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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 in vacant rental apartments. Fictitious applicants whose names represent different ethnic groups send emails with different amounts of information on their ability to pay the rent. Our results indicate that applicants with a name of Moroccan origin are 15 percentage points less likely to receive a response 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 about 9 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.³ The nature of ethnic discrimination and how it can be overcome are of interest to researchers and policy makers. Is 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 common Spanish and foreign-sounding names. To study the reasons behind discrimination, we manipulate the emails to provide different amounts 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 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, which makes it an excellent "laboratory" to study discrimination. Between 1995 and 2009, the share of the foreign-born population shifted from 1% to 12%. This enormous and rapid inflow might have affected natives' views towards immigrants. Moreover, since it is a very recent phenomena, there may be higher levels of uncertainty about immigrants' reliability in Spain than in more traditional immigration countries.⁴ Second, housing location in Spain is important for the provision of public

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³ 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.

⁴ 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 Romanians (29.3%), Moroccans (28.8%), Eastern-Europeans (7.9%) and Hispanics (7.6%).

services such as schools and hospitals. Location is also important for employment opportunities and wages (see, for example, Zenou, forthcoming; Cutler et al., 1999; 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 with respect to employment and occupation, while there is limited evidence of labor market assimilation among African immigrants (Amuedo-Dorantes and de la Rica, 2007).

Field experiments are commonly used to uncover discrimination in labor, housing and consumer markets. Traditionally, field experiments are based on personal approaches where trained auditors enquire 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 et al., 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 signal the ethnicity of the applicants through their names and 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. In another study, Ahmed et al. (forthcoming) find that revealing information through an electronic application about the employment, education and marital status of male candidates does not reduce discrimination in Sweden.

The identification strategy in our correspondence testing experiment also relies on the national origin of the applicants' 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%).⁵ For Hispanics and Romanians, the names are virtually indistinguishable from those of natives. Therefore, we are restricted to focus our experiment only on Moroccan nationals. However, this is perhaps one of the most interesting comparisons, due to the geographical proximity between Morocco and Spain and the large economic differences between the two countries.

To analyze the sources of discrimination we investigate how revealing information affects the chances of receiving an email in response to a flat inquiry. Discrimination can occur if there is uncertainty about the applicant's ability to pay. Accordingly, information about the applicant's quality can be inferred from the average of the ethnic group he/she belongs to. The differential treatment based on average group characteristics has been defined as *statistical discrimination*. Alternatively, the property owner or the real estate agent may have a strong personal bias against ethnic minorities and is 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 discriminatory practices. In contrast, if minorities are statistically discriminated, providing information about the socioeco-

omic status of the applicant should increase the chances of renting a flat. We argue that the Internet-based field experiment offers the possibility to realistically provide different amounts 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 may employ is to 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. This 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 signed with a name of Moroccan origin is 15 percentage points less likely to get a response 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 9 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 is still 12 percentage points less likely to be contacted 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 (22 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 influence discrimination against Moroccan 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 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 an important dislike against 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 method to search for flats. And third, as argued before, the degree to which a name sounds foreign 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 Romanians, as one of the less trusted groups by the native population. 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 males are substantially more discriminated than Moroccan females (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.

⁵ Source: Spanish Statistical Institute, Registry Data 2009.

2. The experimental design

This experiment is based on the email correspondence testing method. We send written applications to rental ads on the Internet.⁶ 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 and real estate agencies can advertise properties at no cost. Similarly, individuals interested in a particular item can send an electronic application 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 emails to 1809 rental ads providing different amounts of information about the applicants. 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 different applicants. In this setting, we are concerned that the response to a candidate may be affected by the characteristics of the pool of applicants to the flat. For instance, it is possible that the response rate to candidates who do not provide information about their quality is affected by the inclusion of candidates who do reveal it. To account for this possibility, in our experimental design we create four teams with a combination of 2, 3 and 4 different candidates which simultaneously submit inquires to the same flat. We randomly assigned those teams to the eight weeks during which the experiment was conducted.

