used in previous studies to investigate rental market discrimination do not contain the address of the housing units, hence it is not possible to conduct the type of analysis that we propose here.

¹²The Registry is conducted at the municipality level and it provides a very accurate measure of immigrant

two levels of spatial disaggregation at the city level: the census district and the ZIP or postal code, being the latter a more disaggregated spatial subdivision.¹³ Barcelona and Madrid add up to 31 census districts and 70 ZIP codes.

The randomness in our experimental design ensures that both immigrants and natives apply on average to similar apartments and hence, the differential treatment that we observed is only attributable to the soundness of names. Tables A1 and A2 in the Appendix provide evidence on the validity of our randomization exercise. These tables present the mean differences (and standard errors) in flat characteristics between rental units contacted by natives and immigrants. We do not find any systematic differences in the type of flats that the two groups apply for.¹⁴

4 Results

Table 1 presents the descriptive statistics of our experimental exercise. The first column shows that the response rate for natives is almost 20 percentage points higher than for Moroccans. Interestingly, as in previous studies (Ahmed et al. 2010 and Bosch et al. 2010), discrimination presents a clear gender pattern against males. Compared to their native counterparts their response rate is 25 percentage points lower, while it is 10 points lower for females. The table also suggests that the response rates increase when positive information about the socioeconomic status of the applicant is revealed. Finally, there is evidence that this information reduces the response rate differential between natives and immigrants, from 23.6 percentage points for those applicants without information to 15.45 for those in high-paying occupations.

The main result of the paper is illustrated in Figure 5. We plot, by ZIP code, the differential response rate in favor of natives against the share of immigrants in that particular ZIP code.

concentration, including undocumented immigrants. The reason is that registration is required in order to have access to public healthcare and education, but also to be eligible in the event of an amnesty. The process of registration does not require proof of legal residence and the data are confidential (that is, cannot be used to expel undocumented migrants). Thus immigrants have strong incentives to register.

¹³While census districts are geographical subdivisions with statistical purposes, ZIP or postal codes are smaller geographical areas designed to facilitate the postal service. Their average population size is 4,198 inhabitants, with a standard deviation of 9,647, a minimum of 1 and a maximum of 116,455. Source: Spanish Local Population Registry.

¹⁴Similar results are found at the ZIP code level.

