Information and Discrimination in the Rental Housing Market: Evidence from a field experiment

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Abstract

This paper investigates the effect of disclosing information on the discriminatory behavior against immigrants in the Spanish rental market. We conduct a field experiment where emails are sent showing interest on vacant rental apartments. Fictitious applicants whose names represent different ethnic groups send emails with different amount of information about their ability to pay the rent. Our results show that applicants with a Moroccan sounding name are 15 percentage points less likely to be contacted by the property owner than those with a Spanish name. We also find that revealing positive information about the socioeconomic status of the Moroccan candidate increases the probability of being contacted by 8 percentage points. However, the information revealed does not completely eliminate discriminatory behavior, suggesting the presence of negative attitudes towards immigrants.

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1   Introduction

Evidence gathered over the past decades shows that ethnic minorities face substantial discriminatory behavior in a wide range of market transactions, from getting a job to renting a flat.[1] The nature of ethnic discrimination and how it can be overcome is of interest to researchers and policy makers. Is that discriminatory behavior due to the lack of knowledge about the abilities of minorities to perform market transactions or is it due to the true dislike or animosity against them? Would learning about the ability of a particular individual reduce the occurrence of discrimination or are members of minority groups stigmatized by their origin?

This paper conducts a field experiment to quantify and understand the sources of discrimination against immigrants in the Spanish rental housing market. We send emails in response to rental advertisements in 20 major cities. We signal the ethnic origin of the applicant by signing the email with native sounding names and foreign sounding ones. To study the reasons behind discrimination, we manipulate the emails to provide different amount of information about the socioeconomic status of the applicant. We alternate the transmission of no information (i.e. just showing interest in the flat) with the signalling of positive information (i.e. work as a university professor). Comparisons of the response rates conditional on the applicant's ethnicity and the amount of information revealed allow us to measure the degree of

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[1]See for instance Bertrand and Mullainathan (2004) for evidence of discrimination in the labor market and Riach and Rich (2002) and Yinger (1998) for discrimination in consumer markets.

discrimination and learn about its sources.

The study of discrimination in the Spanish rental market is relevant in several dimensions. First, Spain is a paradigmatic case of massive immigration in a very short time span. Between 1995 and 2009 the share of foreign-born population shifted from 1% to 12%. Second, housing location in Spain is important for the provision of public services such as schools and hospitals. Location is also important for employment opportunities and wages (see, for example, Zenou, 2009; Cutler, Glaeser and Vigdor, 1999; and Kain, 1968). Thus, discrimination in the housing market may negatively affect the assimilation of immigrants, amplify the negative effects of labor market discrimination and perpetuate differences between natives and the foreign-born population. The scarce evidence on immigrants' assimilation in Spain suggests that Eastern European and Hispanic immigrants assimilate employment and occupation-wise, while there is limited evidence of labor market assimilation among African immigrants (Amuedo-Dorantes and de la Rica, 2007).

Field experiments have been commonly used to uncover discrimination in labor, housing and consumer markets. Traditionally, field experiments were based on personal approaches where trained auditors enquired about vacant flats or job offers. Audit studies for the US housing market reveal that blacks and Hispanics are shown substantially less housing units than white clients (see, for example, Yinger, 1986; Page, 1995 and Ondrich, Stricker and Yinger, 1999). However, Heckman and Siegelman (1993) and Heckman (1998) argue that the results in the audit studies

are likely to be affected by the idiosyncrasy of the testers. An alternative approach is to conduct experiments using written applications. Bertrand and Mullainathan (2004) study the presence of racial discrimination in the labor market by sending resumes to job offers. They use the racial soundness of names to study discrimination against blacks in the US job market. Carpusor and Loges (2006) adapt this approach to test for discrimination in the housing market. They make enquiries via email regarding available apartments in the US. They signal ethnicity through Arabic, African-American or European sounding names and find that Arab and African-American applicants receive significantly fewer responses than their white counterparts. A similar study conducted by Ahmed and Hammarstedt (2008) reveals that ethnic and gender discrimination exists in the Swedish rental housing market.

The identification strategy in our correspondence testing experiment also relies on the foreign soundness of names. In Spain, the immigrant population is relatively heterogeneous. By nationality, the most numerous groups come from Romania (14.2%), Morocco (12.7%), Ecuador (7.4%) and Colombia (5.2%).[2] For Hispanics and Rumanians the names are virtually undistinguishable from those of natives. Therefore, we are restricted to focus our experiment only on Moroccan nationals.