The experiment 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.⁷ For each available unit we recorded the date, the heading of the ad, the geographical location of the apartment (city), whether it was advertised by a private person or a real estate agency, the name and gender of the person placing the ad (if available), the number of rooms, and the rental cost per month. All ads were tracked during the experiment to avoid being contacted more than once by each applicant. 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 applicant was contacted. Second, if the applicant was contacted we recorded whether the answer was positive. That is, whether he/she was invited for a flat showing or to provide additional details. Invitations to flat showing were politely declined.

In order to signal the “origin” of the applicant we use common native and foreign-sounding names. This represents a limitation to study discrimination against particular immigrant groups whose names are similar to Spanish names (i.e. Hispanics and Romanians). 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.⁸

Previous studies find evidence of gender discrimination against males in the rental market. For example, *Ahmed and Hammarstedt (2008)* show that in Sweden 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 flats. In particular, each week we randomly assign half of the email batches to be sent by female candidates while the other half are sent by males.

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*).⁹

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*.¹⁰

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 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

⁶ Internet is widely used in Spain. The Internet penetration rate (the percentage of total population that uses Internet) was 63.3% in 2008, compared to 84.3% in Canada, 72.3% in the US and 63.8% in Germany. The use of Internet platforms has become very popular to buy, sell or rent housing units. Advertising on the Internet is usually free of charge, reaches a wide readership and allows the provision of detailed information about the property. Moreover responding to an Internet ad does not have any cost for the consumer as opposed to buying a newspaper or consulting a real estate agency.

⁷ A Coruña, Alicante, Almería, Badajoz, Barcelona, Bilbao, Cádiz, Córdoba, Girona, Granada, Madrid, Málaga, Murcia, Pamplona, Pontevedra/Vigo, Salamanca, Tarragona, Toledo, Valencia and Zaragoza.

⁸ In Section 5 we conduct an telephone based audit study to explore discriminatory practices against other nationalities.

⁹ A weakness of field experiments based on written applications relative to previous audit studies is that the emails do not directly report the ethnic origin of the applicant but instead suggest it through personal names. Thus, some property owners or real estate agents may simply not notice the names or not recognize their ethnic content. However, this is a minor concern in our setting as Moroccan names are clearly distinguishable from Spanish ones.

¹⁰ As the names are very common we need to use numbers when creating the addresses. For example: *ahmedserroukh35@yahoo.com*.

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”.

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.

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. Almost 50% of the individuals signing or responding the ads are males, and the average number of rooms for all flats is slightly higher than 2.

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 of our experimental design. First, the difference in the response rates between immigrants and natives sending standard emails captures the amount of discrimination in the absence of relevant information other than the ethnic origin. This differential treatment is likely to be a mixture of pure immigrant dislike (taste-based discrimination) and the 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. However, there may be other relevant variables for the rental 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. It may be that, still group belonging is being used to predict this information. We return to these issues when discussing our results in Section 4.

Another crucial point is whose discriminatory behavior we are capturing. In our sample around 30% of the ads are posted by real estate agents while the rest by private individuals (see Table 1). This is important since private individuals and real estate agents may have different incentives to discriminate. Ultimately, we can only capture the behavior of the person who is handling the transaction and is responsible for answering the enquiries. In the case of real estate agents this is likely to be an employee. For private individuals our anecdotal evidence on rental transactions in Spain suggests that most of these ads would be directly posted by the owner of the flat. However, it is possible that these individuals are not the owners, but relatives or employees of the owners. We return to this point in the next section.

3. Empirical analysis

In this section we empirically analyze the presence of discrimination in the Spanish rental housing market. Using a simple model we are able to assess the degree of discrimination and learn about its sources. We also conduct some robustness test for the validity of our results.