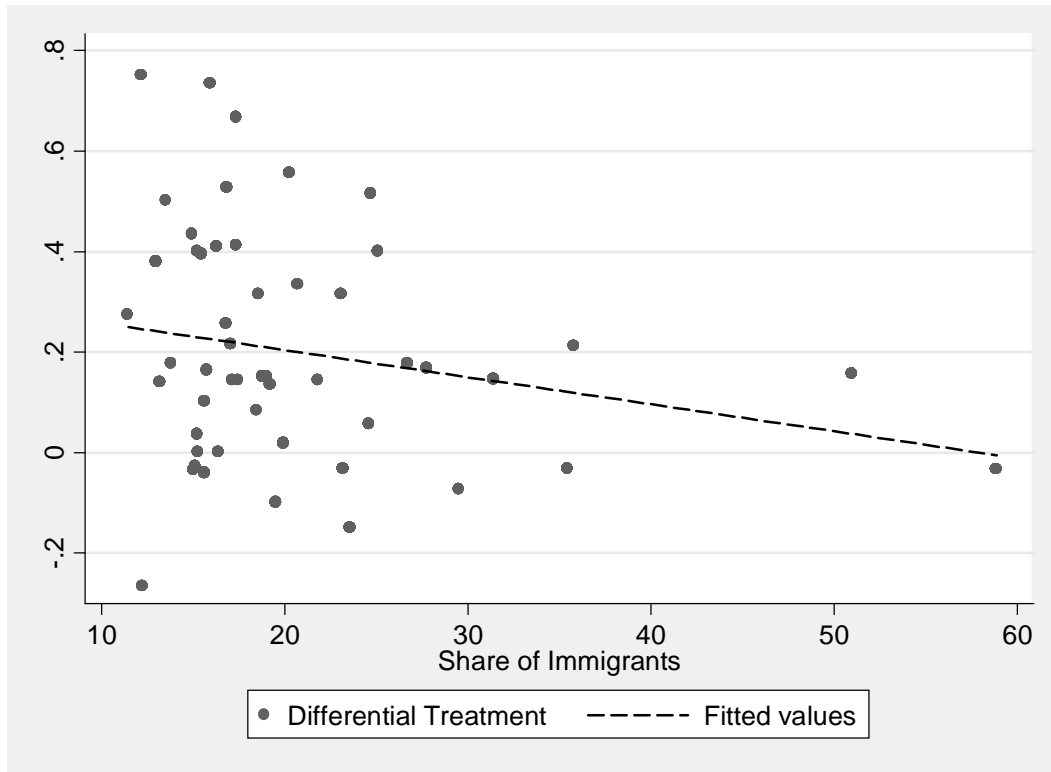
Table 1: Descriptive Statistics

	All	Males	Females	No information	High paying occupation
Natives	71.83% ^(a)	72.85%	70.81%	65.48%	74.94%
N. obs.	600 ^(b)	302	298	197	403
Immigrants	53.75%	46.74%	60.68%	41.88%	59.49%
N. obs.	586	291	295	191	395

(a): Percentage of applicants that receive an email back from the renter.

(b): Number of emails sent.

Figure 5: Difference in response rates and ethnic segregation



Note: The horizontal axis displays the share of immigrants at the ZIP code level constructed from the Registry data. The vertical axis displays the differential treatment in favor of natives at the ZIP code level defined as the percentage of emails answered to native applicants minus the percentage of emails answered to foreign candidates. The line corresponds to a regression of the difference in response rates on the share of immigrants weighted by number of observations at the ZIP level.

Positive numbers in the y-axis indicate that emails signed with a native-sounding name obtain a higher response rate than those signed with a foreign-sounding one. The figure also displays the fitted values from regressing the response rate differential on the share of immigrants, weighted by number of observations at the ZIP level. Although, arguably, there is some noise in the data, a negative relationship emerges, indicating that as the share of immigrants increases in a particular area rental housing discrimination decreases. This evidence suggests that while many factors are likely to be responsible for the geographical concentration of immigrants, the presence of artificial barriers to their mobility may contribute to the persistence of ethnic enclaves in large cities.

We next estimate a set of econometric models to investigate the statistical significance of the previous evidence. Let us first discuss the results for our baseline discrimination model. Following previous studies we run a regression to estimate the probability of being contacted as a function of a set of socioeconomic characteristics including the applicant’s ethnicity:

$$C_i = \beta_0 + \beta_1 \text{Img}_i + \beta_2 \text{Fem}_i + \beta_3 \text{Info}_i + \beta_4 (\text{Fem}_i \times \text{Img}_i) + \beta_5 (\text{Info}_i \times \text{Img}_i) + \beta_6 (\text{Fem}_i \times \text{Info}_i \times \text{Img}_i) + u_i$$

where C_i is an indicator variable that takes value 1 if the applicant is contacted and 0 otherwise; Img_i is an indicator that takes value 1 if the email is signed with a foreign-sounding name; Fem_i takes value 1 for females and Info_i is a dummy variable equals to 1 if information about the applicant’s occupation is provided in the email. The model also includes interactions between the immigrant indicator, and the gender and information variables to unveil patterns of discrimination along those dimensions. Finally, u_i is an error term that given the experimental nature of our setup can be assumed to be uncorrelated with the explanatory variables.

Table 2 displays the estimates of the baseline model. The first column shows the raw level of discrimination, where the dependent variable in the previous equation is regressed only on the immigrant indicator. Accordingly an email signed with a Moroccan-sounding name has 18 percentage points lower probability of getting and answer than an email signed with a native-sounding one. Column (2) shows the results for the same regression but including flat characteristics, such as price per squared meter, number of rooms and city fixed effects. Given the experimental nature of our data is not surprising that our results are unaffected by the inclusion of these controls. In column (3) we include as additional regressors the gender dummy and its interaction with the immigrant indicator. The coefficient on this interaction is