To analyze the sources of discrimination we investigate how revealing information affects the chances of being contacted by the property owner. Discrimination

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[2]Source: Spanish Statistical Institute, Registry Data 2009.

can occur if the property owner is uncertain about the applicant's ability to pay. Accordingly, the owner can infer the missing information from the average of the ethnic group the applicant belongs to. The differential treatment based on average group characteristics has been defined as *statistical discrimination*. Alternatively, the property owner may have a strong personal bias against ethnic minorities and be willing to forgo a profitable business opportunity to avoid interaction with them. This is known as *taste-based discrimination*. If negative attitudes against immigrants are the main source of discrimination then revealing information about the reliability of the potential tenant should not affect the property owner's behavior. In contrast, if minorities are statistically discriminated, providing information about the socioeconomic status of the applicant should increase the chances of renting a flat. We argue that the Internet-based field experiment offers the possibility of realistically provide different amount of information and therefore helps us to distinguish between the different sources of discrimination.

Disentangling statistical from taste-based discrimination is important for policy design aimed at guaranteeing equal opportunities among natives and immigrants. One strategy the government can follow is try to affect public opinion and people's attitudes towards minorities. However, this strategy would only work if negative attitudes against foreigners were the source of discrimination. An alternative strategy is to minimize uncertainty regarding the immigrants' ability to pay the rent. That would only be a successful strategy if uncertainty about the probability of rental

payment was the source of discrimination.

We find evidence of a substantial amount of discrimination against immigrants in the Spanish rental market. When only the origin of the candidate is revealed, an email with a Moroccan sounding name is 15 percentage points less likely to get a response from the property owner than a similar email with a Spanish sounding name. Our results also indicate that part of this differential treatment is due to statistical discrimination. On average, a "high-quality" Moroccan candidate (i.e. one that signals a prosperous employment situation) has about 8 percentage points higher probability of being contacted than a Moroccan who does not provide any information about his/her socioeconomic status. However, revealing positive information does not completely eliminate the response rate differential against immigrants. A "high-quality" Moroccan applicant still has, on average, 12 percentage points less chances of being contacted by the owner than a "high-quality" native. Our results by gender provide further insights to understand the sources of discrimination. First, in the absence of information, discrimination is much higher for Moroccan males (21 percentage points) than for Moroccan females (10 percentage points). Second, the signal of a prosperous employment situation reduces the differential treatment with respect to equivalent natives to 15 percentage points for males, while it does not affect that for females, which remains equal to 10 percentage points. We conclude that the reduction in the male response rate differential after disclosing information indicates that part of the observed discriminatory behavior is due to the negative

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perception about Moroccan applicants' reliability. However, the large response rates differentials, for both males and females, that still remain after the information is revealed suggest that property owners tend to dislike Moroccan candidates.

Our results are subject to a number of potential caveats. First, the comparison between any pair of applicants (e.g. Moroccans with no information and natives with no information) may be influenced by the presence of other candidates with different characteristics. We show that our findings are robust to the inclusion or exclusion of a third and fourth candidate when we compare applications across origins or informational sets. Second, the Internet may not be the most common flat searching method. And third, as argued before, the use of soundness of names is not a valid strategy to detect discrimination against other immigrant groups in Spain. This could pose an external validity problem for our results since there is some evidence that Moroccans appear, together with Rumanians, as one of the less trusted groups by the native population.[3] To address these two last concerns, we conduct a telephone based audit study and find results very similar to those in our main experiment. There is a differential treatment against Moroccans (around 10 percentage points) and Moroccan men are substantially more discriminated than

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[3]The survey "Attitudes towards discrimination by ethnic or racial origin" conducted by the Spanish Sociological Research Center (CIS: Centro de Investigaciones Sociológicas) in 2007 reveals that 51.3% of native respondents distrust a particular group of immigrants. The most distrusted groups are Rumanians (29.3%), Moroccans (28.8%), Eastern-Europeans (7.9%) and Hispanics (7.6%).

Moroccan women (14 versus 7 percentage points). We also show that discrimination against Hispanics is of similar magnitude.

The rest of the paper is organized as follows. Section 2 describes the experimental design. Our main results are presented in Section 3 followed by a discussion in Section 4. Section 5 shows the results of the telephone audit study and Section 6 concludes.

2   The Experimental Design

This experiment is based on the email correspondence testing method. We send written applications to rental ads on the Internet. Information about housing units for rent is obtained from one of the most popular buy and sell sites in Spain, *Loquo.com*. Loquo is a network of local online classifieds similar to Craigslist in the US. The main categories are housing, goods for sale, community, personals, jobs and business services, local events and community discussion forums. On *Loquo.com* people can place ads to buy, sell or rent housing units. Owners can advertise their properties at no cost. Similarly, individuals interested in a particular item can email the owner free of charge. The only information required is the name, email address and a short message.

Our experimental design is aimed at answering three main questions: (a) Are applications sent by immigrants treated differently than those of natives? (b) Do

immigrants benefit from providing positive information in their applications? and (c) Does the differential treatment disappear as the quality of the potential tenant increases? In order to answer these questions, we send batches of either 2, 3 or 4 emails to 1809 rental ads providing different amount of information about the applicant. In particular, we experiment with two information sets, the "origin" and "quality" of the potential tenant. Our results are based on comparing the response rates to emails sent by applicants of different origin and quality to the same flat. Since we vary the number of emails sent to each flat we can test whether the direct comparison between any two candidates is affected by the characteristics of the applicants' pool. For instance, it could be that the difference in response rates between immigrants providing different amount of information is affected by the inclusion of a native candidate.