Table 2 contains descriptive statistics for the distribution of responses within flats. The first column of Table 2 reports the number of flats to which two particular candidates applied simultaneously. The second column shows the percentage and number of cases in which both candidates receive an email back. Column 3 reports the percentage of cases in which none of them gets an answer. The percentages of cases in which only one of the candidates is contacted are reported in columns 4 and 5. We define net discrimination as the difference between these last two columns. Two main patterns seem to emerge from this table. First, immigrants are contacted substantially less than natives. For example, when the two standard applicants send emails to 532 flats (corresponding to flats in columns 3 and 5 of Table 1) we obtain that in around 81% (32% + 49%) of the cases they are equally treated while in 17% of the cases the native is favored and in 2% of them the immigrant is preferred. In all, net discrimination is 15 percentage points in favor of standard native candidates. Second, revealing information about the socioeconomic status of the applicant increases the chances of being contacted. For natives and immigrants net discrimination is 7 and 8 percentage points respectively in favor of the high-quality candidate. Finally, the highest degree of discrimination seems to occur, as expected, when comparing standard immigrants with high-quality natives. In this case, net discrimination is about 20 percentage points.

Table 1
Descriptive statistics of flats where emails were sent.

Number of emails sent to each flat	2	3	4		
				Total	High-quality immigrant 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	607.87	597.29	622.69	605.36	607.48
(Standard deviation)	(273.6)	(199.2)	(242.2)	(313.1)	(283.1)
Average n. of rooms	2.26	2.17	2.28	2.27	2.39
(Standard deviation)	(0.93)	(0.90)	(0.95)	(0.92)	(0.90)
Female owners	52.01%	48.89%	48.15%	54.81%	53.85%

Table 2
Distribution of responses to emails sent.

	N. obs.	Yes – yes	No – no	Yes – no	No – yes	Net discrimination
Standard native – Standard immigrant	532	0.32 ^a (171)	0.49 (258)	0.17 (92)	0.02 (11)	0.15 ^b (81)
High-quality native – High-quality immigrant	986	0.47 (466)	0.35 (351)	0.15 (144)	0.03 (25)	0.12 (119)
High-quality immigrant – Standard immigrant	1382	0.38 (531)	0.46 (636)	0.12 (166)	0.04 (49)	0.08 (117)
High-quality native – Standard native	105	0.46 (48)	0.39 (41)	0.11 (12)	0.04 (4)	0.07 (8)
High-quality native – Standard immigrant	986	0.39 (382)	0.35 (349)	0.23 (228)	0.03 (27)	0.20 (201)
High-quality immigrant – Standard native	105	0.41 (43)	0.46 (48)	0.05 (5)	0.08 (9)	–0.03 (–4)

^a Percentage of emails (number in parenthesis) in which both applicants (standard native and standard immigrant) receive an email back.

^b Percentage of emails (number in parenthesis), in net terms, favoring the standard native applicant.

Table 3
Estimation results for the model in Eq. (1) when the dependent variable is an indicator for “receiving an email back”.

	Probit			Linear probability			Flat fixed effects		
	All	Males	Females	All	Males	Females	All	Males	Females
Immigrant (β)	–0.154*** (0.018)	–0.215*** (0.027)	–0.099*** (0.023)	–0.147*** (0.017)	–0.208*** (0.027)	–0.089*** (0.022)	–0.149*** (0.017)	–0.208*** (0.027)	–0.096*** (0.022)
High-quality (γ)	0.063*** (0.022)	0.033 (0.034)	0.097*** (0.028)	0.060*** (0.021)	0.025 (0.032)	0.094*** (0.026)	0.057*** (0.020)	0.025 (0.032)	0.085*** (0.025)
Immigrant×High-quality (δ)	0.027 (0.022)	0.067** (0.033)	–0.012 (0.029)	0.027 (0.021)	0.069** (0.032)	–0.013 (0.027)	0.029 (0.021)	0.069** (0.033)	–0.007 (0.027)
Observations	4709	2240	2469	4709	2240	2469	4709	2240	2469
(Pseudo) R^2	0.053	0.065	0.068	0.070	0.086	0.089	0.795	0.763	0.825

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

Standard errors are clustered at the flat level.

Estimated marginal effects are reported for probit.