Table 2: Baseline discrimination

	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Img}_i (\beta_1)$	-0.181*** (0.028)	-0.171*** (0.027)	-0.249*** (0.038)	-0.304*** (0.054)	-0.224*** (0.042)	-0.202*** (0.044)
$\text{Fem}_i (\beta_2)$			-0.018 (0.036)	-0.017 (0.036)	-0.017 (0.036)	-0.017 (0.036)
$\text{Fem}_i \times \text{Img}_i (\beta_4)$			0.155*** (0.054)	0.156*** (0.053)	0.156*** (0.053)	0.111*** (0.060)
$\text{Info}_i (\beta_3)$					0.088** (0.039)	0.088** (0.039)
$\text{Info}_i \times \text{Img}_i (\beta_5)$					0.080 (0.057)	0.150** (0.069)
$\text{Fem}_i \times \text{Info}_i \times \text{Img}_i (\beta_6)$						-0.139* (0.082)
Constant (β_0)	0.718*** (0.018)	0.729*** (0.099)	0.745*** (0.101)	0.683*** (0.105)	0.772*** (0.101)	0.776*** (0.101)
Flat characteristics		X		X		
N. observations	1186	1186	1186	1186	1186	1186
R^2	0.035	0.104	0.114	0.132	0.131	0.133

Flat characteristics include price per squared meter, number of rooms and city fixed effects.

The estimates correspond to a linear probability model.

*, **, ***: Significant at 10%, 5% and 1% respectively.

positive, large in magnitude and highly significant. The point estimate indicates that female immigrants are 15 percentage points more likely to be contacted than their male counterparts. This is evidence of the large penalty that male immigrants face in the rental housing market. Column (4) estimates the same model including flat characteristics and, as expected, the results are unaffected.

Next we study how the discriminatory behavior changes with the amount of information disclosed in the application. The model in column (5) contains as additional regressors the information dummy and its interaction with the immigrant indicator to capture differences in the response rate between “high-quality” candidates and those who do not provide any information about their socioeconomic status. According to our estimates candidates signaling a high-paying occupation are 8 percentage points more likely to be contacted than those who do not report any information about their jobs. The interaction of this variable with the immigrant indicator suggests the presence of some additional informational premium for immigrants of around 8 percentage points, which is statistically insignificant. However when this informational premium is interacted with the gender indicator (see column (6)), the returns to information becomes positive and statistically significant for male immigrants.¹⁵ Note that despite this positive premium information does not eliminate the difference in response rate between natives and immigrants.

In all, the results in table 2 confirm the previous findings in the literature. Agents in the rental market use the informational content of names to differentially treat immigrants. This differential treatment is substantially larger for males and it does not disappear when information about the socioeconomic status of the candidate is revealed. This last result indicates that either information other than the socioeconomic status is relevant for the property owners or that negative attitudes towards immigrants are behind the substantial amount of discrimination observed in the rental market.¹⁶

Table 3 explores discriminatory practices across neighborhoods with different concentration of immigrants. Column (1) displays the estimates of the model for the raw level of discrimination including as additional regressor the share of immigrants at the ZIP code level ($ZIP-Imm-Share_i$) interacted with the immigrant indicator. The results indicate that in all-native areas

¹⁵While β_5 captures the returns to information for male immigrants, $\beta_5 + \beta_6$ captures the returns for females, which according to our point estimates are approximately 0.

¹⁶See Bosch et al. (2010) for a deeper discussion about the effect of information on discrimination.

Table 3: Discrimination and immigrant concentration. Evidence at the ZIP code level

	(1)	(2)	(3)	(4)	(5)	(6)
Img_i	-0.304*** (0.048)	-0.308*** (0.062)	-0.448*** (0.097)	-0.282*** (0.061)	-0.349*** (0.074)	-0.365*** (0.080)
$ZIP-Img-Share_i \times Img_i$	0.549*** (0.172)	0.576** (0.237)	1.232** (0.468)	0.510** (0.234)	0.555** (0.221)	0.625*** (0.229)
$ZIP-Img-Share_i \times Img_i \times Fem_i$						-0.001 (0.003)
$ZIP-Img-Share_i \times Img_i \times Info_i$						-0.000 (0.003)
Fem_i					-0.032 (0.040)	-0.032 (0.040)
$Fem_i \times Img_i$					0.173*** (0.055)	0.180** (0.090)
$Info_i$					0.090** (0.043)	0.090** (0.043)
$Info_i \times Img_i$					0.094* (0.055)	0.060 (0.097)
Constant	0.718*** (0.016)	0.658*** (0.034)	0.720*** (0.017)	1.223*** (0.117)	1.339*** (0.112)	1.334*** (0.111)
ZIP fixed effects		X	X	X	X	X
Flat characteristics				X	X	X
N. observations	1186	1186	938	1186	1186	1186
R^2	0.042	0.112	0.051	0.175	0.203	0.203

Flat characteristics include price per squared meter, number of rooms and city fixed effects.

