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Can social media lead to labor market discrimination? Evidence from a field experiment

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Abstract

In this paper, we investigate the role of social media as a source of information for recruiters to discriminate applicants. We set up a field experiment over a 12-month period, involving more than 800 applications from two fictitious applicants which differed in their perceived origins, which is an information available only from their Facebook profiles. During the experiment, an unexpected change in the Facebook layout reduced the salience of the information available on social media profiles. Before this change, a significant 41.7% gap between the two applicants callback rates highlights that personal online profiles are used by recruiters as a source of information to discriminate against applicants of foreign origin. After the layout change that mitigates our signal, the difference in callback rates fades away. This result suggests that the screening conducted by the employers does not go beyond the main pages of profiles. It also illustrates that design choices made by online platforms may have important consequences on the extent of discrimination.

1 | INTRODUCTION

Discrimination based on race and ethnic background, or more generally on personal traits, is a major concern. The spread of social media has made disclosing personal information and traits online a daily habit for hundreds of millions of people.[1] This makes social media attractive to recruiters looking for information on job applicants that does not appear on the application material. While information unrelated to applicants' professional skills might help improving the match between applicants and recruiters, it leaves room for discrimination. In the case of social media used for leisure purposes, for example, Facebook, users often disclose information without considering potential professional consequences. Bertrand and Duflo (2017) highlight that the impact of social media on hiring discrimination has been largely overlooked in the economic literature so far, although documenting such practices is essential since the discrimination occurs without the applicants awareness.[2] In this paper, we propose an experimental setting to assess whether information disclosed on social media constitutes a source of discrimination during hiring. More precisely, we

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investigate whether recruiters discriminate against job applicants on the basis solely of the information they find on Facebook profiles.

In the literature on labor market discrimination, the negative impact on hiring of personal traits linked to minority groups has been well documented for the sexual orientation, religious beliefs, and political opinions (see Bertrand & Duflo, 2017; Riach & Rich, 2002). In addition, the negative effect of belonging to a racial minority has been widely studied and observed worldwide. Recruiters generally gather information on applicants from their application materials (resume, cover letter, etc.), during the interview, or via word-of-mouth (Granovetter, 1995; Rees, 1966). A distinct feature of our study is that the personal traits we use are not disclosed by any of these usual channels.

The personal traits disclosed by individuals on social media are not revealed for professional purposes but rather to entertain friends and relatives in a broad sense. Several scholars have pointed to the effect of the Internet on labor markets (Autor, 2001; Kuhn & Mansour, 2014). In relation to the hiring process, Clark and Roberts (2010) review declarative surveys, which document the emerging use of social media by recruiters to screen applicants. Those practices vary widely among the different surveys due most probably to declarative bias stemming from the illegality of these practices. It has been shown in other contexts such as the short-term housing rental market (Edelman, Luca, & Svirsky, 2017), online commerce (Doleac & Stein, 2013), and peer-to-peer loans (Pope & Sydnor, 2011) that online information found by recruiters can be used to discriminate. The paper by Acquisti and Fong (2016) is closest to our article. They use a field experiment to address the issue of discrimination during hiring based on online information in the US labor market, and find evidence of such discriminatory practices with respect to religious beliefs in some states and counties. Their project is concurrent but independent from ours.

In this paper, we test the use of social media by recruiters to discriminate in hiring decisions, based on a field experiment on the French labor market. We created two fictitious applicants, which differ in one signal—their perceived origins—which is available only on their Facebook profiles. The control applicant has a typically French profile, while the test applicant's profile reveals that he is from Marrakesh, Morocco (North Africa), and speaks Moroccan Arabic, and so is perceived as a candidate of Arabic origin. People of Arabic descent are a minority in France, and numerous studies on the labor market in France and in other countries show that people of Arabic origin are subject to hiring discrimination.[3] Each applicant was given a unique first name and last name combination on social media to ensure that an Internet search would identify the right profile. Our candidates applied for job positions at an accountant in the greater Paris area. We sent one application per job opening using pseudo-random assignment method (see Ahmed, Andersson, & Hammarstedt, 2013; Acquisti & Fong, 2016). Sending one application per job opening alleviates risk of detection, and further reduces the burden on recruiters imposed by the experiment. It also allows us to use identical application materials, resumes, and cover letters, for both applicants.[4] The pseudo-random assignment method allows us to control, during the experiment, that the two fictitious candidates are applying for similar job positions. Following the literature on hiring, we consider a callback from a recruiter to set up a job interview as a positive outcome. Since the two applicants are similar except for their perceived origins displayed only on their Facebook profiles (hometown and spoken languages), a significant difference in callback rates can stem only from the observation by the potential employer of this signal, and the use of it to discriminate.

Using our two fictitious applicants, we applied for more than 800 positions over a 12-month period between March 2012 and March 2013, including the main experiment and two robustness checks. For the main experiment between March and September 2012, we sent 462 applications, equally divided between the two applicants. We find significantly different response rates for our two fictitious applicants: 21.3% for the French candidate, and 13.4% for the Arabic applicant. This gap in callback rates in favor of the French (vs. the Arabic) applicant suggests that in addition to the information in the application material, employers search for other information on applicants, and use the information found on Facebook profiles to discriminate. In our case, a small signal on the Facebook profile generates a significant and constant gap of 37% in the probabilities of our two applicants of being called back for interview.[5] Thus, personal information posted on Facebook has a dramatic effect on the odds of being called for an interview. In other words, we show that recruiters use information found on Facebook profiles to discriminate among applicants.

We also conduct two robustness checks. First, we test for alternative names, and obtain similar results which shows that our main result does not rely on the applicants' names. Second, an exogenous change in December 2012 in the default layout of the Facebook profiles allows us to confirm that the gap between our two applicants relies on the differentiating signal (perceived French origin vs. Arabic origin). The layout change results in a part of our signal, the spoken languages, being located under a secondary tab rather than being displayed on the front page of profiles. After December 2012, the gap in callback rates between the two candidates shrank dramatically, as though in the

recruiters eyes, both profiles now were identical. The effect of this layout change on the outcome of our experiment confirms that recruiters were checking our applicants Facebook profiles, and were taking the spoken languages into account when calling back the applicants.

This behavior is in line with the study by Bisin et al. (2008) which highlights the effect of the spoken language as a marker of cultural identity, and its subsequent discriminatory effect for applicants who are perceived as foreigners. This result suggests that an outcome as important as being called back or not for a job interview is influenced largely by the way personal information is displayed on social media. The overall experiment confirms the importance of Facebook for recruiters and gives some insights into the extent of discrimination exercised by recruiters using social media screening. Moreover, the layout change allow us to obtain two additional results. First, the existence of search costs when browsing an entire Facebook profile, which seems to limit the recruiters' depth of search for personal information. Second, our results make clear that the online platforms design decides how much information is displayed and how salient it is made, which can have real consequences in terms of discrimination. Edelman et al. (2017) and Fisman and Luca (2016) both emphasize this problem when addressing the issues of discrimination in online marketplaces like Airbnb, eBay, or Uber. Hiring is another area where similar issues arise. Although Facebook is not an online job platform like LinkedIn, it serves an important role in hiring decision. Our results also have consequences beyond discrimination: Employers are screening information available on personal social media that is not aimed primarily at employers or potential employers. This shows that the separation between the personal and the professional spheres is becoming increasingly blurred. Also, our experimental setting and use of social media, which is in line with Bertrand and Duflo (2017), allows us to test in a natural context for the impact on hiring of extracurricular activities.

The article is organized as follows: Section 2 reviews the labor market discrimination and data-based discrimination literatures, with a special focus on digital markets. Section 3 describes the field experiment and our protocol. The main results of the experimentation are exposed in Section 4. Robustness checks are provided in Section 5, and Section 6 presents some conclusions.

2 | LITERATURE REVIEW

In this paper, we are interested in understanding the use of social media by recruiters, and how it can lead to discrimination. This investigation contributes to three literature streams. The first refers to the role of nonprofessional information about applicants such as ethnicity, sexual orientation, political opinions, etc., which can lead to discrimination during the hiring process. The second is related to the use by recruiters of formal and informal channels of information to gather personal information on applicants or to identify traits. The third strand of work includes an emerging literature on discriminatory outcomes in online markets including the labor market, based on the use of personal information posted online.

