Hiring discrimination based on national origin
and competition between
the employed and unemployed job seekers

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HIRING DISCRIMINATION BASED ON NATIONAL ORIGIN AND COMPETITION BETWEEN THE EMPLOYED AND UNEMPLOYED JOB SEEKERS

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Abstract:

This study uses the findings of a test carried out by correspondence in order to assess separately the potential hiring effects of North African origin and signaling of employment and unemployment in the French construction sector. We constructed four jobseeker profiles, each representing a particular situation with respect to national origin and job status, and we sent 1204 resumés in reply to 301 job vacancies advertised from mid April to mid September 2011 in Paris and its suburbs. We find evidences of significant hiring discrimination against applicants of North African origin, regardless of their job status. Signaling unemployment seems to be penalizing only for North Africans applicants. We cannot however affirm that unemployed applicants are more penalized by their national origin than the employed ones.

Keywords: hiring discrimination, field experiment, national origin, unemployment

Classification JEL C81, C93, J15, J7

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1. Introduction.

Modern labour market analysis emphasizes the importance of job and worker flows in the understanding of the unemployment issue. From job to job and into and out of unemployment, these flows are high. Each day in France, 10000 jobs are created and the same amount is destructed (Cahuc and Zylberberg 2004). About 13% of the existing jobs at any point in time in the USA will no longer exist one year later and the annual volume of worker separation is five times greater than this amount (Burgess et al, 2000). The job-to job transition rate is twice as large as the rate at which workers move from employment to unemployment (Nagypal, 2005). All these movements represent potential opportunities for job seekers to access to employment or to better positions. However, the literature suggests that these opportunities are not the same for unemployed job seekers and for employed on-the-job seekers. Theoretical models consider that unemployment can be a negative signal of productivity in situation of imperfect information (Spence, 1974, Lockwood, 1991, Decreuse and Kazbakova, 2008) or a human capital (Becker, 1964) trap (Pissarides, 1992). Conversely, employment is seen as a stepping stone in the access to a higher number of job opportunities (Calvo-Armengol and Jackson, 2004) and to the best jobs (Pissarides, 1994).

Empirical results back up the theoretical predictions. Andrews et al (2001) find that the probability of match is positively impact by the fact of being employed. Blau and Robbins (1990) find a greater offer rate per contact for employed searchers than for unemployed searchers. Longhi and Taylor (2013) compare employed and unemployed job seekers in their individual characteristics, work preferences, search strategy and employment histories. They find systematic differences and conclude that employed and unemployed job seekers are unlikely to compete for the same job offers. Other studies like Arulampalam (2001), Skans (2010) or Cockx and Picchio (2011) highlight the negative scarring effect of unemployment on labour market outcomes of individuals. Hence on the job search is seen as producing higher hiring performance than unemployed job search. Nonetheless, the contributions of human capital, search intensity, network and signaling to the observed gap are difficult to be identified separately since some unobservable heterogeneity could be present (Blau and Robbins, 1990).

An unexplored related issue is the impact of *a priori* nonproductive characteristics, in particular national origin on the hiring performances of job seekers. Numerous studies based on the field experiment methodology give strong evidence of origin based hiring

discrimination in various developed countries and job sectors (Riach and Rich, 1991, Bertrand and Mullainathan, 2004, Duguet *et al*., 2007). One result of particular interest is given by Bertrand and Mullainathan (2004). Comparing job access in various occupations they show that African origin applicants have lower returns on their credentials than white American applicants. As a consequence, the hiring performance gap is greater for the more skilled applicants. This gap between the gaps could represent a difference in taste (Becker, 1957) not only for national origin but also for skill. As noted by the authors, it is however more likely that it reflects the presence of a statistical discrimination (Phelps, 1972, Arrow, 1973) "surplus". In other words, national origin signal would not only be a proxy for unobservable skills but would also determine the impact of characteristics supposed to increase employability. Therefore, if being employed is seen as increasing the hiring performance, one can ask if native and foreign origin applicants benefit or suffer from their employment status in the same conditions. More precisely, it would be relevant to determine the sole impact of statistical discrimination based on employment status since it represents the less objective explanation source of the hiring performance gap. On the one hand, Bertrand and Mullainathan (2004) study suggests that foreign origin applicants would not benefit from signaling employment to the same extent than native applicants, which could represent an additional negative incentive to search for a job. On the other hand, one can argue that insofar as foreign applicants are reputed to face harder hiring conditions than native applicants, the impact of signaling employment must be greater for them.