The estimates correspond to a linear probability model where the standard errors are clustered by ZIP code level.

*, **, ***: Significant at 10%, 5% and 1% respectively.

immigrants are on average 30 percentage points less likely to be contacted than natives. However this differential decreases as the presence of immigrants in the area increases. In particular, a 10 percentage points increase in the immigration share at the ZIP code level increases the chances of being contacted (relative to those of natives) by 5.5 percentage points. Accordingly discrimination will disappear in areas where the concentration of immigrants is around 50%.

The remaining columns in table 3 investigate the robustness of the previous result. Column (2) adds ZIP code fixed effects to control for unobserved characteristics that may affect the probability of being contacted. However, due to the experimental nature of our design the results are unaltered. Column (3) investigates the effect of outlier observations. According to Figure 5 one could think that our results are driven by those extreme values. We estimate the model excluding the observations at the top and bottom 10% of the immigrant share distribution. While the relationship between discrimination and immigrant share remains positive and significant, the point estimate increases to 1.23. This increase is mainly due to the substantial reduction in the variance of the immigrant share across neighborhoods after excluding the extreme values. Column (4) adds to the specification with all the observations the set of flat characteristics. Again, the relationship between discrimination and immigrant concentration remains unaffected. Column (5) includes the gender and the information dummy and their interactions with the immigrant indicator. No significant changes affect our results. Finally column (6) investigates whether the relationship between immigrant concentration and discrimination varies with the applicants' characteristics. Accordingly the gender and the information indicators are interacted with the share of immigrants. We do not find evidence that the relationship between immigrant concentration and differential treatment varies with the gender or the quality of the applicant.¹⁷

A similar analysis can be conducted using the concentration of Moroccan immigrants at the ZIP code level. The results are shown in table 4. The point estimate on the interaction between the share of Moroccan immigrants ($ZIP\text{-Moroccan}\text{-Share}_i$) and the immigrant indicator is larger, but this is due to the fact that the mean and the variance of this share are smaller.¹⁸ The point estimate suggests that a 1 percentage point increase in the share of Moroccans at the

¹⁷The results using a probit model instead of a linear probability model are extremely similar and are available upon request.

¹⁸The share of Moroccan immigrants in the sample has mean 1.14 and standard deviation 0.97. The share of all immigrants in the sample has mean 22.05 and standard deviation 9.93.

Table 4: Discrimination and concentration of Moroccan immigrants. Evidence at the ZIP code level

	(1)	(2)	(3)	(4)
Img_i	-0.233*** (0.040)	-0.217*** (0.038)	-0.281*** (0.053)	-0.271*** (0.060)
$ZIP\text{-Moroccan}\text{-Share}_i \times Img_i$	4.598** (2.186)	4.118** (1.980)	4.809** (1.989)	4.016 (2.482)
$ZIP\text{-Moroccan}\text{-Share}_i \times Img_i \times Fem_i$				0.004 (0.029)
$ZIP\text{-Moroccan}\text{-Share}_i \times Img_i \times Info_i$				-0.013 (0.038)
Fem_i			-0.032 (0.041)	-0.032 (0.041)
$Fem_i \times Img_i$			0.172*** (0.055)	0.157** (0.074)
$Info_i$			0.090** (0.044)	0.090** (0.044)
$Info_i \times Img_i$			0.095 (0.055)	0.100 (0.071)
Constant	0.678*** (0.029)	1.224*** (0.116)	1.342*** (0.112)	1.346*** (0.112)
ZIP fixed effects	X	X	X	X
Flat characteristics		X	X	X
N. observations	1186	1186	1186	1186
R^2	0.111	0.174	0.202	0.202

Flat characteristics include price per squared meter, number of rooms and city fixed effects. The estimates correspond to a linear probability model where the standard errors are clustered by ZIP code level.

*, **, ***: Significant at 10%, 5% and 1% respectively.

ZIP code level, increases the chances of response to an email signed by a Moroccan applicant by 5 percentage points. This effect is large and reinforces the view that while several factors may be responsible for the important geographical concentration of immigrants in certain areas of big cities, part of this segregation responds to discriminatory practices in the rental housing market. In particular, property owners through the Internet platform seem to be effectively blocking the supply of housing units immigrants have access to.