To formally investigate the presence of discrimination and its sources we estimate the following model:

$$C_{ij} = \alpha + \beta I_{ij} + \gamma Q_{ij} + \delta(I_{ij} \times Q_{ij}) + \phi_d + \phi_{ra} + \phi_c + \varepsilon_{ij} \quad (1)$$

The dependent variable, C_{ij} , is an indicator that takes value 1 if candidate i receives a reply to the inquiry about flat j and zero otherwise. As explanatory variables we include 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 a set of dummy variables to capture date (ϕ_d), research assistant (ϕ_{ra}) and city (ϕ_c) fixed effects. In the estimation we use 4709 observations obtained from sending batches of 2, 3 and 4 emails to the 1809 ads.

Eq. (1) is straight forward to interpret. The coefficient β captures the differential treatment between natives and immigrants in the absence of information about their socioeconomic status (standard candidates). The coefficient γ measures the returns to information about the employment and job status of the native applicant, and the coefficient δ captures the presence of any additional returns to information for the immigrant applicant.

Before presenting the results a few comments merit attention. In the absence of information the quality of the applicant can be inferred from the average of his/her ethnic group. Discrimination will occur if the predicted average quality for immigrants is lower than for natives. If this is the only reason behind discrimination, the returns to information should be higher for the immigrant group. In fact, if all the observed discrimination responds to signal extraction problems and there is no relevant information missing in the electronic application, revealing information about the candidate's ability to pay should eliminate the response rate differential between high-quality applicants (i.e. $\delta = -\beta$). In contrast, if there is no informational premium for immigrants ($\delta = 0$) the discrimination faced by high-quality immigrants (compared to high-quality natives) should coincide with the discrimination faced by

standard immigrants (compared to standard natives) (i.e. $\beta + \delta = \beta$). This would suggest the presence of negative attitudes or taste-based discrimination against immigrants or perhaps that relevant information for the transaction is still missing in the application (e.g. family status, pets and so on).

Since the dependent variable in Eq. (1) is discrete we estimate a probit model. Table 3 presents the estimated marginal effects for the whole sample (column 1) and separately for males (column 2) and females (column 3). We also estimate Eq. (1) using a linear probability model (columns 4 to 6) and including flat fixed effects (columns 7 to 9). Both in the probit and the linear probability models we account for the fact that several emails are sent to the same flat by clustering the standard errors at the flat level to obtain a robust variance matrix estimator.¹¹ The three techniques give similar results. Given the experimental nature of the data, the unobserved characteristics of the flat are uncorrelated with the explanatory variables in the model. Thus, the estimation results of the linear probability and fixed effects model are almost identical. The estimates of the linear probability and the probit model are also very similar since the percentage of zeros (ones) in the dependent variable C_{ij} is around 50%. When the predicted probabilities are close to 0.5, probit models are expected to generate marginal effects close to OLS because the underlying nonlinear conditional expectation function is roughly linear in the middle (see; for example, Angrist and Pischke, 2009).

The results in Table 3 deliver three main messages. First, when potential tenants restrict the information just to their “origin” (through their names), natives are contacted more often than Moroccans. The estimate of β in column 1 indicates that natives have about 15 percentage points higher probability of getting a response than immigrants. Interestingly, this difference is substantially larger for males (22 percentage points) than for females (10 percentage points). These results are remarkably similar to those in Ahmed and Hammar-

¹¹ Without clustering, the standard errors are about 60–70% larger.

stedt (2008) who find a 20 percentage points differential treatment for male Arabic sounding names compared to male Swedish names.¹²

Second, providing positive information about the employment or the job status of the potential tenant increases the chances of being contacted. The returns to information for natives, γ , are about 6 percentage points in the whole sample. The returns to information for immigrants are slightly higher (9 percentage points), although there is no statistical evidence of an informational premium for immigrants (i.e. we cannot reject the null hypothesis that $\delta=0$). However, an important difference arises when the model is separately estimated by gender. The pattern for females is similar to that of the whole sample. That is, there is no evidence of an informational premium and for both native and immigrant females the probability of receiving an email back increases by about 10 percentage points when positive information about their quality is revealed. As a result, disclosing information does not reduce discrimination among high-quality female applicants, which remains about 10 percentage points (i.e. we cannot reject that $\beta=\beta+\delta$).