The aim of this study is to provide an answer to this question. We use the field experiment methodology to estimate if applicants benefit from signaling employment *ceteris paribus* and if national origin distorts this effect. To our knowledge, we are the first to use field experiments to obtain a renowned unbiased although not generalizable estimator of on-the-job search effect on employability. Indeed, the field experiment methodology allows us to control for any undesired effect such as unobserved differences in productivity, search intensity, access to better professional networks or human capital depreciation. The study is organized as follows: in a first section, we present a theoretical model of discrimination explaining why employed applicants should be better off than unemployed applicants. In a second section, we give a detailed description of data collection and protocol. We direct our experiment at North Africans who are the top source of migrants to France and are known to be hiring discriminated (Duguet *et al*., 2007, 2009). We choose to investigate original professions: those from the construction sector. Although it had never been tested before, this

sector has the reputation to treat native and foreign origin applicants more equally than what is generally observed in other sectors. Moreover its worker turnover is significant. Hence our estimated effects could be considered as a lower bound on the magnitude of hiring discrimination based on the job status and on the distortion induced by the national origin. The third section is dedicated to the results presentation.

2. The model.

The model to be presented here is an extended version of the model described in Aigner and Cain (1977). An employer j aims to evaluate the skill level of "newborn" applicants to his job offer. As in Spence (1973), skill levels are supposed to be exogenous, *i.e.* insensible to training or inactivity. He or she knows the distribution of true score $r \sim N(\bar{r}\,;\,\sigma_r^2)$ and its zero mean equivalent $q \equiv (r - \bar{r}) \sim N(0\,;\,\sigma_q^2)$, where $\sigma_q^2 = \sigma_r^2$. However, he or she is not able to observe perfectly the individual score of applicants. Instead, he or she observes applicants' demographic group membership $i = \{w, b\}$ and a noisy signal Y (the curriculum vitae), composed by the true score equivalent and an error term.

$$Y = q + u \tag{1}$$

True score distribution is considered to be exactly the same in both demographic groups. Error is group specific: $u \sim N(0\,;\,\sigma_{ui}^2)$ with $\sigma_{ub}^2 > \sigma_{uw}^2$ and uncorrelated with the true score: $\rho_{qu} = 0$. Thus, $Cov(q, u) = 0$. A higher variance of the error term for the group b stands for the fact that signals are reputed to be less reliable for foreign origin applicants (Linn, 1973).

Employer utility function is a classic CARA function. Its level only depends of the level of q:

$$U(q) = a - ve^{-cq} \qquad\qquad v, c > 0 \tag{2}$$

Where a, v and c are the parameters of the utility function and e is the base of the natural logarithm. The employer will hire an applicant only if the expected utility he or she gets by doing so exceeds some exogenous threshold $T_{ij} = S_j + D_{ij}$, where S_j is the level of qualification required by employer j and

$$D_{ij} \in \begin{cases} [0; D_{max}] & \text{for } i = b \\ \{0\} & \text{otherwise} \end{cases}$$

is the degree of distaste of employer j toward members of group i. It is supposed to be positive and below $D_{max} = \max\{D_{bj}, \forall j\}$ only for members of group b. Nevertheless, situations in which the degree of distaste is zero for both group members can occur. Moreover

the hiring of b applicant by employers with $D_{bj} > 0$ remains possible. Thus, using the Arrow-Pratt approximation, we can write the employer hiring decision rule as:

$$E[U(q|Y)] = a - ve^{-cE(q|Y)+\frac{c^2}{2}Var(q|Y)} > T_{ij} \tag{3}$$

Where $E(q|Y) = \frac{\sigma_q^2}{\sigma_Y^2}Y = \frac{\sigma_q^2}{\sigma_q^2+\sigma_{ui}^2}Y = \gamma Y$ is the expectation of the true score q conditional to the signal Y. The zero mean of the estimation error implies $Var(q|Y) = E(E(q|Y) - q)^2 = \frac{\sigma_q^2\sigma_{ui}^2}{\sigma_q^2+\sigma_{ui}^2}$ which can be interpreted as a risk aversion measure.