Robustness Checks

We now investigate the effect of a series of confounding factors that could threaten the validity of our previous results. One possibility is that the quality of flats in areas with few immigrants is different from that in areas with a high concentration of them. If the quality/price of the flat determines the level of discrimination (maybe because of the owner’s risk aversion) this could be causing the observed correlation. We investigate this possibility in the first column of table 5. We allow the coefficient on the interaction between the share of immigrants and the immigrant indicator to vary by flat characteristics. None of those interactions is statistically significant and our main result remains invariant, suggesting that the reason for the observed spatial pattern is not that discrimination occurs in expensive/high-quality flats that happen to be in areas where there are few immigrants.

The geographical pattern of discrimination that we observe may also respond to the fact that, because of urban segregation, owners in areas with a high concentration of immigrants are immigrants themselves and less prone to discriminate against those of their own kind. However, the immigration phenomenon in Spain is relatively recent and originates mainly from low income countries. Hence, the home ownership rate among immigrants is relatively low. According to the National Immigrant Survey (2007) this rate is around 30%. Thus it is unlikely that a substantial share of the immigrant population is operating on the supply side of rental market and driving our results. We can actually test this hypothesis with our data. We have the name of approximately 80% of the property owners or renters in our sample, either because they were advertising it in the rental ad or because they would sign the reply email. With this information we can infer the nationality of the owner and test whether it is responsible for the observed discriminatory patterns. In our sample 85% of all the owners (for which we have names) have a Spanish-sounding name. We then compute the share of “non-Spanish” owners by ZIP code and

Table 5: Robustness Checks

	(1)	(2)	(3)	(4)	(5)
Img_i	0.000 (0.000)	-0.286*** (0.063)	-0.294*** (0.050)	-0.250 (0.182)	-0.305*** (0.048)
$\text{ZIP-Img-Share}_i \times \text{Img}_i$	0.496* (0.251)	0.487* (0.249)			
$\text{ZIP-Img Owners-Share}_i \times \text{Img}_i$		0.064 (0.220)			
$\text{District-Img-Share}_i \times \text{Img}_i$			0.559*** (0.150)	0.516* (0.267)	
$\text{District-conservative vote}_i \times \text{Img}_i$				-0.078 (0.265)	
$\text{Increase in Share}_i \times \text{Img}_i$					0.848*** (0.187)
Constant	1.236*** (0.137)	1.226*** (0.116)	0.681*** (0.101)	0.686*** (0.094)	0.688*** (0.102)
ZIP fixed effects	X	X			
District fixed effects			X	X	X
Flat characteristics	X	X	X	X	X
Flat characteristics \times Img	X				
N. observations	1186	1186	1186	1186	1186
R^2	0.175	0.175	0.133	0.133	0.134

Flat characteristics include price per squared meter, number of rooms and city fixed effects.

The estimates correspond to a linear probability model where the standard errors are clustered by ZIP code level.

*, **, ***: Significant at 10%, 5% and 1% respectively.

interact it with the immigrant indicator. The results for this specification appear in column (2) of table 5. We do not find any significant effect for this variable suggesting that our results identify the behavior of native owners.

Another possible explanation is rooted in the fact that attitudes towards immigration may differ across neighborhoods. In Spain the more conservative parties have been strong supporters of laws restricting immigration. They were also against the general amnesty in 2005, whereby immigrants who had lived in Spain for at least one year, had a job and no criminal record could obtain a residence permit. We argue that the share of “conservative” vote in the 2008 general election in a particular neighborhood is a good proxy for the views against immigration in that area.¹⁹ Information on the electoral results is only available at the census district level. To see whether this higher level of aggregation affects our results in column (3) of table 5 we re-estimate our basic specification using the concentration of immigrants by census district. At this level, a 10 percentage points increase in the share of immigrants is associated with a 6 percentage points increase in the probability that an immigrant will be contacted. Since the results at the census district and ZIP code level are similar, column (4) includes the district share of vote to the conservative parties in the 2008 general elections (*District-conservative vote_i*) interacted with the immigrant indicator. This allows us to study whether more conservative districts discriminate more. We do not find support for this hypothesis in our data as the new interaction is statistically insignificant. In contrast, the coefficient on the interaction between the concentration of immigrants and the immigrant indicator variable slightly falls from 0.56 to 0.52, but remains significant at the 10% level of significance. Thus we conclude that political preferences are not responsible for the persistence of ethnic enclaves.