2.1 | Personal traits and labor market discrimination

According to the economic literature, hiring discrimination against minority groups relies on two main mechanisms: recruiters dislike of interacting with members of minority groups (Becker, 1957), or the expectation that members of minority groups are less productive on average than members of other groups (Arrow, 1973; Phelps, 1972). There is a large empirical literature documenting the different personal traits underlying hiring discrimination, and measuring the range of the negative effects (Bertrand & Duflo, 2017; Riach & Rich, 1991). These studies rely mostly on field experiments so as to circumvent declarative bias associated with the illegality of this practice. Amongst the personal traits that can lead to hiring discrimination, the negative effect of belonging to a minority race or ethnic group is the most frequently documented in many contexts (Bertrand & Duflo, 2017).[6]

Using correspondence test methodology, several studies manipulate applicants' names or first names so that applicants are perceived as members of a racial or an ethnic minority group. In the studies by Bertrand and Mullainathan (2004) and Jacquemet and Yannelis (2012) on the American labor market, the names and first names of fictitious applicants are manipulated so that they are assigned either typically African American-sounding names or White-sounding names. Both studies show that individuals with African American names received around half the number of callbacks as individuals with White-sounding names. These results illustrate large and systematic discrimination in the United States against the African American minority group compared to the White-American majority group. Using a similar method of investigation, other studies illustrate the existence of discrimination in hiring

against racial or ethnic minorities based on applicants' name in many countries. Oreopoulos (2011) shows hiring discrimination in the Canadian labor market against applicants with Chinese, Indian, or Pakistani-sounding names compared to applicants with English-sounding names, that is, applicants from the White majority group. Galarza and Yamada (2014) observe discrimination in Peru against individuals with indigenous-sounding names against individuals with White-sounding names. In the case of Europe, the results are similar for discrimination against Asian-sounding names in Czech and German labor markets (Bartoš, Bauer, Chytilová, & Matějka, 2016). In line with our study, Duguet et al. (2010) and Edo and Jacquemet (2013) provide results of discrimination on the French labor market against applicants with Arabic-sounding names. Alongside these studies that investigate the effect of the names, some studies address the effect of a foreign nationality on labor market discrimination. For instance, Firth (1981) shows that in the British labor market, applicants with African, Indian, or Pakistani nationality indicated by their place of birth, have significantly lower callback rates than British applicants. In France, Duguet et al. (2010) highlight the negative effect on callbacks of Moroccan nationality compared to French nationality. Those studies show clearly that applicants that are perceived to be members of a racial or minority group based on name, first name, nationality or cultural characteristics face hiring discrimination in many countries including France. This evidence from the discrimination literature led us to choose perceived origin (French vs. foreign origin) as a differentiating signal in our experiment. This signal is likely to generate discrimination. In the empirical literature on labor discrimination, personal traits often are not available explicitly but can be inferred from information recruiters find in the application material. This led to our focus on the way recruiters gather applicants' personal traits, that is, to pinpoint sources of information on applicants.

2.2 | Informal sources of information for recruiters

Formal and informal channels of information can be distinguished based on the information source. In the case of recruiters and applications, the formal channel of information is the applicant who provides explicit information to recruiters. This is contained in the application material (resume, cover letter, reference letters, etc.), and, if selected, the interview. In both cases, the information provided by the applicant as identity, education, work experience, and qualifications can be verified (DeVaro, 2008; Holzer, 1987; Rees, 1966; Spence, 1973).

Informal channels of information for recruiters include the applicants former colleagues and/or acquaintances via references and word-of-mouth (Albrecht & van Ours, 2006; Granovetter, 1995; Montgomery, 1992; Rees, 1966; Van Ommeren & Wentink, 2012). Since the works by Granovetter (1995) and Rees (1966), many studies have highlighted the importance of referrals and recommendations in the hiring process (Obukhova & Lan, 2013). Former or current valued employees are considered reliable sources of information about potential recruits because they are likely to recommend candidates with similar competences, and their recommendations can affect their reputations as referees (Rees, 1966; Sterling, 2014). The empirical literature underlines the complex effects of informal contacts and networks on labor outcomes due to individual, relational, and employer heterogeneity (Cappellari & Tatsiramos, 2015; Ioannides & Loury, 2004; Pellizzari, 2010). Studies using more recently available data show that informal channels of information matter since they carry reliable information that it would be difficult to convey via formal channels (Bayer, Ross, & Topa, 2008; DeVaro, 2008; Kramarz & Skans, 2014).

The empirical literature on labor market shows that recruiters use both types of information channels (Granovetter, 1995; Rees, 1966). However, as Autor (2001) and Kuhn (2014) suggest, labor market and hiring process are being affected strongly by the Internet. Some studies, based mainly on declarative surveys, to the use of the Internet, and especially social media as emerging channels of information on applicants (Clark & Roberts, 2010). However, very few works have intended to focus on the potential discriminatory behaviors that can originate from this new practice.

2.3 | Discriminatory outcomes on online markets

Our article also contributes to the growing number of studies focusing on use of online information to discriminate in online markets (Fisman & Luca, 2016). In online selling of used goods, Doleac and Stein (2013) show that if a picture attached to an ad conveys information about the sellers race, this has consequences for the negotiation with prospective buyers. African American sellers receive 17% fewer offers and a smaller highest offer compared to their white counterparts. In an online peer-to-peer lending market, Pope and Sydnor (2011) show that, for similar credit profiles, White (vs. African American) borrowers enjoy both a higher chance of being funded and a lower subsequent interest rate. In the short-term rental housing market, Edelman et al. (2017) create fictitious guests with distinct characteristics and are able to document an eight-point penalty in the

acceptance rate for guests with typically African American names. Beyond the human decision to discriminate, Lambrecht and Tucker (2018) present evidence of the impact of the auction algorithm which is used to allocate advertising impressions and its discriminatory outcome.

In a labor-market context, Acquisti and Fong (2016) is the closest to this paper. They address the question of discrimination by recruiters in the United States based on personal traits related to religious belief (Christian vs. Muslim) and sexual orientation (straight vs. homosexual) available on social media.[7] They implement a correspondence test using two pairs of fictitious applicants, and manipulated a signal only available on Facebook made with closed- or open-ended text fields: "Religion:" (Christian or Muslim), and "I'm interested in:" (female or male). They submitted around thousand applications in various American cities for each fictitious applicant, and found a significant difference in callback rates only for religious treatment but not at the national level. These gaps in callback rates occur in states and counties characterized by a high proportion of Republican voters, relatively older people, and a low proportion of Muslims. Their setting and results differ from ours in several ways. First, we are only interested on the impact of an applicant's perceived foreign origin. This personal trait has been shown by Duguet et al. (2010) and Edo and Jacquemet (2013) to induce strong name-based discrimination in the same geographical area as our study (the greater Paris area). Second, our indication of foreign origin is based on text only, while Acquisti and Fong (2016) also manipulate the background image across fictitious applicants. Third, their applicants have a large online presence, for example, LinkedIn, Google+, and Google Sites. This wider presence tends to provide several sources of online information for recruiters, which can mitigate the effect of the manipulation. Fourth, during the course of our experiment, the layout of the Facebook profiles changed and displaced some information into a subtab. Acquisti and Fong (2016)'s study was not affected by this layout change since it occurred before the beginning of their experimentation. As a consequence of this natural experiment, we are able to compare two versions of the site's visual ergonomy. This allows us to get a sense of how deep into the profiles recruiters were looking for information, and to determine that the screening is very superficial. It illustrates that small design choices made by the platform in how prominently it displays user information can have major consequences.

3 | EXPERIMENTAL DESIGN

We conduct a correspondence test using pseudo-random assignment to detect whether employers discriminate based on information they found on social media. In this section, we describe the design of our experiment, that is, the creation of two applicants with identical resumes and cover letters, and with identical social media profiles except for the tested signal. Below we describe our methodological choices (3.1), the characteristics of the fictitious applicants (3.2), and our applications protocol (3.3).

3.1 | Methodology

3.1.1 | Labor market and field experiments

To capture whether employers' real practices rely on information found on social media and to avoid declarative bias, we chose a field experiment. In the labor market literature, field experiments rely on two main methodologies: audit/situation testing, and correspondence testing. Audit testing consists of real people, usually professional actors briefed by the experimenters, who apply for job openings, and present themselves for job interviews. The audit approach allows a focus on employers' hiring behaviors along the multiple steps of the hiring process, that is, (a) whether they call the candidate for an interview, (b) whether they offer the position after the interview, and (c) the wage level offered. One of the limitations of this approach is that it is difficult in practice, to ensure similar applicant performance in face-to-face interviews. Also, actors' direct interactions with employers during interviews raise concerns about experimenter bias.[8] Correspondence testing involves fewer methodological issues (Riach & Rich, 2002). It allows for better control over the experimental environment, especially the content of applications. The method is also less time-consuming and easier to reproduce (Bursell, 2007). In addition, although correspondence testing reveals discrimination at the interview callback stage, and not at the final hiring decision stage, it has been shown that about 90% of the discrimination occurs in the former stage (Riach & Rich, 2002). According to Bursell (2007), correspondence testing is a type of randomized experiment, and therefore, provides the most convincing method to allow causal inferences.[9] The main difficulty lies in constructing two applications that are similar in all the relevant characteristics except the one being tested. Indeed, the

two applicant materials need to be sufficiently different to avoid detection by the employer, but sufficiently similar that the difference in callback can be attributed to the tested characteristic.