In order to signal the "origin" we use the soundness of names. This represents a limitation to study discrimination against particular immigrant groups whose names are similar to Spanish names (i.e. Hispanics and Rumanians). In contrast, Moroccans, who constitute the second largest group of immigrants in Spain, are ideal for the study since their names are markedly different from Spanish names.[4]

Previous studies find evidence of gender discrimination against males in the rental market. For example, Ahmed and Hammarstedt (2008) show that in Sweden

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[4]In Section 5 we conduct an telephone based audit study to explore discriminatory practices against other nationalities.

males are almost 13 percentage points less likely to be invited to a flat showing than females. In our setting, to prevent gender discrimination to alter our results, male and female candidates apply to different housing units.

To decide on which names are uniquely Moroccan and which are uniquely Spanish, we use name frequency data collected by the Spanish National Statistics Institute in 2007. We experiment with the most popular Spanish male names (i.e. *Manuel, Antonio, José* and *Juan*) and female names (i.e. *Ana, Isabel, Carmen* and *María*). To create several applicants we randomly allocate to these names the four most common Spanish surnames (i.e. *García, González, Fernández* and *Rodríguez*). We also employ the most common Moroccan names for males in Spain (i.e. *Mohamed, Ahmed, Rachid* and *Youssef*), and the most common for females (i.e. *Rachida, Aicha, Naima* and *Khadija*). We then randomly allocate to these names the four most common Moroccan surnames (i.e. *El Idrissi, Mohamed, Saidi* and *Serroukh*).

We created an email address for each of the fictitious applicants. The email accounts were created from 3 different providers: *gmail, hotmail* and *yahoo*. For example: *jose.garcia@hotmail.com; mohamed_saidi@gmail.com* or *ahmedserroukh@yahoo.com*.[5]

To understand the sources of differential treatment across ethnic groups we vary the quality of the potential tenant. We experiment with two different scenarios. We

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[5]As the names are very common we need to use numbers when creating the addresses. For example: *ahmedserroukh35@yahoo.com*.

send a standard email showing interest in the flat without any information about the candidate other than the name. This represents what we call a "standard" applicant. Alternatively, to signal a "high-quality" applicant, the email contains a detailed description of his/her current employment situation and occupation. We consulted with several real estate agents about who constituted the ideal tenant for landlords. University professors and banking clerks were identified as highly reliable occupations in terms of their ability to pay the rent.

When no information other than the name is provided we send the Spanish version of one of the two following emails:

"Standard" applicant

"Hello,

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

or alternatively:

"Hi,

I would like to have a look at the flat. Please email me if the flat is still available. Thank you. NAME".

Similarly, a "high-quality" applicant sends the Spanish version of one of the two following emails:

"High-quality" applicant

"Hello,

I am interested in this flat. I work for an important commercial bank. I have recently moved to (city) 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 University of (city). I have been living in (city) 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".

Comparing the response rates across "origin" and "quality" allows us to study discrimination in the Spanish rental market. Differences in response rates within the same "quality" and gender type of emails are informative about the differential treatment received by immigrants relative to natives. Alternatively, differences in the response rates to "high-quality" and "standard" applicants within the same "origin" and gender capture the returns to information about the socioeconomic status of the applicant.

We should highlight a few aspects about our experimental design. First, the difference in the response rates between immigrants and natives sending standard emails (i.e. no information other than the name) is a rough measure of the amount of discrimination in the rental market. This differential treatment is likely to be a mixture of pure immigrant dislike (taste-based discrimination) and the owner's priors

about the quality of the potential tenant (statistical discrimination). In contrast, the difference in the response rates to emails sent by "high-quality" candidates should purge a substantial part of the statistical discrimination. In this case, the two applicants signal a high occupational status and the only difference is the origin of the candidate. We believe that the occupation of the potential tenant is the most relevant piece of information for the owner. However, there may be other relevant variables for the owner's decision that may differ across ethnic groups and are missing in the email sent. For example, family size or the ability to take care of the flat. The owner may still use group belonging to predict this information. We return to these issues when discussing our results in Section 4.

The correspondence test was conducted between January and March 2009. During this period, our candidates applied to all apartment ads on Loquo without any restrictions as to size and cost. We focus on 20 of the largest Spanish cities.[6] For each available unit we recorded the date, the heading of the ad, the geographical location of the apartment (city and complete address), whether the owner was a private person or a company, the name and gender of the property owner (if available), the number of rooms, and the rental cost per month. All property owners were tracked during the experiment to avoid being contacted more than once by

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[6]A Coruña, Alicante, Almería, Badajoz, Barcelona, Bilbao, Cádiz, Córdoba, Girona, Granada, Madrid, Málaga, Murcia, Pamplona, Pontevedra/Vigo, Salamanca, Tarragona, Toledo, Valencia and Zaragoza.

each applicant.