In such a setting, differential in hiring performance according to the group membership could occur from three facts. First, $\sigma_{ub}^2 > \sigma_{uw}^2$ implies that the so called signal to noise ratio $\gamma = \frac{\sigma_q^2}{\sigma_q^2+\sigma_{ui}^2}$ is lower in group b than in group w. Therefore, group w (*resp.* group b) members signaling Y above (*resp.* below) the mean of the true score will have a higher conditional expectation than group b *(resp.* group $w)$ members with the same signal. Secondly, the conditional variance is increasing with the dispersion of the error term: $\frac{\partial \frac{\sigma_q^2\sigma_{ui}^2}{\sigma_q^2+\sigma_{ui}^2}}{\partial \sigma_{ui}^2} = \frac{\sigma_q^4}{(\sigma_q^2+\sigma_{ui}^2)^2} > 0$. Hence, group b members face a higher degree of risk aversion because of the lower precision of their signal. Thirdly, group b members could face the challenge of being above a higher threshold than group w members, due to the possible presence of distaste. For all these reasons, group b applicants have lower chances to satisfy the employer's decision rule than their identical group w counterparts.

When the threshold rule is satisfied, the applicant is hired. Then employer is able to learn more about the applicant's true productivity and the relevancy of his hiring choice. The learning process is common among all employers and is defined as follows: at the end of each period of learning k, the employer has a probability $p = \frac{k}{k+1}$ to detect a mistakenly hired applicant. If so, the match ends immediately. As time goes by, the probability converges to 1 and the keeping of these workers become unlikely. Note however that a "free rider" has always a chance to remain employed. Moreover, matches are subject to idiosyncratic shocks $\tilde{\delta}_j \in [0; \tilde{\delta}_{max}]$, where $\tilde{\delta}_{max} = \max\{\hat{\delta}_j, \forall j\}$. These shocks impact the level of qualification required S_j, inducing an increase in the threshold $\tilde{T}_{ij}$ to exceed $\tilde{T}_{ij} = T_{ij} + \tilde{\delta}_j$, in order to remain employed. Thus, even an applicant fairly hired with respect to threshold T_{ij} can end up

losing his job because of the shock $\tilde{\delta}_j$ on his specific job threshold. Following the literature, employed workers do not quit their jobs spontaneously. Hence, the rupture of a match reveals either the detection of a mistakenly hired applicant or the presence of a shock on the threshold.

Consider now the problem of an employer facing two types of applicants: the current employed ones and those who recently lost their jobs. The information conveyed by the applicants' job status will depend on his knowledge of the other employers' thresholds. Nonetheless, this knowledge is limited. First, the level of qualification required by other employers S_{-j} cannot be precisely evaluated. Instead, recruiters unanimously know that being currently employed by employer j' guarantees that a minimal productivity level $M_{j'} \leq S_{j'}$ is possessed. This level is positively correlated to $S_{j'}$. However, since being unemployed could be induced by a selection mistake, it is not possible to associate a corresponding M_j for unemployed workers. Secondly, the employer specific level of distaste is clearly private information but employers know the average level of distaste $\overline{D_b}$ in the economy. Thirdly, the specific value of an idiosyncratic shock is not known by the employers, while its average level $\overline{\tilde{\delta}}$ is. As this shock might be sufficiently high to breack any job relation, and as signals don't tell anything about the reason of the rupture, unemployed applicants' conditional expectations and conditional variances should be calculated on the basis of the true score distribution of "newborn" applicants. In addition, the decision rule should be the same as (3). Conversely, decision rule, conditional expectations and conditional variance must be modified by the information on the minimal productivity level and its reliability driven by the learning process. Thus we can write the decision rule for employed applicants as:

$$\frac{k}{k+1} \left[E[U(q|q > M_{j'} + \overline{D_i}, Y)] \right] + \frac{1}{k+1} \left[E[U(q|Y)] \right] > T_{ij} \tag{4}$$