3.1.2 | Pseudo-random assignment

Following Ahmed et al. (2013), we carry out a correspondence test in which we send only one application per job opening. Compared to the usual correspondence testing which consists of sending at least two applications per job opening, this methodology has three main advantages. First, it allows us to create two fictitious applicants that are identical regarding their application material (resumes and cover letters) and with identical Facebook profiles apart from the manipulated characteristic (or signal) information that is available only on their social media profiles. Any observed difference in the callback rates may then be clearly attributable to this signal. Second, since the applications are sent to two different firm samples, there is no risk of detection by these firms. Third, each recruiter receives only one application. This means that our study interferes only marginally with the real hiring process compared to sending multiple applications for each opening. This is more efficient and more desirable ethically.[10] We ensure that our two applicants apply for positions with similar characteristics using a pseudo-random assignment procedure by responding to job openings available on pole-emploi.fr, the website of the French public employment agency Pôle Emploi. Ads on this website provide detailed information on both job positions and firms.

In line with the literature, we consider a callback from a recruiter to arrange a job interview as a positive outcome. Since the two applicants are similar except for one signal that is available only on their Facebook profiles, a significant difference in callback rates may stem from observation of the signal by recruiters. Another approach would be to use a system similar to Google Analytics to track whether recruiters visited our candidates' profiles. However, the data gathered would be virtually useless for economic analysis. For example, if the information relied on the recruiters' IP address, it would be impossible to distinguish the companies' address from the Internet service providers IP address, and particularly in the case of smaller firms.[11] The most meaningful statistic produced by an analytics tool would be the total number of visits to the profile, and not the part of the recruiters who visited it. Finally, it is not possible to include an analytics code in the Facebook profiles.

3.2 | Fictitious applicants

3.2.1 | Resumes and cover letters

The construction of the application material has three objectives: (a) creation of similar material for both applicants, (b) producing realistic material, and (c) maximizing the number of interview calls so as to increase statistical significance. Since our two applicants have the same resumes and cover letters, the two sets of application materials are similar. Before starting the experiment and alongside conducting pretests, we interviewed human resources managers to ensure the relevance of the cover letters to current job market conditions. Also, depending on what the job ad specified, both the letter and the resume included some standard sentences corresponding to profiles being sought by the recruiters.[12] Cover letters and resumes that are too general and too standardized are usually considered less effective because most employers are seeking a specific professional profile (customer, supplier, asset manager, etc.). We used information on the recruiting firm available on the Internet on official websites, web articles, etc. When this information on the firms was not available, the cover letters were unspecific. Resumes and cover letters were submitted by e-mail as pdf files accompanied by a standard message. To maximize hiring opportunities, both our applicants declared being already in employment when they applied, and having never been unemployed.[13] Both have a 3-year higher education degree in accounting, flawless school record, and three internships with various experience suitable for most accounting jobs. We decided to focus on accounting jobs for two main reasons. First, accountancy is a back-office job, which usually involves no direct contact with customers. This avoids discrimination based on customer preferences that might affect the hiring process. Secondly, accountant positions are among the most regularly advertised jobs on the Pôle Emploi website in many different sectors, and thus, ensured a minimum number of ads available to apply to each week. It avoided a focus on a few sectors with specific hiring practices.

For each applicant, in both the resume and the cover letter, we provide the following information: name, address, owning a driving license, date of birth and age, phone number, and e-mail address. In the applications package, there was no link to the applicants' social media, nor any reference to the personal traits manipulated. The applicant's address is in an affluent district of Paris (15th arrondissement) which avoids location-based discrimination. The applicant holds a driving license. The phone numbers are distinct in each resume so as to track candidates' callbacks. The e-mail address of each applicant is registered on Gmail with the user names following the same pattern "firstname.lastname@gmail.com."

3.2.2 | Social media profiles

In our experiment, the only difference between our two fictitious applicants relies on a signal appearing only on their Facebook profiles. The social media profile of one applicant includes a signal that could lead him to be perceived as a member of the Arabic minority. More precisely, the profile mentions that the applicant is from a well-known North-African city (Marrakesh, Morocco), and that the applicant speaks Moroccan Arabic. The control profile refers to a typical French city (Brive-la-Gaillarde, France), and the applicant speaks Italian. Thus, we differentiate our applicants by city of origin and languages spoken according to their social media profiles (see Figure 1 for screenshots of the two Facebook profiles).

We chose this signal because many studies highlight the negative impact of an applicant's perceived origins or ethnicity on interview call rates (Ahmed & Hammarstedt, 2008; Bertrand & Mullainathan, 2004; Duguet et al., 2010; Jacquemet & Yannelis, 2012). In particular, studies conducted in Europe show that applicants' foreign language skills act as a signal of foreign cultural identity (Battu & Zenou, 2010; Bisin et al., 2008). Thus, this signal can produce discrimination if the supposed cultural identity is different from the recruiter's, or might reinforce the perceived cultural similarities between the applicant and the recruiter (Edo & Jacquemet, 2013). We find the studies by Duguet et al. (2010) and Edo and Jacquemet (2013) particularly interesting since we use very similar fictitious applicants in terms of education, qualifications, and job search area (i.e., Paris region). Both these studies used correspondence tests to measure the extent of discrimination against Arabic applicants for accountant or assistant-accountant positions in the Paris region. They show a gap of 35–40% in callback rates in favor of the French compared to the Arabic applicants. Therefore, provided that the signal is perceived, we expect it to have a negative impact on the odds of being called for interview.

To ensure that the foreign origin signal is conveyed only by the social media profile, the first and last names of each applicant are French-sounding, namely Thomas Marvaux and Stéphane Marcueil. The first names were picked from the top-five first names for the year of birth. Each first name-last name combination is unique on Facebook,[14] and our fictitious profiles are the sole results of searches on these first and last names on the three leading French language web search engines, and on Facebook.[15]

3.3 | Experiment protocol

We selected job openings published between March 19, 2012 and September 30, 2012 on the French public agency for employment website—Pôle Emploi. We focus on this website because job openings advertised on this website provide systematic and detailed information on jobs (wage, type of contract, working hours, education requirements, work experience, etc.), and firms (name, location, sector, size, etc.). This information is crucial for pseudo-random attribution of applicants to job offers and for statistical analysis. Other popular French employment websites—Monster, Keljob, Indeed, etc.—provide fewer details, and therefore, were not considered. Moreover, we selected only openings that provided a recruiter's direct contact information (contact name and e-mail), and excluded those which required the applicant to contact a third party, usually Pôle Emploi or a recruitment agency. Only openings for long-term work relations were considered, that is, with regular (undefined work duration) or fixed-term contracts (at least 6 months). In France, ending these types of contracts involves high severance payments in addition to legal and administrative procedures.[16] In this context, recruiters are expected to be more careful when screening applicants.

Our applicants have a bachelor's degree (i.e., 3 years of undergraduate education) in accounting, and we responded to ads in the three relevant groups (accountant, assistant-accountant, and aid-accountant) in the Pôle Emploi categorization. For each selected opening, we generated application materials, that is, the resume and the cover letter, using predefined key sentences to match the advertised job. To avoid experimenter bias, the material was not assigned to an applicant until all the application material had been generated.

We observe the recruiters' behavior based on the differences (if any) in return rates for the two fictitious applicants. The candidates have identical application packages and differ only in selected information available on their social media profiles. Following Acquisti and Fong (2016) and Ahmed et al. (2013), we sent only one application per job offer and use a pseudo-random assignment procedure to ensure that both applicants apply to similar positions along the experiment. This pseudo-random assignment is based on job positions (accountant, assistant-accountant, etc.), required work experiences, firm sizes, and firm sectors (see Table 1 for descriptive statistics). Half of the recruiters in our sample received an application from the French candidate, and half received an application from the Arabic candidate. Figure 2 summarizes the timing of the experiment.