Table 1 contains descriptive statistics of the 1809 flats where our fictitious applicants sent emails. As the table shows, we sent 2 emails (one from a high-quality immigrant and another one from a standard immigrant) to 396 flats, 2 emails (standard native and standard immigrant) to 427 flats, 3 emails (high-quality native, high-quality immigrant and standard immigrant) to 881 flats and 4 emails (high-quality native, high-quality immigrant, standard native and standard immigrant) to 105 flats. The table indicates that flats where different number of emails were sent are of similar characteristics. For example, the average price per month for all flats considered is 607.87 euros which is very similar to the average price for the flats where batches of 2, 3 or 4 emails were sent. About 30% of the vacant properties are rented from real estate agents and the rest from private owners. Almost 50% of the property owners are males. The average number of rooms for all flats is slightly higher than 2.

To avoid systematic discriminatory behavior towards a particular kind of professional occupation (i.e. university professor or banker), we alternatively sent the two versions of the emails. The order of the applications was also controlled. Each applicant was the first to apply in $1/n$ of the cases, where n is the number of applications sent to that particular apartment. The time delay between applications for the same apartment was between half an hour and one hour.

Information on vacant apartments was gathered on Tuesdays and emails were

sent on Tuesdays and Wednesdays each week. The results from the experiment were collected one week after. First, we recorded whether or not the property owner contacted the applicant. Second, if the applicant was contacted we recorded whether he/she was invited for a flat showing. Invitations to flat showing were politely declined.

3 Results

In this section we compare the response rates to emails sent by applicants with uniquely Spanish sounding names to that of applicants with clearly Moroccan sounding names and different amount of information disclosed. In what follows we present the most relevant results of the experiment.

3.1 Are applications sent by Moroccans treated differently than those of natives?

We start by comparing the response rates to applications sent by natives and Moroccans when no information other than the name is provided (i.e. standard applicants).

Table 2 contains the results when the two standard applicants send emails to 532 property owners (corresponding to flats in columns 3 and 5 of Table 1). The first column of Table 2 reports the percentage and the number of cases when both the native and the immigrant applicant are contacted by the property owner. The second

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column reports these numbers when none of them gets an answer. The number of cases when only the native or only the immigrant is contacted are reported in column 3 and 4 respectively. We define net discrimination as the difference between these two columns. The last column of the table shows the test statistic for the null hypothesis of no discrimination (i.e. the difference in response rates equals zero). This is a two sample paired t-test for equal means. The first line in the table displays the results for all the applicants and the second and third separately by gender.

The average response rate is around 52%, since 274 out of the 532 property owners contacted replied to at least one of the candidates. The main message from Table 2 is that when potential tenants restrict the information just to their "origin" (through the soundness of the names), natives are contacted more often than Moroccans. Natives have about 15 percentage points higher probability of getting an email back from the property owner than immigrants. Interestingly, this difference is substantially larger for males (21 percentage points) than for females (10 percentage points), suggesting both a racial and a gender component in the transaction. These results are remarkably similar to those in Ahmed and Hammarstedt (2008) who find a 20 percentage points differential treatment for male Arabic sounding names compared to male Swedish names.

The results in Table 2 are the composite of comparing standard applicants across origins under two different competition settings. In 80% of the cases only the two standard candidates apply to the same ad, while in the remaining 20% of the cases

two additional high quality applicants (one native and one immigrant) also apply.[7] When only two emails are sent, the differential treatment is 15.69 percentage points, while it is 13.83 in the presence of high-quality applicants. These two numbers are not statistically different from each other. Hence we conclude that the results are robust to the inclusion of high quality applications.

Note that being contacted by the property owner is just the first step in the process of renting a flat. Thus, our results identify a lower bound of discrimination. One could also look at the next step of the transaction by comparing invitations to a flat showing after being contacted. However, it is difficult to construct an indicator from this information. In some cases it is not straight forward to assess whether the owner is inviting the candidate for a flat showing or simply asking additional information. We attempted to construct an indicator for being invited to a flat showing. The results, available upon request, indicate that once contacted, natives and immigrants are treated equally in terms of invitations to see the flat. Hence examining differences in response rates seems appropriate to measure discrimination.

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[7]Obviously we can only control the number of applications within our experiment as we do not have information about the number of emails received by each particular flat.

3.2 Do immigrants benefit from providing positive information in their applications?

Our previous findings indicate that there is discrimination against immigrants when no objective information about the quality of the applicant is provided. Next, we investigate whether the differential treatment received reflects animosity against Moroccans or simply lack of information about their reliability. In a pure taste-based discrimination model owners simply discriminate against immigrants because of dislike. Thus, the provision of information about the quality of the candidate should not affect the owner's discriminatory behavior. However, if the differential treatment is due to the lack of information, revealing some of the candidate's socioeconomic characteristics should have an effect on the chances of being contacted.