Finally, we discuss two possible channels that can explain the correlation between discrimination and immigrant concentration by studying the evolution of the latter during the last decade. Again we use the census district as a unit of analysis since we only have data on the past spatial concentration of immigrants at this level. The idea is to relate the increase in immigrant concentration in a particular neighborhood with the current level of discrimination. We employ as explanatory variable the growth in the share of immigrants by district between 2000 and 2008 interacted with the immigrant indicator. Column (5) shows that there is a very

¹⁹In Madrid this includes the share of vote to the conservative Popular Party (PP). In Barcelona we pool together the shares to the Popular Party and the Catalan Conservative Nationalist Party (CIU) on the grounds that they have common views on immigration.

strong correlation between the increase in the immigrant population and the current levels of discrimination. In particular, a 1 percentage point increase in the stock of immigrants in one district is associated to a fall in discrimination of 0.85 percentage points. One possible explanation for this result is that districts discriminating more in 2008 were also over discriminating in 2000, thus generating a lower influx of immigrants. Alternatively, one could argue that immigrants moving into certain districts brought in new information and increased acceptance of the foreign born population. Unfortunately our data do not allow us to disentangle these two explanations. The former would suggest that discriminatory practices are crucial for shaping spatial segregation. The latter would imply that as immigrants move into particular areas, assimilation reduces discriminatory practices.

On the whole, our results indicate that the degree of discrimination varies substantially with the ethnic composition of the neighborhood. We find evidence that property owners or renters discriminate more in areas with a higher concentration of natives. Although possible there are other factors determining ethnic segregation at the city level, we can conclude that the presence of rental housing discrimination contributes to the existence of ethnic enclaves in large cities and makes the geographical assimilation process of immigrants an arduous task.

5 Conclusions

In this paper we conduct a field experiment to show that discrimination against immigrants in the rental market is strongly correlated with their spatial concentration in the two largest Spanish cities, Madrid and Barcelona. Our estimates indicate that in areas with very few immigrants the differential in response rates between natives and immigrants reaches a magnitude of 30 percentage points. As the concentration of immigrants increases, this differential is reduced. In particular, a 10 percentage points increase in the share of immigrants at the ZIP or postal code level increases the chances that an immigrant will be contacted by the property owner or renter by 6 percentage points (relative to their native counterpart). We also show that this spatial pattern does not respond to differences in the quality and price of flats, political preferences, or ethnic origin of the owners across geographical areas.

These results do not allow us to conclude that discriminatory practices generated the current distribution of immigrants across neighborhoods. Probably other factors, like housing prices and immigrants' preferences to live close to each other played a substantial role in shaping the

spatial distribution we observed today. Nonetheless our results show that, even if other forces would have been responsible for triggering ethnic segregation, the discriminatory behavior of property owners and renters would have created persistency once segregation started and thus prevent the geographical assimilation of immigrants.