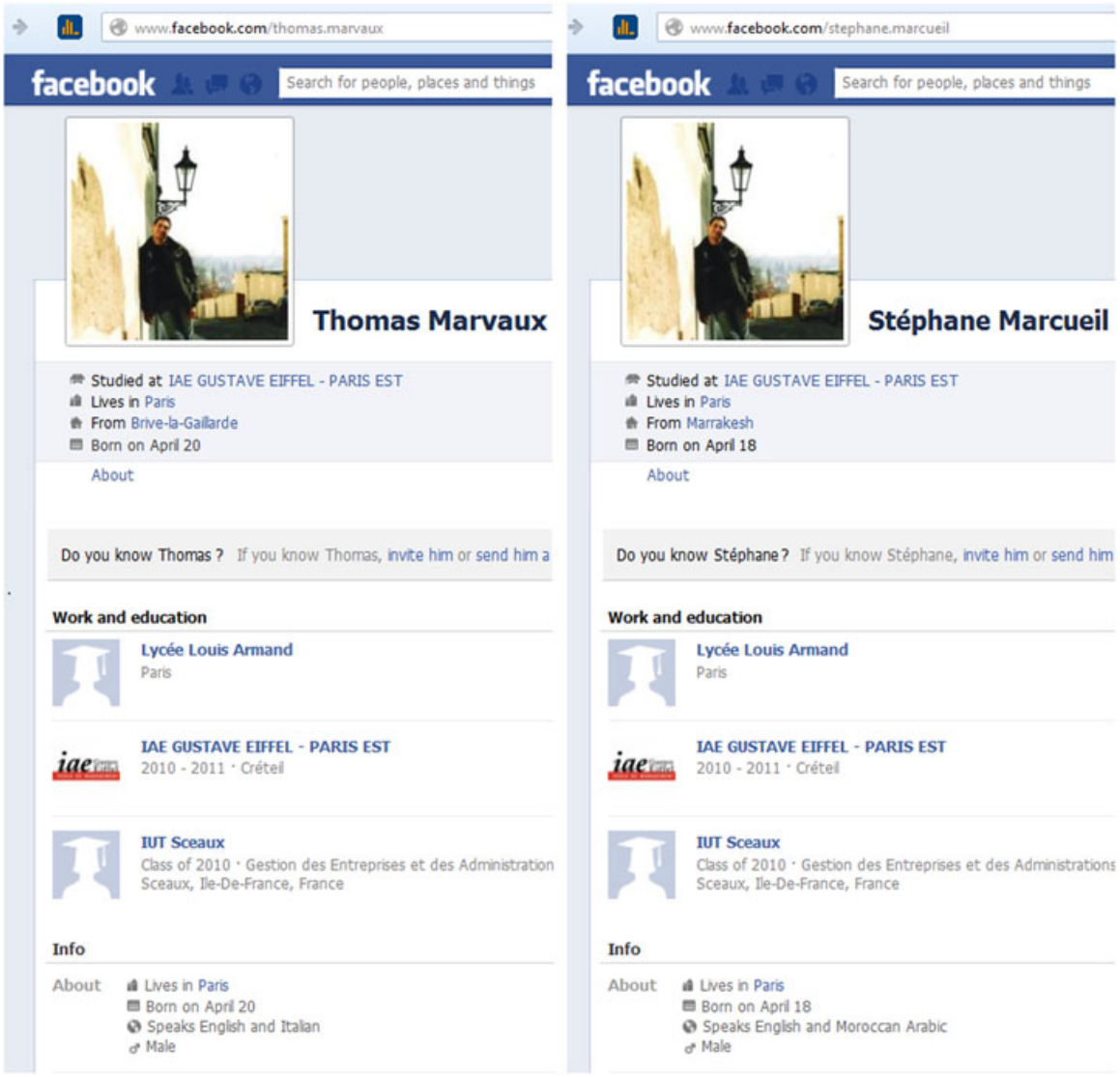

FIGURE 1 Screenshots of the social media profiles of our two applicants and the differentiating signal (city of origin and spoken language) [Color figure can be viewed at wileyonlinelibrary.com]

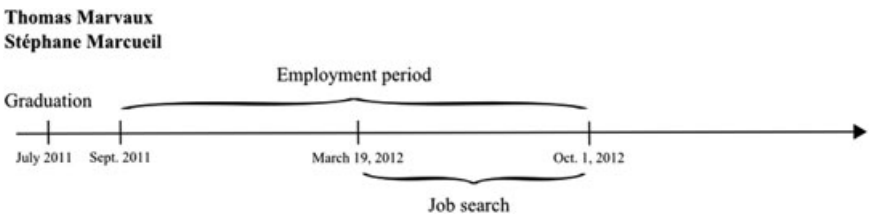

FIGURE 2 Experiment timing

4 | RESULTS

The results of the experiment are as follows. First, we present the main outcome of the experiment based on graphics and independence tests (model-free evidence). Second, we provide robustness checks of the results using probit models. In Section 5, we conduct two additional robustness checks related to the names of the fictitious applicants, and the signal perceived by recruiters.

4.1 | Model-free evidence

We sent a total of 462 applications from both candidates between March 19, 2012 and September 30, 2012. Applications were sent at similar rates over this period. Each job opening received one application, and we ensured that the two applicants applied for positions that were similar according to the observable characteristics of job positions, using pseudo-random attribution process. Table 1 presents a description of the job positions for each applicant.

Table 2 below provides an overview of the main result of this paper. During the period, our applicants received 80 positive calls for interview. This overall return rate is quite high (17.3%) compared to other studies on the Paris area (Duguet et al., 2005, 2010; Edo & Jacquemet, 2013). The most plausible explanation for this higher interview call rate in our study is that we matched application cover letter and resume to each job opening, incorporating predefined sentences corresponding to the characteristics of the firm and the advertised position. Recruiters contacted our applicants mostly by phone (68.0%) and e-mail (26.3%). A few used both means (5.7%). The applicants' postal addresses were real but did not receive regular mail.

TABLE 1 Description of the job applications for each applicant, March–September 2012

Variables	French applicant	Arabic applicant
Job position (%)		
Accountant	44.3	43.1
Specialized accountant	9.6	10.3
Accounting assistant	23.9	29.3
Accountant and secretary assistant	18.7	14.7
Other accounting assistant	3.5	2.6
Required education (%)		
Not specified	40.4	38.8
Vocational certificate	1.3	2.1
High school diploma	11.3[a]	5.2[a]
Associate degree	42.6	49.6
Bachelor's degree	4.4	4.3
Required work experience (%)		
No experience	25.2	27.1
6 months–1 year	12.6	12.5
2 years	27.8	23.3
3 years	16.5	19.4
4 or 5 years	17.9	17.7
Firm size (%)		
0–5 employees	23.5	23.3
6–19 employees	27.8	29.7
20–49 employees	17.8	19.0
50–249 employees	21.3	21.1
250+ employees	9.6	6.9
Firm status (%)		
Private	83.0	83.6
Public	6.5	4.7
Not-for-profit	10.4	11.6
Contract (%)		
Regular	28.7[a]	19.4[a]
Fixed-term	71.3[a]	80.6[a]
Fixed-term contract length (mean [sd], month)	8.2 (4.1)	7.8 (3.3)
Work time[b] (mean [sd], hr/week)	34.3 (5.4)	34.2 (5.6)
Mean wage (mean [sd], €/hr)	12.3 (2.4)	12.3 (2.2)
Industry	see Appendix A	
Location	see Appendix A	
Number of applications	230	232

[a]Indicates a significant difference in proportion at 5% threshold between the two applicants.
[b]French standard weekly work time = 35 hr.

TABLE 2 Callback statistics by applicant

	French applicant	Arabic applicant	Total
Positive callbacks	49 21.3%	31 13.4%	80 17.3%
Negative callbacks	181 78.7%	201 86.6%	382 82.7%
Total	230	232	462

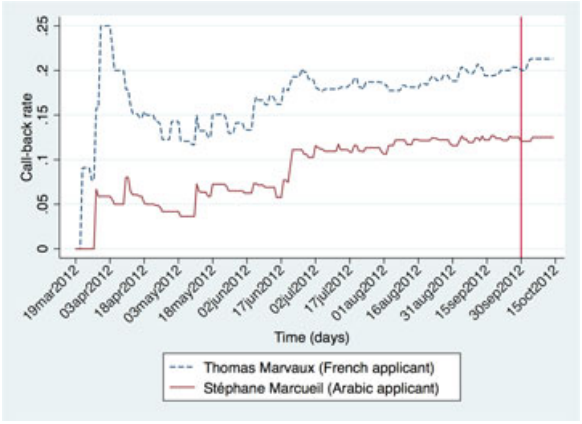

FIGURE 3 Applicants callback rates [Color figure can be viewed at wileyonlinelibrary.com]

The number of interview calls received by our two applicants shows a consistent gap in favor of the French applicant. In particular, Figure 3 shows a roughly constant gap of 8% points between the two applicants in favor of the control candidate who received 21.3% positive returns compared to 13.4% for the test candidate. A χ^2 test ($\chi^2(1) = 5.09$; Pr = 0.024) and Fisher's exact test (Pr = 0.027) confirms the significance of this difference. This gap represents a drop of 37% in callbacks for the Arabic candidate. Figure 3 shows also that both candidates experienced an increased average number of callbacks after June 2012. This change can be explained by the easing of the labor market after the French presidential elections in April–May of 2012. The number of applications sent every month follows the same evolution, showing that firms had more confidence in the economic context after the elections.

Based on the experimental protocol in place, this gap in favor of the control candidate must be the joint result of employers choosing (a) to screen applicants' Facebook profiles, and (b) to use the information collected to discriminate candidates. Employers use information obtained from social media, and consider this information as reliable although it is not part of the formal application package. The results show that the content of the online profile is taken into account for the decision to interview the candidate. In other words, personal information displayed on social media profiles has become a part of the application material considered by recruiters, and can be used to discriminate applicants.