where
$$
\begin{cases}
E[U(q|q > M_{j'} + \overline{D_i}, Y)] = a - ve^{-cE(q|q>M_{j'},Y)+\frac{c^2}{2}Var(q|q>M_{j'},Y)} \\
E(q|q > M_{j'} + \overline{D_i}, Y) = \gamma Y + \sigma_q \frac{\phi(\frac{M_{j'} + \overline{D_i} - \gamma Y}{\sigma_q})}{1 - \Phi(\frac{M_{j'} + \overline{D_i} - \gamma Y}{\sigma_q})} = \gamma Y + \sigma_q \lambda(\frac{M_{j'} + \overline{D_i} - \gamma Y}{\sigma_q}) \\
Var(q|q > M_{j'} + \overline{D_i}, Y) < Var(q|Y)
\end{cases}
$$

$E\left(q \middle| q > M_{j\prime} + \overline{D_i}, Y\right)$ represents the conditional expectation of a true score drawn from a left truncated normal distribution. ϕ and Φ are the *pdf* and *cdf* function of *q*. $\lambda\left(\frac{M_{j\prime} + \overline{D_i} - \gamma Y}{\sigma_q}\right)$ the so called inverse Mill ratio is positive and increasing in $M_{j\prime}$ and $\overline{D_i}$. A well-known property of the truncated distributions is that the more truncated, the lower the variance is. Thus, the domain interval where conditional expectations are defined must be smaller in the truncated case and $Var\left(q \middle| q > M_{j\prime} + \overline{D_i}, Y\right) < Var(q|Y)$, which means that employed applicants will be considered as less risky investments than unemployed ones.

Interpretation is straightforward: applicants currently employed will provide a higher expected utility than their identical unemployed counterparts when facing a same threshold. An interesting feature of the model is that benefits from signaling employment are supposed to be proportionally greater for group *b* members. Indeed, as employers are aware of the presence of distaste against *b* applicants, they should infer that the minimal threshold level of productivity ($M_{j\prime} + \overline{D_i}$) is higher for them, which is reflected by a higher truncation. Hence the presence of distaste and harder hiring conditions induce that statistical discrimination based on national origin must be lower for employed applicants.

3. Data collection and protocol description

The test consists in sending a large number of dummy resumés in reply to a sample of job vacancies listed between April and September 2011. We present the data collection protocol and reasons of the choices that led us to design the test in this way.

Nature of the experiment

Creation of fictitious applications

Individual characteristics of applicants

We test the effect of the signaling of two individual variables on the probability of obtaining a job interview: the signal of North African origin and the signal of being currently employed with respect to unemployment. For this purpose, we build four separate applications. The first category of application signals being currently employed. The second category of application signals being unemployed since a short period. For each category of application, two applicants are presented: one whose name signals North African origin and another whose name signals French origin. Comparisons within origin and job status are used to evaluate the effect of signaling employment according to the origin *ceteris paribus.*

To indicate the origin of applicants we give them typical French and North African sounding first and last names. For our French applicants, we select two first names among the most frequently given during their year of birth. Then, we randomly select two last names among the ten most common last names during the year of the experiment and randomly match them with the selected first names. For our North African applicants, we randomly select two North African sounding first names among the ten most frequently given during their year of birth. Then we randomly choose North African sounding last names inspired by the names of small North African cities, and randomly match them with the first names. To ensure that these matches do not allow misidentification, we observe the number of results and their content when googling applicants' names[2]. We may note that by using of typical North African sounding names we send no signal about different social or cultural

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[2] The North African first names we chose are Samir (in position 207 among the most frequently given first names in France during 1990) and Ahmed (position 333). The number of births ranges between 236 (Ahmed) and 494 (Samir) for each first name. The North African sounding last names we chose are Atta (in position 139721 among the most common last names in 2011, and Larbi (position 7183). The number of births ranges between 32 (Atta) and 846 (Larbi) since 1966 (INSEE). The number of results when googling the North African names is between 2700 and 50000.

backgrounds: indeed North Africans first names are equally distributed among different social classes. This way of mentioning national origin should however signal at the same time closeness to Muslim religiosity (Pierné, 2013).