Third, information does reduce discrimination for males. Table 3 reveals an informational premium of about 7 percentage points for male immigrants. Accordingly, the response rate differential among high-quality applicants with respect to standard applicants is substantially reduced (i.e. $\beta=0.22$ versus $\beta+\delta=0.15$). This result indicates that, at least for males, part of the observed discriminatory behavior responds to the lack of information about an immigrant ability to pay. However, the sizeable response rate differentials that still remain after revealing some of the candidate's socioeconomic characteristics suggests that negative attitudes against immigrants also affect the transactions in the rental market.¹³

Our dependent variable, C_{ij} , captures a lower bound for discrimination. Discrimination may occur not because immigrants do not receive response, but because it is negative. We analyze this additional margin of discrimination by studying the “positive” response rates to our inquiring emails. We define an alternative outcome variable that takes value 1 if the candidate is “invited to further contacts” and zero if either there is no response or the response is negative. Admittedly, in constructing this variable there is a certain degree of subjectivity. Our “positive” response of “invited to further contacts” may range from a direct invitation to visit the flat to a somehow less clear reply (i.e. more questions about his/her socioeconomic characteristics or instructions to contact at a further date). In order to be as objective as possible we consider a negative response only when the email specifically states that the flat is no longer available. The results are reported in Table 4. Discrimination patterns among standard immigrants are virtually unchanged, albeit slightly muted. The only significant difference with respect to Table 3 is the increase in the returns to information for native male candidates from 3.3 to 6.1. This results in a reduction of the informational premium for immigrant candidates of around 2 percentage points that renders it statistically insignificant (it is only significant at the 15% level). This is consistent with the fact that conditional on receiving an email back, high-quality natives get more positive replies than the rest of applicants. This gives some support to the hypothesis that there is an additional margin of discrimination. In all, our interpretation is that, although informative, the ambiguities in the construction of the

variable “invited to further contacts” make it a less reliable indicator of discrimination. Hence, we focus our analysis in the results obtained from our original dependent variable.¹⁴

Summing up, our results indicate that there is substantial differential treatment between native and immigrant candidates. In the absence of any information this differential treatment is around 22 percentage points for males and 10 percentage points for females. We also find that revealing information about the socioeconomic status of the potential tenant significantly increases the chances for an immigrant of being contacted, by about 7 and 10 percentage points for males and females respectively. However, despite traces of an informational premium for male immigrants, the response rate differentials among high-quality applicants are still large (i.e. 15 percentage points for males and 10 percentage points for females).

In order to better understand the patterns of discrimination, we explore how the treatment received by different candidates varies across flat characteristics. We re-estimate the model in Eq. (1) including two additional controls that describe some of the flat characteristics and the interaction of these controls with the three variables of interest (I_{ij} , Q_{ij} and $I_{ij} \times Q_{ij}$). In particular, we include an indicator variable that takes value 1 if the rental price per room is above the mean price of the city and another indicator variable that takes value 1 if the ad is placed by a real estate agency. Table 5 shows the estimated marginal effects of the probit model. Note that the sample is reduced by around 10% since these two characteristics could not be recorded for all applications. The coefficients on I_{ij} , Q_{ij} and $I_{ij} \times Q_{ij}$, capture now the discriminatory behavior of private individuals in below average price flats. The interaction of these three variables with the price indicator illustrates the differential behavior occurring in above average price flats. The interaction with the real estate indicator informs about the discriminatory practices of real estate agents (relative to private individuals). Two results should be highlighted from the table. First, real estate agents seem to discriminate significantly less than private individuals. Indeed, the response rate differential between standard natives and standard immigrants is about 18 percentage points when a private individual places the ad, while it is only approximately 8 ($\beta+\beta_{RE}$) percentage points when it is placed by a real estate agent. Interestingly, the gender pattern that appears in Table 3 is still present for real estate agents. That is, immigrant males are discriminated substantially more than their female counterparts. Second, we do not find any evidence that discrimination varies by flat quality as none of the price indicators are statistically significant.