4.2 | Main results

To confirm our first result, we use a probit model to control for different variables that might affect the probability of being invited for interview. For an application i, the probability of being called back is modeled as follows:

$$Pr(Interview_i) = +\beta_1 ArabicApplicant_i + \beta_2 ApplicationDelay_i + \beta_3 JobCharacteristics_i + \beta_4 FirmCharacteristics_i + \beta_5 Time_i + \alpha + \epsilon_i, \quad (1)$$

where $ArabicApplicant_i$ is a dummy variable that equals 1 for the Arabic applicant, and zero for the French one. $ApplicantDelay_i$ is a set of dummy variables indicating the number of days between the posting of the job opening on the website and the application. $JobCharacteristics_i$ includes various job characteristics such as contract type, job position, mean wage offer, etc., related to the job offer.[17] $FirmCharacteristics_i$ is a vector of characteristics related to the

TABLE 3 Probit model results

Dependent variable: callback (yes/no)	Model 1	Model 2	Model 3
Arabic applicant	−0.313**	−0.431***	−0.404***
	(0.139)	(0.159)	(0.156)
Application delay controls	No	Yes	Yes
Job characteristic controls	No	Yes	Yes
Mean wage offer	No	Yes	No
Firms' characteristic controls	No	Yes	Yes
Time dummies	Yes	Yes	Yes
Constant	−0.567**	1.826**	0.386
	(0.234)	(0.784)	(0.592)
Observations	462	462	462
Pseudo-R^2	0.051	0.232	0.216

Note. Robust standard errors in parentheses. *, **, and *** mean significant at 10%, 5%, and 1% thresholds. Omitted variable for applicant type is French applicant.

firm that offers the job such as industry, size, location, etc. $Time_i$ is a set of monthly dummies, while α and ϵ_i are, respectively, a constant and an error term.

Table 3 provides three specifications of the probit model described above (see Appendix 1 in Supplemental materials for detailed results). Model 1 contains only the main explanatory variable, plus time dummies and a constant. Model 2 includes all the available control variables, and Model 3 includes all the control variables except "mean wage offer" due to multicollinearity issues.[18] In all three specifications, the Arabic signal that is available only on the online profile is associated with a significant negative impact on the probability of being invited for an interview. These results confirm that social media is a source of information that is being used by recruiters to discriminate applicants without their awareness.

5 | ROBUSTNESS CHECKS

Here, we propose two robustness checks on our results. First, we test whether changing the applicants' names has an impact on the outcome of the experiment. Second, we take advantage of a Facebook webpage redesign that occurred in mid-December, namely a change in the profile layout, to provide evidence of recruiters' perception of information displayed on the social media.

5.1 | Alternative names

The design of our experiment is such that the only difference between our two applicants is the Arabic signal on the Facebook profile. However, the names and first names of the applicants, although they sound French and are similar, can have an effect on the application outcome. To control for this effect, from October 2012 to March 2013, we used a second pair of fictitious applicants with new names and first names. Again, the new first names were selected from among the five most popular French-sounding first names, and again, the two French-sounding last names are very similar. These combinations also are unique on Facebook. We reset the new fictitious applicants work experience so that our second pair of applicants graduated in July 2012. Thus, the new candidates have less work experience ranging from 1 month to 6.5 months. This avoided our fictitious applicants having had significantly more work experience at the end of the experiment; discrimination against foreign origin individuals is known to decrease with applicants' work experience (Aeberhardt, Coudin, & Rathelot, 2010). Table 4 summarizes the names of the applicants and their work experience in the overall experiment, and Figure 4 presents the timing of the experiment with the second set of names.[19]

Figure 5 shows that applicants of the same type but with different names, one month after applying for job positions have a similar cumulative callback rate. Also, this callback rate is higher for the French applicants compared to the Arabic applicants.[20] This comparison was applied only to the first two months (60 days) for each pair of applicants because the Facebook layout change occurred 2 months after we introduced the second pair.

TABLE 4 Applicants' names and first names used in the experiment

Timespan	First name and name	Type of applicant	Work experience
March 2012–September 2012	Thomas Marvaux Stéphane Marcueil	French Moroccan	6.5 to 13 months
October 2012–March 2013	Julien Bautrant Nicolas Lautrant	French Moroccan	1 to 6.5 months

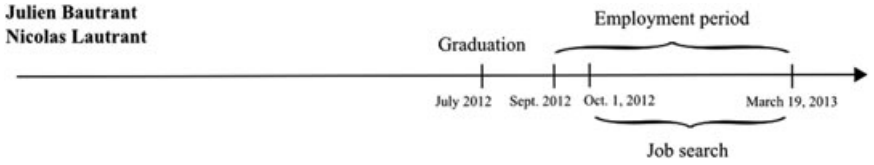

FIGURE 4 Experiment timing with the alternative names

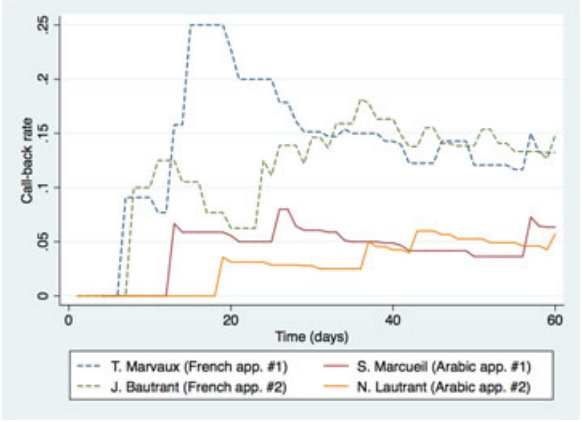

FIGURE 5 Callback rates in the first two months for each applicant [Color figure can be viewed at wileyonlinelibrary.com]

Independence tests confirm that the several last names and first names used for our fictitious applicants have no impact on the experiment outcome. The callback rates of the Arabic applicants are not different ($\chi^2(1) = 0.46$; Pr = 0.496, two-sided Fisher'exact test (Pr = 0.532) and one-sided Fisher' exact test (Pr = 0.363)). This is also the case for the French applicants ($\chi^2(1) = 0.005$; Pr = 0.944, two-sided Fisher'exact test (Pr = 0.99) and one-sided Fisher'exact test (Pr = 0.561)). Additional evidence that applicants' names do not affect the outcome of the experiment is presented in the next section.

5.2 | Social media layout change

In December 2012, two months after we had been using alternatives names, the social media platform rolled-out a new default layout for the profiles, so that our signal was split into two smaller signals on different tabs.[21] The profile layout changed from a single page, to a front page with tabs to provide access to certain personal information. Specifically, information on city of origin continued to be displayed on the front page (default "Timeline" tab requiring no click from the viewer) but information on language(s) required a click on the "About" tab and a scroll down the page to be accessed. Figures 6 and 7 below are screenshots of Facebook's new layout. As the default layout was rolled-out in mid-December, for the positive callbacks received in this timeframe it is not possible to determine whether the recruiters based their decisions on the new layout or not. To suppress any uncertainty during the transition period, we consider as the period before the layout change as the applications sent before December and which received their positive callbacks before December.

This exogenous change allows us to better understand the way the signal is perceived by recruiters. This modification could have created a search cost to access the entire signal (i.e., the city of origin and the languages spoken). If the mechanism we suggest holds, that is, that recruiters do look at the Facebook profiles, then the effect should become less