Revealing the job status of applicants is more complex. Actually, applicants signaling explicitly their unemployment period would be unusual. In order to achieve this, we rely on a classic habit in the curriculums' presentations of work experience history which we believe to be shared by most of the job seekers. When the applicant is supposed to signal unemployment, he indicates that his last job ended by writing its exact duration. Concretely, this is done by giving exact opening and closing date to the last work experience. For example, unemployed applicants signal that their last job began in September 2010 and ended in February 2011 at the beginning of the experiment (April 2011). In the case of employed applicants we signal only the starting date, adding the word "Since" before or "Currently" after it. In addition, we make visibly appear a mention "Currently searching for a job" on the unemployed curriculums only. We also add a line in their cover letter underlining that they are looking for a job. To the extent that employed applicants simulate a job searching behavior as well, these additional mentions are not a signal of unemployment in themselves but rather reinforcements of our proxy for unemployment. A key point is that human capital depreciation must be controlled in order to obtain the sole effect of employment signaling. Thus, unemployment duration should be long enough to be visible meanwhile not as long as to induce human capital depreciation. In our experiment, unemployed applicants signal to be unemployed during the last one to four months, with a mode at three months. Table 1 summarizes the identity of applicants.

Table 1 Identity of applicants

Last name	First name	Signal	Employment status
BERNARD	Julien	French	Employed
DURAND	Jonathan	French	Unemployed
ATTA	Ahmed	North African	Employed
LARBI	Samir	North African	Unemployed

The credibility of our job status signals maybe vulnerable to some criticism. In particular, one could argue that they could represent some negligence on behalf of applicants in the curriculum updates. On the one hand our employed applicants could have been

perceived as unemployed applicants forgetting to precise the ending date of their last job. On the other hand unemployed applicants could have been considered as employed applicants omitting to update their last job duration. Reliability of our proxy could be therefore affected. Moreover, the effect of unemployment must be conditioned by the type of contract of the last job occupied. One can imagine that the information conveyed by the signaling of unemployment resulting from the end of a fixed term contract has not the same value as the one resulting from an indefinite term contract. In order not to influence the results in one direction on another, we do not make appear the job contracts applicants get through their carrer. By doing so, we raise in some sense the uncertainty on the reasons of unemployment.

The other characteristics of applicants are similar. They are 20 or 21[3] years old, single without children and live in socio economically similar neighborhoods located in Paris (10th, 11th 12th and 13th municipal arrondissements). To comply with French norms, the nationality of French origin applicants doesn't appear. However, the French nationality of North African origin applicants is explicitly mentioned. In this way, we protect our study from any effects that may be induced by North African nationality (Duguet et al., 2007) in order to retain only the effect of North African origin. We assign different leisure activities to the applicants (one sport and one hobby without cultural signification) in order to diversify their applications without influencing their productivity signals. Finally, we assign mobile phone numbers and email addresses to the applicants.

Bottleneck jobs choice

We assess discriminatory hiring practices in the construction sector, focusing on three particular professions: mason, electrician and plumber. Studies which aim to measure hiring discrimination generally focus on bottleneck job offers with high labor flow. Choosing bottleneck jobs maximizes the applicants' chances of getting positive responses, and allows us to avoid the situation in which no differences are observable due to job market saturation. Choosing a job with high labor flow allows us to minimize the chances of detection by employers. A quick review of the job market for these professions in the Paris area shows that the job to applicant ratio was respectively of 0.26 (masons), 0.23 (electricians) and 0.33 (plumbers) with a job seeker stock of about 4000 people in each profession in March 2010[4]. Furthermore, the portion of forecast recruitments considered as difficult ranges between

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[3] We operate a rotation of this characteristic between applicants with the same job status.
[4] Source : Fichier Historique Statistique of Pôle Emploi 1st quarter 2010

58.9% (masons) and 65,6% (plumbers). This bottleneck job choice is not without impact on the estimated results. Indeed, Baert et al. (2012) find that employers seem to discriminate less against applicants of foreign origin when jobs are difficult to fill. One could certainly extend this result to all characteristics potentially source of a differential treatment. As a result, we probably underestimate the level of hiring discrimination against North African and unemployed persons.