In a setup where there is a limited number of applicants to each property we are concerned that the response rate to candidates is affected by the composition of the applicants' pool. In particular, discrimination faced by standard immigrants with respect to their native counterparts may be influenced by the inclusion of high-quality candidates.

In order to test if this is the case, we study how discrimination patterns vary with the composition of the application pool.¹⁵ We estimate the following model:

$$C_{ij} = \alpha + \beta I_{ij} + \gamma Q_{ij} + \delta(I_{ij} \times Q_{ij}) + \eta(I_{ij} \times \phi_{Sj}) + \phi_{Sj} + \phi_d + \phi_{ra} + \phi_c + \varepsilon_{ij} \quad (2)$$

¹² These authors do not compare differences in the response rates of native and immigrant females.

¹³ Ahmed et al. (forthcoming) do not find evidence that revealing information about the education, occupation or marital status of the candidate reduces discrimination against male immigrants in the Swedish rental housing market. This different result may respond to differences in the immigration histories of the two countries. While immigration in Spain is a very recent phenomenon, that is not the case in Sweden. As a result, the level of uncertainty about the reliability of immigrants may be higher in Spain. Accordingly, revealing information about the quality of the immigrant candidate may have higher returns in Spain than in Sweden. These authors do not perform the experiment for females so the comparison is not possible.

¹⁴ A weakness of our experiment is that we can only measure discrimination at the first stage of the transaction. We simply measure responses to flat inquiries and invitations to further contacts. Hence, we cannot explore the discrimination that results from further interactions with the property owner or real estate agent. Nevertheless to the extent that fewer responses to the enquiries reduce the possibility of renting a flat, our experiment provides important insights on the degree of discrimination in the rental market.

¹⁵ 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.

Table 4
Estimation results for the model in Eq. (1) when the dependent variable is an indicator for “invited to further contacts”.

	Probit			Linear probability			Flat fixed effects		
	All	Males	Females	All	Males	Females	All	Males	Females
Immigrant (β)	-0.136*** (0.018)	-0.204*** (0.027)	-0.078*** (0.023)	-0.127*** (0.017)	-0.194*** (0.026)	-0.066*** (0.021)	-0.134*** (0.017)	-0.194*** (0.026)	-0.079*** (0.021)
High-quality (γ)	0.085*** (0.021)	0.061* (0.033)	0.108*** (0.027)	0.084*** (0.020)	0.055* (0.032)	0.110*** (0.025)	0.075*** (0.020)	0.055* (0.031)	0.094*** (0.025)
Immigrant \times high-quality (δ)	0.004 (0.021)	0.048 (0.032)	-0.035 (0.028)	0.001 (0.020)	0.045 (0.031)	-0.041 (0.026)	0.006 (0.021)	0.045 (0.032)	-0.030 (0.026)
Observations	4709	2240	2469	4709	2240	2469	4709	2240	2469
(Pseudo) R^2	0.054	0.065	0.076	0.071	0.085	0.098	0.797	0.763	0.831

****: significant at 10%, 5% and 1% respectively.
Standard errors are clustered at the flat level.
Estimated marginal effects are reported for probit.

Table 5
Estimation results for the model in Eq. (1) with flat characteristics (Probit estimates).

	All	Males	Females
Immigrant (β)	-0.177*** (0.030)	-0.230*** (0.040)	-0.129*** (0.047)
High-quality (γ)	0.076** (0.039)	0.079 (0.053)	0.079 (0.058)
Immigrant \times high-quality (δ)	0.010 (0.037)	0.030 (0.051)	-0.014 (0.056)
Price (ϕ_p)	0.020 (0.046)	0.001 (0.067)	0.033 (0.065)
Price \times immigrant (β_p)	0.001 (0.044)	-0.002 (0.064)	-0.001 (0.063)
Price \times information (γ_p)	-0.022 (0.055)	-0.052 (0.080)	0.003 (0.077)
Price \times immigrant \times information (δ_p)	0.022 (0.051)	0.048 (0.075)	0.007 (0.073)
Real estate (ϕ_{RE})	-0.125** (0.052)	-0.039 (0.091)	-0.171** (0.067)
Real estate \times immigrant (β_{RE})	0.104** (0.048)	0.094 (0.084)	0.105* (0.063)
Real estate \times information (γ_{RE})	0.047 (0.060)	-0.016 (0.105)	0.093 (0.077)
Real estate \times immigrant \times information (δ_{RE})	-0.028 (0.057)	-0.019 (0.096)	-0.033 (0.077)
Observations	4268	1997	2271
Pseudo R^2	0.062	0.072	0.087