We study the effects of revealing positive information about the quality of the applicant on the owner's discriminatory behavior. Accordingly, we compare the response rates to applications by Moroccans with positive information about their socioeconomic status (i.e. high-quality applicant) and those by Moroccans without such information (i.e. standard applicant). The difference in response rates provides an idea of the amount of discrimination that can be attributed to missing information about the immigrant's ability to pay.

Table 3 contains the results when the two types of Moroccan applicants send emails to 1382 property owners (corresponding to flats in columns 2, 4 and 5 of

Table 1). There are several features from the table that should be highlighted. First, the overall response rate is 53.98%, slightly higher than in the previous case. Second, providing positive information about the employment or the job status increases the chances of being contacted by the landlord. Applicants with Moroccan sounding names signaling that they are high-quality potential tenants are 8 percentage points more likely to get a reply than those who do not provide any information about their socioeconomic status. Third, the returns to information seem to be similar across genders. Net discrimination in favor of immigrant candidates providing positive information is 9.25 percentage points for males and 7.74 percentage points for females, and these two numbers are statistically significant. Furthermore, we cannot reject that they are equal. Finally, we highlight that the results in Table 3 represent a lower bound for the presence of statistical discrimination as we do not provide all the information that may be relevant for the transaction (e.g. family status, pets and so on).

In this case, the inclusion of a native candidate could be particularly relevant. Accordingly, we send batches of two emails (i.e. standard and high-quality immigrant applicants); batches of three emails adding a high-quality native applicant; and finally batches of four emails with all candidates considered. The results are extremely robust. The difference in the response rate between high-quality and standard immigrants is 8.88, 8.17 and 9.52 percentage points respectively.

Summing up, the results indicate that revealing information about the socioe-

conomic status of the potential tenant significantly increases the chances of being contacted by the property owner, by about 8 percentage points both for male and female immigrants. We conclude that at least part of the differential treatment reported in the previous section responds to the signal extraction problems that characterize statistical discrimination.

3.3 Does the differential treatment disappear as the quality of the potential tenants increases?

Finally we explore whether providing positive information about the quality of both the immigrant and the native candidate affects the discriminatory behavior of property owners. We compare the response rates between natives and immigrants when both send emails signaling that they are high-quality applicants. If the differential treatment for natives and immigrants is only due to signal extraction problems and if occupational status is the only relevant information for the owner's rental decision, then we should expect similar response rates to emails sent by high-quality candidates independently on their origin.

Table 4 contains the results when the two high-quality applicants send emails to 986 property owners (corresponding to flats in columns 4 and 5 of Table 1). The response rate in this case is 64.40%, higher than in previous cases. The results in the table indicate that high-quality native candidates are 12 percentage points

more likely to be contacted than high-quality immigrant candidates. This suggests that disclosing information does not completely eliminate discrimination. In fact, the reduction in the response rate differential with respect to the standard applications is rather modest, 3 percentage points (see Table 2). However, this number conceals a large gender difference. For females, disclosing information does not affect discrimination, which remains about 10 percentage points (see Tables 2 and 4). However, it does for males. Discrimination against high-quality male immigrants is 6 percentage points lower than discrimination against their standard counterparts (i.e. 21 versus 15 percentage points). These results again support the presence of statistical discrimination, at least for males.

The different treatment received by native and immigrant high-quality candidates is less likely to be affected by the inclusion of standard applicants. This is confirmed when conditioning on the number of emails sent.

3.4 A linear probability model

Our results so far indicate that there is a significant amount of discrimination based on the soundness of the applicant's name. We are now interested in learning whether that differential treatment varies along some independent variables related to flat and owner characteristics.

We first estimate a linear probability model where the dependent variable is an indicator of whether the candidate i has been contacted by the property owner

j (C_{ij}) and the explanatory variables are an indicator that takes value 1 if the candidate is an immigrant (I_{ij}), an indicator for a high-quality candidate (Q_{ij}), and the interaction between these two variables. We also include dummy variables to capture date (ϕ_d), research assistant (ϕ_{ra}) and city (ϕ_c) fixed effects.

$$C_{ij} = \alpha + \beta I_{ij} + \gamma Q_{ij} + \delta I_{ij} \times Q_{ij} + \phi_d + \phi_{ra} + \phi_c + \epsilon_{ij}. \tag{1}$$

The coefficient β captures the differential treatment between natives and immigrants in the absence of relevant information. The coefficient γ captures the returns to information about the employment and job status of the applicant, and the coefficient δ captures any difference in those returns between immigrants and natives.

Table 5 shows the estimates of equation (1) for the whole sample (column 1), and separately for males (column 2) and females (column 3). In the estimation we use 4709 observations obtained from sending batches of 2, 3 and 4 emails to the 1809 ads. The results confirm our previous findings. Moroccan immigrants without information are on average 15 percentage points less likely to be contacted. Revealing positive information about the socioeconomic status increases the chances of being contacted by 6 percentage points. The interaction between the information and immigrant indicator, although positive (3 percentage points), is not significant for the whole sample.