A particularity of the construction sector is that it has the reputation to be a more informal and origin blind sector than what is generally observed. Annexes 1 and 2 present the main characteristics of the active populations of each job tested. We can see that employed workers whom parents are born in North Africa represent shares globally equivalent in the three professions. They tend to be less educated than workers whom parents are born in France, notably in the masonry. Their job seniority is lower, except for the electricians and unskilled workers, and they hold more oftenly temporary contracts. North African origin unemployed workers are globally older, less educated and know higher unemployment duration. Hence these professions should be considered as lower bounds on the magnitude of hiring performance differences caused by national origin and unemployment signaling. It must be noted that the majority of employed workers cite in first place their social network or unsolicited application as the method used to obtain their job while these methods are poorly cited by unemployed workers. Pole Emploi[5], more cited by North African origin workers and the unemployed ones, is clearly not the first channel of job search. This point comforts the construction sector's reputation of informality. It explains partly the scarcity of job offers available on the channels generally investigated by field experiments, which conduct us to test more than a sole profession in order to obtain a more consequent sample.

Productive characteristics of applicants

The applications we create are exactly equivalent with respect to productivity determining characteristics. To avoid detection, however, we are forced to make them differ in some points. All the following differences are equivalent and randomly distributed. Thus, we can state with confidence that they do not influence the quality of the resumés on average.

Our six applicants hold a youth training degree (CAP). They all graduated in 2008. To diversify their paths, we indicate that our applicants graduated in different provincial towns

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where center of apprentice training (CFA) are located. There is a possibility that the reputation of the CFA from which they graduated could impact the performance of some applicants. Nonetheless, as they all graduated from the same kind of establishment located outside Paris and its suburbs and as the number of CFA is relatively high (about 1000), we should expect no effect arising from this source of heterogeneity. Applicants have spent two years in apprenticeship, followed by three years of work experience shared between three positions in small firms. This weak employability is not a coincidence. Indeed, the less qualified the applicant, the less human capital he can lose. Thus the work profile of our applicants is an additional guaranty against human capital depreciation. Moreover unemployment must be more forgivable for young applicants. They did not have any other periods of unemployment or career breaks than the short one that unemployed workers signals. Employed workers are currently working in jobs similar to the ones they are applying for. Staying with the objective of introducing some heterogeneity into our applications, we make the applicants' careers start in the departement where they graduated, and we have them move to the Paris area at different times. To obviate any reputational effect of firms, work experiences of all our applicants takes place in fictitious firms.

For several reasons, we do not detail the skills of our applicants. First, it is difficult to signal a set of skill wide, credible and equivalent between applicants and professions. Thus our applications are easily transferable. Secondly, we are able to give an estimation of the effects of North African origin and unemployment more general than a one influenced by a specific set of skill. Thirdly this way to proceed is consistent with respect to the jobs we test and we are able to apply to a greater number of job offer. In return, our success rate will probably be lower than the one we would obtain by creating applications with detailed skills and by focusing on job offers consistent with these skills.

The other differences appearing between the six applications are as follows. The type font, the font size and the layout of the resumés and of the covering letters are distinct while remaining standard. To control the similarity and the credibility of our resumés, we had them checked by an expert in construction jobs. To ensure that characteristics other than origin and job status do not influence the quality of the applications, we implement a resumé rotation system between applicants with the same job status[6]. The French applicants use the first templates for the ten first job offers. Then, they swap templates with their corresponding

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[6] For simplicity, we do not implement the rotation system between applicants of different job status.

North African applicant who uses it for the ten following job offers and so on. Therefore, our applicants retain only their first and last names, job status, mail address, email address and mobile phone number for the whole experiment.

Unfolding of the experiment

Restriction of the test to job interviews access

We limited our experiment to job interviews access, choosing not to send applicants to the interviews in cases where they were invited. In this sense, our measure of hiring discrimination is crude, since we do not really observe job access. This methodological restriction does offer several advantages, however (Riach and Rich, 1991). First, we are able to control perfectly the unfolding of the experiment. In particular, this provision ensures the absence of physical appearance bias (our applications contain no photographs) and more generally, any bias related to unobservable characteristic. Thus, Heckman's critique concerning the equality of the average and variance of unobservable characteristics does not apply. Secondly, our data collection procedure is simplified. We are able to produce a bigger sample by restricting ourselves to job interviews access. Overall, we sent 1204 applications in response to 301 job[7] offers over a five month period.