****: significant at 10%, 5% and 1% respectively.
Standard errors are clustered at the flat level.
Estimated marginal effects are reported.
The dependent variable is an indicator for “receiving an email back”, C_{ij} .

where ϕ_{Sj} corresponds to an indicator variable that takes value 1 if only standard candidates (one native and one immigrant) apply to property j and 0 otherwise. Under the specification in Eq. (2), β captures the differential response rate among standard candidates when high-quality candidates are in the application pool. Then $\beta + \eta$ captures the differential treatment when only standard applicants apply to the property. Table 6 shows the results. We cannot reject the hypothesis that $\eta = 0$ for any of our samples (all, male and female applicants).

More generally, we can test whether there are significant differences in discrimination patterns when we send all four possible emails, compared to the results when we send 2 or 3 emails. With this objective we estimate the following model:

$$C_{ij} = \alpha + \beta I_{ij} + \gamma Q_{ij} + \delta (I_{ij} \times Q_{ij}) + \beta_A (I_{ij} \times \phi_{Aj}) + \gamma_A (Q_{ij} \times \phi_{Aj}) + \delta_A (I_{ij} \times Q_{ij} \times \phi_{Aj}) + \phi_{Aj} + \phi_d + \phi_{ra} + \phi_c + \epsilon_{ij} \quad (3)$$

where ϕ_{Aj} is an indicator variable that takes value 1 if all four emails are sent to the same property j and 0 otherwise. The results are presented in Table 7. Again, we cannot reject $\beta_A = \gamma_A = \delta_A = 0$. Hence, we conclude that despite our concerns, it seems that the composition of the applicants' pool does not have a significant effect on the discriminatory patterns.

Table 6
Estimation results for the model in Eq. (2) (Probit estimates).

	All	Males	Females
Immigrant (β)	-0.134*** (0.034)	-0.185*** (0.057)	-0.092** (0.038)
High-quality (γ)	0.082** (0.033)	0.061 (0.058)	0.101*** (0.038)
Immigrant \times high-quality (δ)	0.006 (0.035)	0.037 (0.059)	-0.019 (0.042)
ϕ_S	-0.086 (0.170)	0.062 (0.205)	-0.220 (0.182)
$\phi_S \times$ immigrant (η)	-0.032 (0.040)	-0.041 (0.067)	-0.022 (0.047)
Observations	4709	2240	2469
Pseudo R^2	0.053	0.065	0.069

****: significant at 10%, 5% and 1% respectively.
Standard errors are clustered at the flat level.
Estimated marginal effects are reported.
The dependent variable is an indicator for “receiving an email back”, C_{ij} .
 ϕ_S is an indicator that takes value 1 if only standard candidates apply to the property.

Table 7
Estimation results for the model in Eq. (3) (Probit estimates).

	All	Males	Females
Immigrant (β)	-0.161*** (0.021)	-0.225*** (0.030)	-0.101** (0.029)
High-quality (γ)	0.055** (0.027)	0.021 (0.041)	0.096*** (0.036)
Immigrant \times high-quality (δ)	0.033 (0.025)	0.079** (0.038)	-0.014 (0.034)
ϕ_A	0.043 (0.134)	-0.059 (0.155)	0.074 (0.292)
$\phi_A \times$ immigrant (β_A)	0.024 (0.051)	0.054 (0.078)	-0.005 (0.067)
$\phi_A \times$ information (γ_A)	0.022 (0.047)	0.045 (0.070)	-0.010 (0.062)
$\phi_A \times$ immigrant \times information (δ_A)	-0.012 (0.066)	-0.078 (0.084)	0.052 (0.095)
Observations	4709	2240	2469
Pseudo R^2	0.053	0.065	0.068

****: significant at 10%, 5% and 1% respectively.
Standard errors are clustered at the flat level.
Estimated marginal effects are reported.
The dependent variable is an indicator for “receiving an email back”, C_{ij} .
 ϕ_A is an indicator that takes value 1 if all four candidates apply to the property.