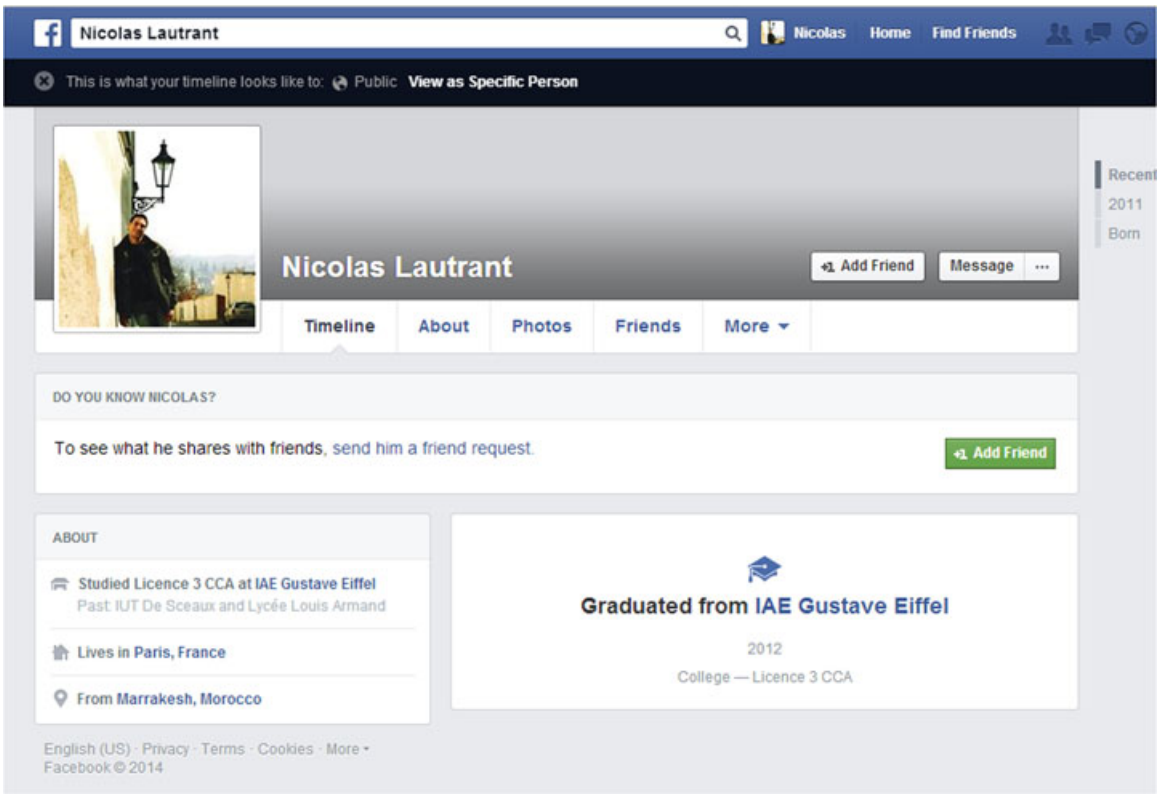

FIGURE 6 Screenshot of the social media profile of the Arabic applicant with the new layout: Default "Timeline" tab displaying only the town of origin (same kind of display for the French applicant) [Color figure can be viewed at wileyonlinelibrary.com]

significant as the information is harder to retrieve. This intuition is confirmed since the layout change greatly affected perception of the differentiating signal by recruiters; the constant eight-point gap we observed since the beginning of the experiment no longer held after December 2012. This result appears to be coherent with the literature that highlights the role of spoken languages as a significant factor in job discrimination (Bisin et al., 2008; Edo & Jacquemet, 2013; Oreopoulos, 2009). We present detailed results below.

Table 5 and Figure 8 below show clearly that callback rates before and after the layout change are different. Before the layout change (October–November 2012), Table 5 shows that the Arabic applicant received four positive callbacks from a total of 69 applications, and the French applicant received 13 positive callbacks from a total of 81 applications, that is, a 10% point gap in callback rates between the French (16.0%) and the Arabic (5.8%) candidates. A χ^2 test indicates the significance of this difference at the 5% threshold ($\chi^2(1) = 3.90$; $\Pr = 0.048$).[22] This result is additional evidence that our previous findings do not arise from our applicants' names and first names. The period before the layout change (March–November 2012) confirms our main result. Indeed, in the first 8 months of the experiment with the initial Facebook layout, the French applicant received 62 positive callbacks from 311 applicants (19.9%) compared to 35 callbacks from 301 applications (11.6%) for the Arabic applicant ($\chi^2(1) = 7.91$; $\Pr = 0.005$).[23] This corresponds to a 41.7% decline which is in line with the French studies testing for name-based discrimination mentioned earlier which find a 35–40% decline for Arabic-sounding applicants (Duguet et al., 2010; Edo & Jacquemet, 2013). In those studies however, the information signaling the applicant's foreign origin is directly available in their resumes. Our setting introduces the information only in the Facebook profiles, but leads to a similar impact in terms of discrimination. The share of recruiters browsing the applicants profiles is not a data made available by Facebook. However, the discrimination rate in our experiment is similar to that in studies based on the applicants names – as if the online information that we introduce is perfectly obtained by employers. Assuming that recruiters discriminatory practices are consistent with the studies of Duguet et al. (2010) and Edo & Jacquemet (2013), the gap between callback rates seems to indicate that most employers searched for the information, and obtained it from social media.

After the Facebook layout change (i.e., after December 20th, 2012), the Arabic applicant is called back at a rate that is not statistically different from that of the French applicant, respectively 13.2% and 9.5% ($\chi^2(1) = 0.64$; $\Pr = 0.42$).[24] To

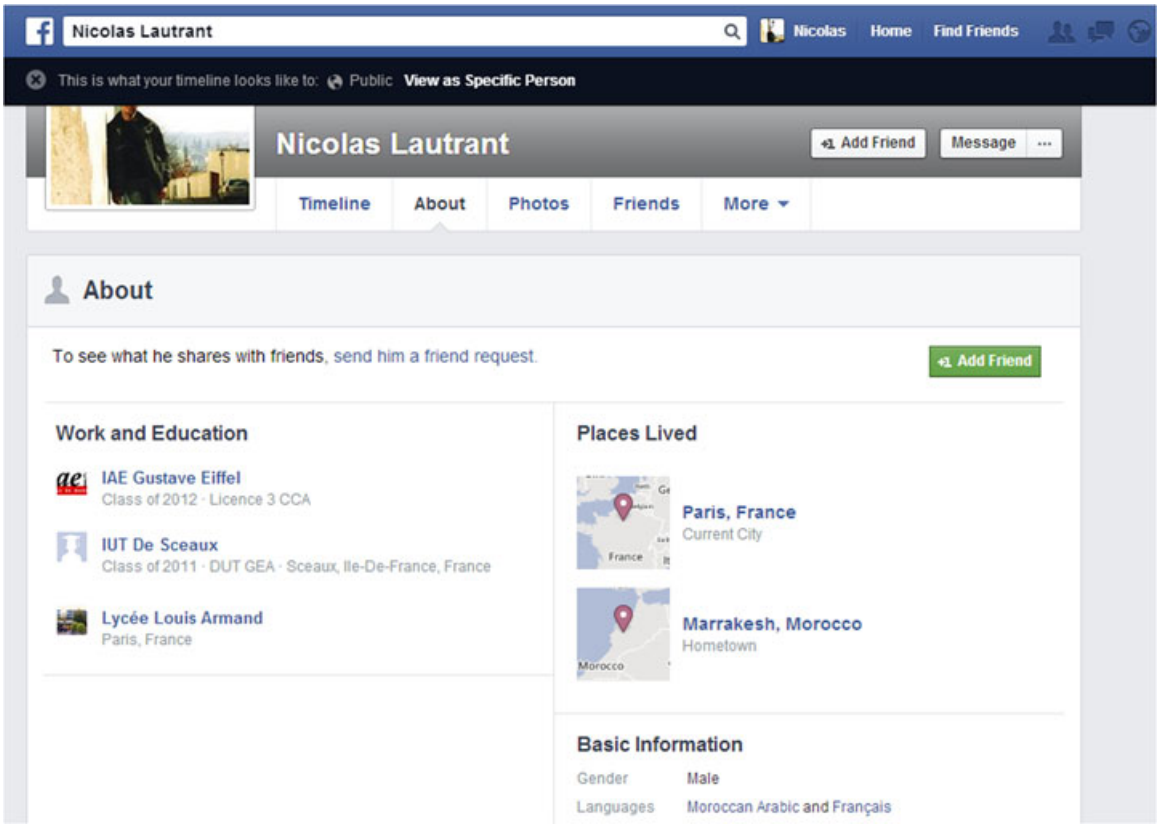

FIGURE 7 Screenshot of the social media profile of the Arabic applicant with the new layout: "About" tab displaying the town of origin and the spoken languages (same kind of display for the French applicant) [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 5 Callback rates before and after the Facebook layout change with alternative names

	Before layout change October–November 2012		After layout change December 20, 2012–March 2013		Overall experiment[a] October 2012–March 2013
	French app.	Arabic app.	French app.	Arabic app.	Total
Positive callbacks	13 16.0%	4 5.8%	9 9.5%	12 13.2%	38 12.8%
Negative callbacks	68 84.0%	65 92.9%	86 90.5%	79 86.8%	298 87.2%
Total	81	69	95	91	336

[a]The overall experiment period excludes the period of transition to the new layout, December 1–19, 2012.

better understand the consequences of the layout change, we present in the table below the respective effects of the new layout and of being an Arabic applicant on the probability of receiving a callback. More precisely, we estimate the following equation for an application i using a probit model:

$$Pr(Interview_i) = +\beta_1 ArabicApplicant_i \times LayoutChange_i + \beta_2 ApplicationDelay_i + \beta_3 JobCharacteristics_i + \beta_4 FirmCharacteristics_i + \beta_5 Time_i + \alpha + \epsilon_i, \quad (2)$$

where $LayoutChange_i$ is a dummy variable equals to 1 after the social media layout change (i.e. after December 20, 2012), and zero before the December 1, 2012. The other variable or set of variables used are similar to those described in the "Main results" section. The introduction in the model of an interaction term, which indicates the Facebook layout change, allows us to strengthen and deepen our previous results.