If job interview access provides an imperfect assessment of hiring discrimination, it should be noted that organizing interviews is costly, which encourages recruiters to interview only those applicants who actually have a real chance of obtaining the vacancy. Moreover, studies show that hiring discrimination flows directly from job interview access (Neumark et al 1996, Kenney and Wissoker, 1994). For all these reasons, job interview access may be taken as a relevant measure of job access.

Source of job offers

Ideally, all the job offers posted in the Paris area should have the same probability of being tested. However, this requirement is physically impossible to meet. In this study, we focus exclusively on the job offers available in Internet. Most of them come from the website of Pole Emploi. By taking this step, we introduce a possible bias into our results. Indeed, we cannot be sure that recruiters using the Pole Emploi website behave in the same way as

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[7] Among the 301 job offers tested, 150 are mason job offers , 83 are electricians job offers and 68 are job plumbers offers

recruiters prospecting on others channels for job search[8]. More broadly, our results are biased in view of the fact that we test only one channel for job search. In addition, Pole emploi and the job advertisement channels are far from being the most successful ones. From this perspective, our study probably tends to underestimate hiring discrimination. However, the Pole Emploi website is still one of the most frequently used websites for job search, and it has the advantage of providing job offers with very detailed characteristics (wage offered, work experience required, etc.), which is not the case with others websites[9]. Thus, we privileged the testing of job offers whose characteristics are identified (in particular the work experience requirement) rather than testing job offers whose characteristics are unknown and for which we are not sure that at least one of our applicants has the opportunity of being called back. For the same reason we preferred to test existing job offers than sending spontaneous applications.

Sending the applications

Applications were sent between mid April and mid September 2011 to the job offers available on Internet. We replied to the job offers by sending an email with the resumé and the covering letter attached and a short message explaining that the applicant is interested in the offer. As we send our four applications to the same job offer, we take special precautions in doing so. To avoid detection by recruiters, we apply on two different days (two applications are sent the first day and the two others the second day). This procedure runs the risk of promoting the first application sent. In order to obviate this, we operate a perfect rotation in the order of applications sent, so that the effect must be null on average.

We replied to all the job offers that matched the qualification and experience of the applications and that also satisfied the following criteria:

- Fixed term or indefinite term contract (this excludes temporary jobs).
- Positions located throughout Paris Area.

Processing the responses by recruiters

A response is considered to be positive when the recruiter asks the applicant to attend an interview or when he or she asks for more information on the applicant's current situation

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[8] If searching on the Pole Emploi website is perceived as more risky in term of detection by discriminating recruiters, then it is likely that there is less job discrimination from Pole Emploi job offers.
[9] For technical reasons, we have excluded websites requiring pre-registration.

or qualifications. Conversely, a response is considered to be negative if the recruiter formally rejects the application or if he or she does not respond to it.

3. Results

Table 2 Average call back rates
Global call back rate: % of job offers having provided at least one positive call back

Sample	Call back rates				
	French applicants		*North African applicants*		**Global call back rate**
	Employed	Unemployed	Employed	Unemployed	
Total (301 job offers)	12.96%	11.63%	10.63%	7.31%	14.29%
Masons (150 job offers)	10.67%	10.00%	9.33%	6.67%	12.00%
Electricians (83 job offers)	14.46%	13.25%	12.05%	7.23%	15.67%
Plumbers (68 job offers)	16.18%	13.24%	11.76%	8.82%	17.65%

Table 2 presents the average call back rates. We can see that the ranking of applicants is the same in the three professions. French origin applicant signaling employment is always first with call back rates ranging between 10% (as a mason) and 16% (as a plumber). French origin applicant signaling unemployment knows similar performance, except as a plumber. North African applicant signaling employment is slightly below the French applicants. The impact of origin for employed applicant seems considerably lower than what is generally observed in field experiments, which could be a proof of the origin blindness of the construction sector. North African applicant signaling being unemployed is the less fortunate. His call back rate suggests that he is clearly more penalized by his job status than the corresponding French applicant. Globally, applicants have known poor performances. This reflects the difficulty in finding a new or a better construction job for young and inexperienced individuals. Success rate is a bit higher in the electrician and plumber profession. However, this could be partly explained by the difference in the size of the samples. Masonry is the sector which treat applicants the more equally. It could be mentioned that the global call back rate and the one of French origin applicant signaling employment are nearly the same. This indicates that this profile of applicant is always preferred by recruiters. As the difference in professions is thin and as we can control for them, we reason hereafter on the global sample.