Table A1: Comparison of flats contacted by natives and immigrants. Madrid

	ROOMS (Number of rooms)	PRICE (Rental price per month)	M2 (Squared meters)	GENDER-L (Gender of the landlord)	GENDER-A (Gender of the applicant)
(1) Fuencarral	-0.349 ⁽¹⁾ (0.381) ⁽²⁾	-271.4* (153.3)	-19.99 (17.02)	0.127 (0.216)	0.062 (0.195)
(2) Moncloa	-0.167 (0.396)	-133.3 (158.6)	0.417 (17.36)	-0.136 (0.243)	0.083 (0.197)
(3) Tetuán	0.074 (0.233)	-58.38 (64.21)	-5.384 (6.747)	0.125 (0.166)	-0.236* (0.132)
(4) Chamartín	-0.129 (0.404)	-171.3 (145.8)	-9.190 (15.68)	-0.094 (0.227)	-0.243 (0.186)
(5) Hortaleza	0.292 (0.512)	-197.5 (192.3)	-5.750 (22.61)	0.133 (0.260)	0.125 (0.237)
(6) Barajas	-0.550 (0.776)	-267.5* (130.6)	-31.00 (21.02)	0.333 (0.333)	0.150 (0.350)
(7) Chamberí	-0.578* (0.321)	-206.1 (181.7)	-13.69 (12.66)	0.433 (0.092)	0.000 (0.156)
(8) Salamanca	0.006 (0.325)	278.2 (194.5)	13.23 (14.07)	0.050 (0.172)	0.018 (0.152)
(9) Ciudad Lineal	-0.261 (0.280)	6.797 (97.70)	-4.882 (8.440)	0.442** (0.188)	-0.126 (0.163)
(10) San Blas	0.974* (0.472)	155.7* (82.87)	29.23** (11.29)	0.299 (0.246)	0.282 (0.218)
(11) Centro	0.047 (0.141)	127.1** (60.53)	1.147 (4.767)	0.090 (0.109)	0.103 (0.093)
(12) Retiro	-1.114*** (0.284)	-135.9* (78.73)	-27.13** (10.90)	-0.077 (0.201)	-0.188 (0.179)
(13) Moratalaz	0.133 (0.501)	-18.87 (131.2)	-2.133 (22.33)	-0.333 (0.471)	0.067 (0.414)
(14) Vicálvaro ⁽³⁾	1.000 (.)	70.00 (.)	-9.000 (.)	-1.000 (.)	1.000 (.)
(15) Latina	-0.425 (0.324)	-97.53* (48.70)	-13.42 (8.958)	-0.089 (0.222)	-0.117 (0.185)
(16) Carabanchel	0.158 (0.352)	31.84 (51.83)	5.413 (8.686)	-0.198 (0.220)	0.113 (0.177)
(17) Usera	0.143 (0.479)	55.24 (74.22)	5.024 (11.35)	0.429* (0.202)	0.238 (0.292)
(18) Arganzuela	-0.326 (0.306)	-80.64 (71.41)	-12.18 (7.252)	0.100 (0.188)	-0.140 (0.170)
(19) Puente de Vallecas	-0.775* (0.363)	-82.50 (61.50)	-4.425 (13.57)	-0.222 (0.274)	0.275 (0.208)
(20) Villaverde	0.250 (0.412)	-50.63 (52.51)	1.000 (10.67)	0.458* (0.247)	0.250 (0.250)
(21) Villa de Vallecas	-0.686 (0.699)	-57.14 (120.5)	-19.97 (28.08)	-0.083 (0.416)	-0.457 (0.284)

⁽¹⁾: Difference in average characteristics (i.e. number of rooms) between housing units contacted by natives and immigrants.

⁽²⁾: Standard error of the difference in average characteristics.

⁽³⁾: Standard errors cannot be computed since there is only 1 observation.

*, **, ***: Significant at 10%, 5% and 1% respectively.

Table A2: Comparison of flats contacted by natives and immigrants. Barcelona

	ROOMS (Number of rooms)	PRICE (Rental price per month)	M2 (Squared meters)	GENDER-L (Gender of the landlord)	GENDER-A (Gender of the applicant)
(1) Ciutat Vella	0.019 ⁽¹⁾ (0.168) ⁽²⁾	-31.29 (70.39)	-2.819 (5.776)	0.002 (0.109)	0.113 (0.093)
(2) Eixample	0.206 (0.224)	-65.56 (61.62)	-2.864 (5.792)	-0.111 (0.126)	-0.045 (0.104)
(3) Sants-Montjuïc	-0.256 (0.256)	-75.78 (51.16)	-7.937 (5.509)	0.050 (0.166)	0.027 (0.143)
(4) Les Corts	-0.033 (0.424)	-117.5 (108.5)	-6.685 (11.28)	-0.084 (0.213)	-0.388** (0.163)
(5) Sarrià-Sant Gervasi	0.046 (0.299)	109.7 (111.2)	6.582 (10.91)	-0.167 (0.135)	0.034 (0.120)
(6) Gràcia	0.145 (0.235)	84.12 (58.56)	5.003 (6.470)	0.100 (0.148)	-0.051 (0.130)
(7) Horta-Guinardó	0.164 (0.231)	88.92 (64.09)	10.70* (5.716)	0.011 (0.155)	-0.021 (0.127)
(8) Nou Barris	-0.293 (0.251)	6.447 (41.67)	-8.632 (5.401)	-0.136 (0.214)	0.218 (0.167)
(9) Sant Andreu	0.188 (0.316)	-0.625 (61.69)	8.188 (9.741)	-0.084 (0.213)	0.188 (0.179)
(10) Sant Martí	-0.210 (0.235)	9.377 (100.6)	-0.027 (6.030)	-0.048 (0.158)	-0.150 (0.117)

(1): Difference in average characteristics (i.e. number of rooms) between housing units contacted by natives and immigrants.

(2): Standard error of the difference in average characteristics.

*, **, ***: Significant at 10%, 5% and 1% respectively.

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