When the model is separately estimated by gender, we do find significant dif-

ferences in the returns to information for immigrant males relative to their native counterpart. Differential treatment decreases by 7 percentage points when male immigrants signal they are high-quality applicants. This is consistent with the results in Tables 2 and 4, where discrimination decreases from 21 to 15 percentage points after disclosing information. In contrast, there is no evidence of differences in the relative returns to information for females.

The differential treatment received by immigrant candidates may vary by flat and property owner's characteristics. Table 6 investigates this possibility by re-estimating equation (1) for different sub-samples of flats along three dimensions: price per room (i.e. below or above median price), private owner or real estate agent, and property owner's gender. Each line in Table 6 shows, for each sub-sample of flats, the estimated coefficient of the differential treatment in the absence of information (β), the returns to information (γ) and the difference in those returns between natives and immigrants (δ). The results are reported for the overall sample and separately by gender. We highlight several interesting features from Table 6. First, discrimination against immigrants seems higher in more expensive flats (above the median price per room) than in relatively cheaper ones (below the median price per room). On average, immigrants are 16 percentage points less likely to be contacted when applying to expensive flats and 12 percentage points less likely in cheaper ones. Second, we find that private property owners seem to discriminate more than real estate agents (16 versus 12 percentage points). However, the

differential treatment applied by private property owners is highly biased against male immigrants (23 versus 7.4). There is also evidence that in this case immigrant males receive a statistically significant premium of 7 percentage points when providing positive information about their socioeconomic status. Finally, the last two lines in the table reveal that both male and female property owners discriminate against immigrants (26 and 25 respectively). While the discriminatory behavior of female owners does not depend on the gender of the applicant (27 for males and 23 for females), this is not the case for male owners who seem to discriminate substantially more against male candidates (34 compared to 17). Interestingly, the last two columns in the table indicate that only immigrant applicants that share gender with the owner benefit from disclosing positive information relatively to their native counterparts.[8] In all, the results in Table 6 indicate that the patterns we find in our base line specification are confirmed in the different sub-samples. The new insight is that the larger amount of discrimination against male immigrants seems to be driven by the behavior of private property owners.

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[8]We can only infer the gender of the owner if he/she signs the returning email. Therefore, results should be interpreted with caution since this variable is only available for 51% of the observations in the sample

4 Discussion

The results of our experiment indicate that for two individuals with a similar job, searching for a flat, the one with a Moroccan name would receive fewer contacts. An extreme interpretation of our findings would be to conclude that discrimination in the rental market is mostly driven by animosity against Moroccans (i.e. taste-based discrimination). Indeed, we observe a substantial response rate differential for high-quality immigrant candidates when competing against natives of comparable characteristics. However, two pieces of evidence point against this extreme interpretation. First, information improves the response rates of Moroccan applicants, around 8 percentage points. This indicates that immigrants do benefit from signalling a prosperous employment career, which does not fit with the predictions of a pure taste-based discrimination model. Second, we find higher returns to information for immigrant than for native males. This result is in line with traditional models of statistical discrimination (see Aigner and Cain, 1977), which predict that signals about the quality of the applicant should be more informative for the minority group.

However, we are also skeptical to conclude that the differential treatment observed in the data is evidence of just signal extraction problems. Statistical discrimination models could not easily account for the gender difference observed in the relative returns to information. These models could only explain the gender pattern

if either information was irrelevant for females or if the quality of the information females provide was noisier. Both these explanations seem implausible. First, we find that native and immigrant females equally benefit from disclosing information (see column 3 in Table 5). Second, it is unlikely that the "quality" of the signal is worse for women since we use the same jobs (alternatively bank clerk and university professor) for both genders. Furthermore, the information provided is easily verifiable since in order to sign a rental contract the applicant has to provide documentation regarding the wage and labor market status.

In all, we interpret our results as evidence that, at least for men, part of the raw discrimination observed in the rental market is caused by the owners' perception that a Moroccan name signals low ability to pay. Nevertheless, the absence of an information premium for immigrant women suggests that additional factors are responsible for the differential treatment. It could be that other information relevant for the transaction is missing (i.e. marital status, number of household members and so on). However, it is difficult to think what kind of information is more relevant than the ability of the tenant to pay the rent. Moreover, the gradient in the reduction of discrimination is not steep enough. Crucial information, such as proof of ability to pay, only reduces the differential treatment between immigrant and native males in 6 percentage points. Thus, it is unlikely that the remaining differential treatment, 15 percentage points for men and 10 percentage points for women, can be completely eliminated by providing additional information. This suggests the presence of some

animosity against immigrant tenants.