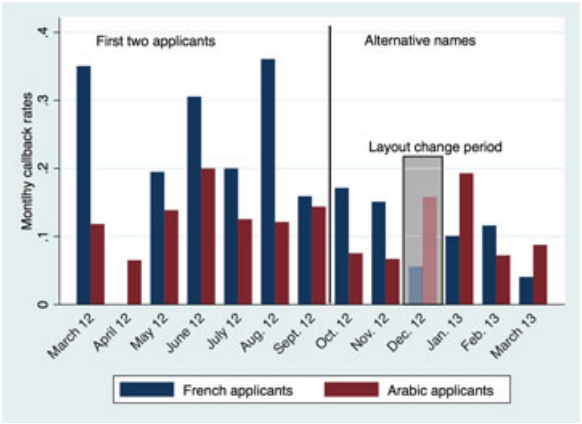

FIGURE 8 Monthly callback rates [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 6 Layout change impact on application outcome

Dependent variable: callback (yes/no)	
French applicant and new layout	−0.736***
	(0.289)
Arabic applicant and old layout	−1.122***
	(0.339)
Arabic applicant and new layout	−0.340
	(0.277)
Application delay controls	Yes
Job characteristic controls	Yes
Mean wage offer control	No
Firm characteristic controls	Yes
Time dummies	No
Constant	1.438***
	(0.805)
Observations	336
Pseudo-R^2	0.209

Note. Robust standard errors in parentheses. *, **, and *** mean respectively significant at 10%, 5% and 1% thresholds. Omitted variable for applicant type and layout is French applicant and old layout. In this model, layout change dummy acts as time dummies.

For the second pair of fictitious applicants, Table 6 shows that before the layout change we still observe a negative and significant effect of the Arabic candidate compared to the French candidate (See Appendix 6 in Supporting Information materials for detailed results). This result confirms that Facebook has become a new informal source of information for recruiters which enables early-stage discrimination.

The second interesting point is that there is no longer a difference between the French applicant with the old layout and the Arabic applicant with the new layout (i.e., without the spoken language appearing on the front page). In other words, once the differentiating signal is mitigated (removal of spoken languages from the front page) the two applicants are no longer considered different by recruiters. The similarity of the two fictitious applicants becomes more noticeable and the role of spoken language as the main differentiating factor is highlighted. This result is in line with other studies on discrimination showing that languages are important explanatory factors in job discrimination (Bisin et al., 2008; Edo, Jacquemet, & Yannelis, 2015; Oreopoulos, 2009). The second element of our signal, namely "city of origin," does not seem to have an impact if isolated from the spoken languages. Bisin et al. (2008) show that foreign spoken language seems to act as a signal of origin in a foreign culture.

This result points also to the existence of search costs associated with screening social media platforms. Exploring all the tabs seems to be costly; recruiters tend not to carry out a thorough screening of applicants' personal social media profiles, and to rely only on the front page. More study is required to characterize this behavior further. For instance, in our experiment the education level of applicants is 3 years undergraduate study; it is possible that more senior jobs would involve more thorough social media profile screening. Moreover, it shows that online platform design matters when it comes to the extent of discrimination (Edelman et al., 2017; Fisman & Luca, 2016). A small change in the platform design, by making an information still available but less salient, dramatically lowers the resulting discrimination.

6 | CONCLUSION

Advancements in social media use means that multiple personal traits can be identified by screening job applicants online. Our findings show that the consequences in the hiring process are real: the audience of leisure-oriented social media includes professionals. For potential employers inclined to discriminate against applicants, a candidate's social media profile carries considerable weight. These results are obtained by setting an experiment using real job applications for accountant positions in the greater Paris area. We create two fictitious applicants who differed only in their perceived origins, observable only on their Facebook profiles. While the control applicant is associated to a typically French hometown and to European spoken languages, the test applicant displays signals that means that he is perceived as member of the Arabic ethnic minority in France. His Facebook profile indicates Marrakesh (Morocco, North Africa) as his city of origin, and Moroccan Arabic as a spoken language. In line with the literature on labor discrimination, this signal—if observed—is expected to have a significant negative effect on rates of callback for interview for the test applicant compared to the control applicant (Bertrand & Duflo, 2017). We send more than 800 applications for job openings for accountants in the Paris region using the pseudo-random assignment method. During the experiment, an unexpected change in the Facebook layout altered the display of our online signal by sending away the applicant's language spoken into a subtab. We take advantage from this natural experiment.

Before the layout change, in the period March to November 2012, among more than 600 applications callbacks show a constant and significant gap of 8% points between the French (19.9%) and the Arabic (11.6%) applicants. The design of the experiment and the subsequent robustness checks ensure that the 41.7% difference in callback rates resulted solely from observation of the Arabic signal available only on the Facebook profile. This significant difference indicates that personal social media are a new informal source of information on applicants that can lead to discriminatory callback decisions. In implementing a field experiment to shed light on these new discriminatory practices our paper adds to Acquisiti and Fong (2016) work which is concurrent but independent from our experimentation. For many recruiters, Facebook profiles are being considered a part of the application material along with the applicants resume and cover letter, and social media are affecting the matching process in the labor market. After the layout change, discrimination fades away with callback rates no longer statistically different. Our results illustrate the existence of search costs associated with online screening, and give clear evidence that online platforms design choices in terms of information salience may influence the extent of discrimination, as emphasized by Edelman et al. (2017) and Fisman & Luca (2016).

We identify some limitations regarding the generalization of our results.[25] Our experimental setting is realistic but comes with some necessary simplifications. For instance, the content of our Facebook profiles was basic but realistic. An actual Facebook profile can include more information about its owner, and as a result, send a mixed signal to the recruiter. In our setting, we simplified the complexity of the Facebook profiles to allow for a clear interpretation of our results. Similarly, choosing a unique name and first name combination for applicants ensures that the recruiter does not find anyone other than our fictitious candidate. Actual applicants can have homonyms which would impede finding their profile and would reduce the gap in callbacks between the two profiles. However, this would be a complex setting where the final effect could not be disentangled. It also would raise an ethical issue as the fictitious candidate could have unwanted effects on the existing homonyms. Finally, we are measuring callbacks not actual hiring decisions. Although it is not equivalent to the final decision to hire, it shows a lower employment opportunity: we are testing the early stage of hiring which gives a lower bound of discriminatory screening since the actual hiring has additional steps where discrimination can still occur.

Our findings have three implications for public policy. The first is related to job applicants who should understand that their social media presence is part of their application material. Government communications should include this aspect when educating the public. Our findings suggest potential solutions to its use, ranging

from locking one's profile, to—where possible—cleaning information that might lead to discrimination during job search or assessment periods, to use of multiple social media profiles ("official" profile accessible to anyone, and private), to use of an avatar. The second implication is related to social media platforms. The second part of our experiment makes clear that a change in the layout of the social profile can have a dramatic effect on the information gathered by the employer, and consequently can affect the employers decision. The social profile layout acts as what Sunstein and Thaler (2008) describe as a nudge, and drives the decision by framing the information presented to the audience. The public debate over social media has so far, largely evaded their responsibility in terms of which information is made salient and the consequences of this design choice. Online platforms should be aware of the potential consequences their design choices. For instance, Fisman and Luca (2016) recommends that sensitive information such as gender or race be made either not accessible or less salient. Third, policymakers and other organizations tackling discrimination should be cognizant that the source of discrimination is not just the formal application material which is already well regulated and tested. In line with Bertrand and Duflo (2017), our results suggest that a particular focus should be put on extracurricular information ("beyond the resume") available online.

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END NOTES

[1] For instance, Facebook, the most popular social media, had reached more than 2 billion monthly active users in mid 2017. Information about Facebook users (birthdate, occupation, etc.) is often publicly available, even to non-users. Access to more detailed information requires only the completion of a free registration form.

[2] For most social media, and especially Facebook, it is impossible to know whether someone has screened a profile unless the individual leaves an explicit trace (a message, a like, etc.). For recruiters, this feature of social media sites is important since use of personal information—whether found online or elsewhere—to select applicants is illegal in many regions.

[3] The literature on labor market discrimination shows that this characteristic negatively affects an applicant's callback rate and labor market integration more generally. See Duguet and Petit (2005); Duguet, Leandri, L'Horty, and Petit (2010); Edo and Jacquemet (2013) for France; Bertrand and Mullainathan (2004) for the United States; Battu and Zenou (2010); Bisin, Patacchini, Verdier, and Zenou (2008) for the UK.

[4] In the usual systematic attribution testing methodology, two or more applications for a job opening are sent simultaneously, and the resumes and cover letters of the fictitious applicants need to be sufficiently different to avoid detection by an employer.

[5] This gap reaches 41.7% when including applications sent until the layout change.

[6] Other personal traits leading to labor market discrimination include sexual orientation (Ahmed et al., 2013; Drydakis, 2009; Weichselbaumer, 2003), gender (Booth & Leigh, 2010) and attractiveness (Galarza & Yamada, 2014).

[7] Our field experiment is independent from Acquisti and Fongs (2016) study, which started in early 2013. Ours was conducted from early 2012 to early 2013.

[8] See Bertrand & Mullainathan (2004); Bursell (2007) for other labor market-related audits results and limitations.