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 9 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 (at least not with those of a model where animosity against the minority group is so strong that discrimination is practiced at any cost). Second, we find some evidence of higher returns to information for immigrant males compared to their native counterparts. 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, the results of the experiment do not allow us 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 provided 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 3](#)). 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 males, part of the raw discrimination observed in the rental market is caused by the perception that a Moroccan name signals low ability to pay. Nevertheless, the absence of an information premium for immigrant females 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 7 percentage points. Thus, it is unlikely that the remaining differential treatment, 15 percentage points for males and 10 percentage points for females, can be completely eliminated by providing additional information. This suggests the presence of some animosity against immigrant tenants.

An additional result from our experiment is that discrimination patterns do differ for private individuals and real estate agents. This comes as no surprise. Real estate agents have to balance the incentive of closing the transaction and satisfying the owner's demands about the tenant. In fact, the main bulk of real estate agents' income comes from closing the transaction. In most cases, they are virtually unaffected by the probability of default by the potential tenant. Hence, if the reason for discrimination is the uncertainty about the long term ability of immigrants to pay the rent, they will be less demanding than private owners.

Admittedly, one could think of alternative explanations for our results. For instance, it is possible that the rental decision is being influenced by the possible reaction of existing tenants in the same

building and does not represent prejudice of the individual handling the transaction. This is a form of “costumers” discrimination. Although this discriminatory mechanism has been detected in restaurants and hotels, we do not think that it is driving our results. It is very uncommon in Spain (contrary to the US) that a single person or a real estate agency owns a whole building and is concerned about the possible externality that a Moroccan tenant may cause on other residents in the same property.

Another possibility is that the additional returns to information for immigrants reflect that people placing the ads are afraid to discriminate against high-quality candidates, as they are more likely to take legal actions in the presence of discrimination. However, we do not think this is the case either. As we have discussed in the introduction immigration is a very recent phenomenon in Spain. The law governing rental transactions in Spain dates from 1994 and it is completely silent about discrimination practices. Therefore, there are still no institutions in place to protect ethnic minorities of abuses in this market such as fair housing offices in the US. As an example, in the course of our experiment we found several ads that specifically urged immigrants not to apply.¹⁶

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 flat searching method. 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 rental properties. 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](#); [Heckman, 1998](#)) and it does not allow us to differentiate the sources of discrimination. However it is useful to obtain an indication 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 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 min) to ensure that the 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 invitations to visit the flat.

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

¹⁶ The Spanish constitution prohibits discrimination by country of birth, race, gender, religion, opinion or any other personal or social circumstance. Direct evidence of discrimination is rare and when it exists, corroboration is difficult. For example, testing procedures as the one conducted in this paper are not uniformly accepted by lawmakers, courts and administrative bodies in Spain.

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 person renting the flat. 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 telephone audit study are presented in Table 8. The first column reports the percentage and the number of cases when both the native and the immigrant candidate are invited to visit the flat. The second column reports these results when both applicants fail to arrange a visit. The number of cases when only the native or only the immigrant is invited to a flat showing is reported in columns 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 invitations to a flat showing 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 candidates and the second and third separately by gender.

The telephone audit study returns very similar results to those in the main experiment. From the 201 properties 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 9 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.

Table 8
Percentage and number of invitations to a flat showing in the audit study.

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

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

^a Percentage of cases (number in parenthesis) in which both candidates are invited to visit the property.

^b Percentage of cases, in net terms, favoring the native applicant.

^c Test statistic for the null hypothesis "The percentage of cases, in net terms, favoring the native applicant is 0".

Table 9
Net discrimination test in the audit study.

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

See footnotes b and c in Table 8.

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 names of Moroccan origin. 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, unless negative attitudes against the foreign-born population disappear.

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