5 The telephone audit study

Our experimental design based on written applications has two potential caveats. First, sending an email may not be the usual matching method between tenants and owners. And second, the correspondence test is not valid to detect discrimination against immigrants whose names are similar to the native population. To circumvent these problems we conduct an audit study where trained auditors from different nationalities make phone calls to property owners. The identification strategy in this case is based on different accents across nationalities. This experimental approach is subject to the common criticisms of audit studies (see, for example, Heckman and Siegelman, 1993 and Heckman, 1998) and it does not allow us to differentiate the sources of discrimination. However it is useful to obtain a flavor of the amount of discrimination against different minority groups and when using a more traditional flat searching method.

The experiment based on phone calls was carried out in May and June 2008. We select a random sample of the advertised housing units in Loquo. We employ pairs of trained auditors, one Spaniard and the other with a markedly foreign accent. We focus on the largest non-European groups of immigrants: Moroccans and Hispanics (i.e. Ecuadorians and Colombians). During the phone call, auditors inquire

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about the ad and try to arrange a visit to the property. We quantify the degree of discrimination by comparing the number of invitations received by natives and foreigners.

As in the previous experiment, we employ paired-matched applications instead of randomly assign applicants to landlords. Auditors make phone calls to the same ad during a short time span (i.e. 30 minutes) to ensure that property owner characteristics and housing market conditions remain constant. Auditors are matched on the basis of fictitious age, occupation (e.g. bank officer or university professor), income and family characteristics. Finally, the order of the applications is controlled. The native applicant is the first to apply for an apartment in half of the cases. During the call, auditors complete a layout with the characteristics of the rental housing unit such as price, area and street, number of rooms, garage and financial guarantees. At the end of each day, we call to cancel the visit.

It is important to note that the results of this experiment are not strictly comparable to the correspondence test. For example, the control of information is harder when making phone calls. We highlight that we do not attempt to distinguish between standard and high-quality applicants in this experimental setting. The auditors are chosen among postgraduate students at University of Alicante and, hence, constitute a selected sample among immigrants. For this reason, they are trained to provide the same information as a high-quality applicant in the previous experiment, but this is only revealed if prompted by the landlord. Accordingly, the amount of

information provided varies with the nationality of the applicant and the interest of the owner. In most cases differential treatment occurs before any information is revealed. But in other cases we observe differential treatment after providing some information. Furthermore, the cost of rejecting an applicant on the phone may be different to that of rejecting an electronic application.

The results of the audit study are presented in Table 7. This approach returns very similar results to those in the main experiment. From the 201 property owners contacted, total net discrimination is around 10 percentage points. We again observe that discrimination is higher for males (15 percentage points) than for females (7 percentage points). Hence the telephone based test corroborates the results of the correspondence test. Furthermore, we find similar patterns of discrimination against the two ethnic groups employed in the experiment. Table 8 suggest that, on average, Moroccans are 10 percentage points less likely to be invited for a flat showing than natives, compared to 11 percentage points for Hispanics. On the whole, our results suggest that discrimination seems to be present regardless of the contact method, and that there are no substantial differences across Moroccans and Hispanics.

6   Conclusions

This paper conducts an Internet-based field experiment to study discrimination against immigrants in the Spanish rental market. Our results reveal important

traces of discrimination against rental candidates with Moroccan sounding names. There is also evidence that disclosing positive information about the socioeconomic status of the candidate improves the chances of being contacted for both Moroccan male and female applicants. However, differences in response rates between natives and immigrants still persist even when the candidates signal a high ability to pay the rent. One reading of our results is that the upgrading of skills and qualifications that would come naturally for second generation immigrants are unlikely to completely eliminate the level of discrimination observed in the Spanish rental housing market.

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Table 1: Descriptive statistics of flats where emails were sent

Number of emails sent to each flat		2		3	4
Sample	Total	High-quality Immigrant Standard Immigrant	Standard Native Standard Immigrant	High-quality Native High-quality Immigrant Standard Immigrant	High-quality Native High-quality Immigrant Standard Native Standard Immigrant
Vacant flats	1809	396	427	881	105
Female applicants	52.13%	50.25%	51.52%	52.89%	55.24%
Real estate agents	28.34%	25.57%	28.33%	29.90%	26.32%
Average monthly price (standard deviation)	607.87 (273.6)	597.29 (199.2)	622.69 (242.2)	605.36 (313.1)	607.48 (283.1)
Average n. of rooms (standard deviation)	2.26 (0.93)	2.17 (0.90)	2.28 (0.95)	2.27 (0.92)	2.39 (0.90)
Female owners	52.01%	48.89%	48.15%	54.81%	53.85%

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Table 2: Percentage and number of responses to emails sent by standard native and immigrant applicants

	Native YES Immigrant YES	Native NO Immigrant NO	Native YES Immigrant NO	Native NO Immigrant YES	Net Discrimination
Total	32.14[1] (171)	48.50 (258)	17.29 (92)	2.07 (11)	15.22***[2] (t=8.49)[3]
Males	35.43 (90)	41.34 (105)	22.05 (56)	1.18 (3)	20.86*** (t=7.63)
Females	29.14 (81)	55.04 (153)	12.95 (36)	2.88 (8)	10.07*** (t=4.35)

[1]: Percentage of emails (number in parenthesis) in which the property owner replied to both applicants.