[9] For examples of correspondence tests, see Brown and Gay (1985) and Hubbuck, Britain, and Carter (1980) for the UK, Riach and Rich (1991) for Australia, Bertrand and Mullainathan (2004) for the Unites States, and Duguet and Petit (2005); Duguet, Leandri, L'Horty, and Petit (2010), Edo and Jacquemet (2013) for France.

[10] However, it halves or reduces the number of observations even more compared to an experiment based on the usual correspondence test on a similar number of job openings.

[11] In addition, recruiters could log into Facebook using an assumed name with no mention of their position as recruiter.

[12] See Appendices B and C, for examples, of resumes and cover letters. Additional material is available on request.

[13] For empirical evidence that employers tend to hire the worker with the lowest unemployment duration, see Eriksson and Rooth (2014). Using Swedish data, they show that a recent period of unemployment has a negative effect on applicant callback rates.

[14] During the experiment we checked regularly that our fictitious profiles were the sole results. After our experiment was concluded a profile named Thomas Marvaux, unrelated to our experiment, showed up on a less popular social network site, Badoo.com and then disappeared. This profile was not present during the time of the experiment. Therefore, a recruiter could not have seen this profile in addition to our Facebook profile. Also, Facebook has made additional changes to the layout since the experiment took place, which is why the screenshots in this paper may not correspond to the current Facebook page layout.

[15] The market shares of the web search engines in France in December 2012 were as follows: 90.1% for Google, 3.3% for Bing, and 1.5% for Yahoo (source: http://www.atinternet.com, retrieved June 2014).

[16] See Blanchard & Landier (2002) and Lamy Social (2012) for more details on French employment protection rules.

[17] We distinguish the variable *mean wage offer* from the other variables in the model due to multicollinearity with the other job characteristics.

[18] The condition index of Model 2 is equal to 29.8. This is very close to the threshold indicating multicollinearity problems according to Belsley, Kuh, and Welsch (1980). This multicollinearity issue is not surprising since the wage offered is related to the required education level, and to job characteristics such as required experience, industry, job position, and firm size among others. Once we exclude mean wage offer in Model 3, the condition index falls to 20.4.

[19] More descriptive statistics on jobs and firms' characteristics are available in Appendix 2 of Supporting Information materials.

[20] The gap between the callback rates of the two control applicants at around 20 days of applications is due to the fact that, as callbacks start, a small difference in the number of calls from employers causes a large gap in the cumulative rate. This effect disappears after a month of applications, and the rate of returns stabilizes thereafter.

[21] For further information, see Yao R. 2013. "Improvements to Timeline," http://newsroom.fb.com/News/584/Improvements-to-Timeline, retrieved June 2017; Milano D. 2012. "Facebook May Be Changing Your Timeline: Redesign Tests in Progress" http://abcnews.go.com/blogs/technology/2012/12/facebook-may-be-changing-your-timeline-redesign-tests-in-progress, retrieved June 2017, and on other news, or bloggers' websites that observed this change about mid-December 2012 (retrieved June 2017): http://mashable.com/2012/12/20/facebook-timeline-change//#GoRYX74dYPqU and http://www.marismith.com/facebook-single-column-timeline-layout/.

[22] The corresponding Fisher's exact test is below the 10% significance level (Pr = 0.069). These model-free evidence are confirmed using a probit model (see Appendix 4 in Supporting Information materials). All the models—base model and models including control variables—show a significant and negative impact on callback rates of the Arabic applicant.

[23] More descriptive statistics on jobs and firms' characteristics are available in Appendix 3 of Supporting Information materials.

[24] Robustness checks provided in Appendix 5 of Supporting Information materials confirm that applicant's type is not significant for this period.

[25] We thank an anonymous referee for her helpful comments in this discussion.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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APPENDIX A: JOB APPLICATIONS BY INDUSTRY AND BY LOCATION (MARCH–SEPTEMBER 2012)

	Control applicant	Test applicant
Industry (%)		
Accounting	10.4	11.7
Association/union	3.1	3.5
Transport	5.7	4.3
Bank/insurance	2.6	4.8
Construction	2.6	3.1
Retail trade	5.2	6.5
Wholesale trade	10.0	10.8
Audit/consulting	5.6	6.9
Culture/leisure	1.8	1.3
Management	4.4	3.0
Teaching/research	5.2	3.4
Hotel/restaurant	6.1	4.3
Real estate	3.0	4.3
Telecom/computer	4.4	5.2
Health/social	6.5	5.6
Public organizations	1.7	2.2
Advertising/communication	4.8	4.3
Business services	7.4	7.4
Personal services	3.0	2.2
Industry/energy/waste	6.5	5.2
Location (%)		
Seine-et-Marne	4.4	3.0
Yvelines	9.1	8.6
Essonne	4.8	9.1
Hauts-de-Seine	16.1	15.5
Seine-Saint-Denis	10.0	12.1
Val-de-Marne	12.2	8.2
Val-d'Oise	4.4	3.5
Central districts of Paris	9.1	8.2
North-East districts of Paris	6.5	5.2
North-West districts of Paris	11.7	13.8
South-East districts of Paris	5.2*	1.3*
Applicant's district and contiguous districts in Paris	6.5	8.6
Observations	230	232

Note. *indicates a significant difference in proportion at the 5% threshold between the two applicants.

Paris areas definitions:

- Central districts of Paris: 1st, 2nd, 3rd, 4th, and 5th districts;
- North-East districts of Paris: 10th, 11th, 19th, and 20th districts;
- North-West districts of Paris: 8th, 9th, 17th, and 18th districts;
- South-East districts of Paris: 12th and 13th districts; and
- Applicants' district and contiguous districts: 15th, 14th, 16th, 17th, 6th, and 7th districts.

APPENDIX B: EXAMPLE OF A SENT RESUME (TRANSLATED INTO ENGLISH)

Thomas MARVAUX
38, rue du Cotentin, 75015 Paris
Driver's license, class B
Born on April 20, 1991 – age 21
Tel. : 07 60 21 ** **
e-mail : thomas.marvaux@gmail.com

ACCOUNTING ASSISTANT

EDUCATION

2012	LICENCE 3 CCA (Accounting, Control, Audit) at the IAE Gustave Eiffel – Paris-Est Créteil University, **with second class honors**
2011	DUT GEA (Business and Administration Management) option Finance / Accounting at the IUT of Sceaux (92), **with second class honors**
2009	SCIENTIFIC BACCALAUREAT (Louis Armand High School, Paris 15th arrondissement), **with third class honors**

WORK EXPERIENCE

Since September 2012
Cabinet ALF, Nogent-sur-Marne, Statutory audit Office
Accounting assistant

February 2012 to end of April 2012 (3 months)
Cabinet ALF, Nogent-sur-Marne, Statutory audit Office
Internship : accounting assistant
- Financial accounting : accounts auditing, quarterly and annual figures, social and tax returns, payroll management
- Cash management : control of cash position
- Relationship with other accountants and representatives in various industries

February to end of March 2011 (2 months)
THERMOSANI, Vitry, SME in the construction sector (50 employees)
Internship, Accounting department
- Financial accounting-Management : payroll posting
- Cash management : DAILLY Act, factoring, bank reconciliations, salaries payroll
- Clients accounts : billing, customer reminders (mail and phone)
- Suppliers accounts : negotiations of extension with suppliers, bill payments

February 2010 (1 month)
CAISSE D'EPARGNE, Paris 12th arrondissement
Internship, Accounting department
- Financial Accounting : bank reconciliations, salary inputs, switchboard, filing

SKILLS

English : Fluent
Spanish : Moderate

Computer skills :
Accounting software : Ciel, SAGE 100
Office software : Word, Access, Excel (pivot tables, macros)

Activities : soccer, badminton, takraw and movies

APPENDIX C: EXAMPLE OF A SENT COVER LETTER (TRANSLATED INTO ENGLISH)

Thomas MARVAUX
38, rue du Cotentin
75015 Paris
Tel. : 07 60 21 ** **
e-mail : thomas.marvaux@gmail.com

Paris, March 15, 2013

Subject : Application for the position of Accounting Assistant – Ref. : ******

Dear *****,

Following your ad published on the website of Pôle Emploi, I am applying for the position of Accounting-assistant. Your company is interesting to me because of its high standards, good quality and rigor. These values correspond to the values acquired during my training and my previous experience.

I graduated with a Licence 3 Pro in Control, Accounting and Audit (IAE of Paris-Est University), I had opportunities to take up several internships and gained a solid understanding of financial accounting and cash management. My previous experience has taught me how to carry out the various tasks entrusted to me in compliance with procedures. This experience, particularly in the ALF Office and in Thermosani, confirmed my interest in the variety of tasks that an accountant position involves. I also acquired more knowledge and skill in the use of accounting and office software.

I am organized and thorough, and would accomplish the tasks you assign me efficiently. I would be happy to meet you to provide more detail on my experience and motivation.

I look forward to hearing from you further, and hope you will consider my application seriously.

Thomas Marvaux