[2]: Percentage of answers, in net terms, favoring the native applicant.

[3]: Test statistic for the null hypothesis "The percentage of answers, in net terms, favoring the native applicant is 0".

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

Table 3: Percentage and number of responses to emails sent by high-quality and standard immigrant applicants

	High-quality YES Standard YES	High-quality NO Standard NO	High-quality YES Standard NO	High-quality NO Standard YES	Net Discrimination
Total	38.42 (531)	46.02 (636)	12.01 (166)	3.55 (49)	8.46*** (t=8.17)
Males	35.20 (232)	46.43 (306)	13.81 (91)	4.55 (30)	9.25*** (t=5.67)
Females	41.36 (299)	45.64 (330)	10.37 (36)	2.63 (19)	7.74*** (t=5.90)

See footnotes in Table 2

Table 4: Percentage and number of responses to emails sent by high-quality native and immigrant applicants

	Native YES Immigrant YES	Native NO Immigrant NO	Native YES Immigrant NO	Native NO Immigrant YES	Net Discrimination
Total	47.26 (466)	35.60 (351)	14.60 (144)	2.54 (25)	12.06*** (t=9.56)
Males	44.59 (206)	36.15 (167)	17.10 (79)	2.16 (10)	14.93*** (t=7.76)
Females	49.62 (260)	35.11 (184)	12.40 (65)	2.86 15)	9.54*** (t=5.75)

See footnotes in Table 2

Table 5: Estimation results of the linear probability model

	Total	Males	Females
Immigrant (β)	-0.147***	-0.208***	-0.089***
	(0.017)	(0.027)	(0.022)
Information on Quality (γ)	0.060***	0.025	0.094***
	(0.021)	(0.032)	(0.026)
Interaction (δ)	0.027	0.069***	-0.013
	(0.021)	(0.032)	(0.027)
Observations	4709	2240	2469
R^2	0.070	0.086	0.089

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

Standard errors are clustered at the flat level.

Table 6: Estimation results of the linear probability model for different sub-samples of flats

	Observations[1]	Immigrant (β)			Information on Quality (γ)			Interaction (δ)		
		Total	Males	Females	Total	Males	Females	Total	Males	Females
Below median (Price/Room)	2066	−0.118*** (0.017)	−0.188*** (0.035)	−0.042 (0.030)	0.103*** (0.030)	0.091** (0.045)	0.128*** (0.039)	0.008 (0.030)	0.038 (0.044)	−0.33 (0.041)
Above median (Price/Room)	2118	−0.159*** (0.028)	−0.226*** (0.045)	−0.104*** (0.034)	0.046 (0.033)	−0.017 (0.054)	0.099** (0.040)	0.021 (0.033)	0.073 (0.053)	−0.023 (0.041)
Real estate agent	1285	−0.119*** (0.030)	−0.122** (0.053)	−0.119*** (0.038)	0.069* (0.038)	0.054 (0.068)	0.080* (0.046)	0.011 (0.039)	0.020 (0.065)	0.005 (0.051)
Private property owner	3218	−0.162*** (0.022)	−0.226*** (0.030)	−0.074** (0.029)	0.056** (0.026)	0.031 (0.037)	0.112*** (0.036)	0.033 (0.026)	0.070* (0.037)	−0.031 (0.035)
Male property owner	1149	−0.262*** (0.040)	−0.336*** (0.055)	−0.173*** (0.060)	0.022 (0.046)	−0.022 (0.064)	0.083 (0.068)	0.077 (0.048)	0.131** (0.065)	0.004 (0.072)
Female property owner	1278	−0.250*** (0.042)	−0.269*** (0.056)	−0.225*** (0.064)	0.090* (0.047)	0.156** (0.069)	0.050 (0.068)	0.101** (0.049)	0.048 (0.067)	0.129* (0.075)

[1]: This represents total number of observations. The corresponding number for males and females are approximately 50% of the total.

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

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Table 7: Percentage and number of invitations to a flat showing in the audit study

	Native YES Immigrant YES	Native NO Immigrant NO	Native YES Immigrant NO	Native NO Immigrant YES	Net Discrimination
Total	79.70 (161)	4.95 (10)	12.87 (25)	2.48 (5)	10.39*** (t=3.90)
Males	77.08 (74)	6.25 (6)	15.63 (15)	1.04 (1)	14.59*** (t=3.73)
Females	82.08 (87)	3.77 (4)	10.38 (11)	3.77 (4)	6.61* (t=1.83)

See footnotes in Table 2

Table 8: Net discrimination test in the audit study

	Moroccan	Hispanics
Total	10.00*** (t=2.23)	11.01*** (t=3.01)
Males	14.71*** (t=2.42)	13.20*** (t=2.51)
Females	5.55 (t=0.85)	8.93** (t=1.76)