Estimation of discrimination

While these results provide initial presumptive elements that indicate hiring discrimination, they can be given greater depth by carrying out further comparisons between applicants' performances. For this purpose, we examine the significance of callback gaps by pairs of applicants. Table 3 presents the main potentially observable effects.

Table 3 Main detectable effects

Comparison by pairs on the same job offers	Potential effects
French origin employed/French origin unemployed	Employment status for a French origin applicant
North African origin employed/ North African origin unemployed	Employment status for a North African origin applicant
French origin employed/North African origin employed	Origin for an employed applicant
French origin unemployed/North African origin unemployed	Origin for an unemployed applicant

Comparisons by pairs of applicants allow us to isolate and assess the effect of North African origin on hiring discrimination. In order to achieve this, we observe the pairs of table 3. If the effect of North African origin remains the same regardless of job status, then we can conclude that the effect of North African origin on hiring discrimination appears to be independent of job status.

Table 4 Effects of North African origin, employment status and difference in difference estimations
(Global sample)

The Student statistics have been computed by the bootstrap method on 10000 repetitions. *. Significant at 10% **. Significant at 5% ***. Significant at 1%

Comparison by pair on the same job offers	Difference between the callback rates (in % points)	T-statistic
Effect of employment status		
French origin applicants	1.33	1.41
North African origin applicants	3.32**	2.51
Effect of North African origin		
Employed applicants	2.33*	1.94
Unemployed applicants	4.32***	2.86
Comparison of differences between the pairs of applicants	**Difference in difference between the pairs of applicants (in % points)**	**T-statistic**
Employed applicants/Unemployed applicants	1.99	1.22

According to our results, the effect of North African origin is significant regardless of the job status signaled by the applicants. The difference between the callback rates of applicants signaling unemployment is about 4.5 percentage points It reaches 2.5 percentage points for the applicants signaling being currently employed. In parallel, effect of signaling employment is significant only for North African origin applicants. As expected, the difference between currently employed applicants is lower than the one between unemployed applicants and, therefore being unemployed (*resp.* employed) has a stronger negative (*resp.* positive) impact on the applicant with North African origins rather than it does on the one with French origins. To observe whether the signal of origin differs significantly to another, we run difference in difference analysis. It emerges that employment does not modify the effect of North African origin. The fact that French origin applicants still benefit of signaling employment, even non significantly, and that the hiring gaps are small can explain that result do not exactly fit the model's prediction according to which North African origin applicants must retire greater benefits from signaling being currently employed than French origin ones.

Another way to observe how the effects of origin, job status and their interaction articulate themselves in our experiment is to run logit regression analysis. We specify the following relation:

$$C_{ij} = \alpha_0 + \alpha_1 x_i + \alpha_2 y_j + \mu_{ij}$$

Where C_{ij} stands for whether applicant i received call back from job ad j. x_i is a vector expressing applicant i's properties and y_j is a vector representing job ads j's properties detailed in the description of the job offers. As our sample is small and we do not wish to overcharge our regression we only put an interaction term for origin and job status. Since the estimation of this interaction is important in our study, we choose to give variables effect coding rather than dummy coding. This manner of proceeding consists in giving a binary coding (-1; 1) rather than the classic (0; 1) dummy coding. It is particularly relevant when some interaction is present. The primary benefit is that we can get reasonable estimates of both the main effects and interaction using effect coding. With dummy coding the estimate of the interaction is fine but main effects are not "true" main effects but rather what are called simple effects, *i.e.*, the effect of one variable at one level of the other variable. From the estimated coefficients, we can check the relevancy of origin, job status and their interactions directly. Results are presented in Table 5:

Table 5 Binary logistic regression used to estimate the impact of North African origin, employment status and job properties (Global sample)

Explained variable: No or negative call back; Positive call back. The following effect coded variables had been introduced into the regression: origin, employment status, interaction between origin and employment status, profession, résumé template used, method of application, type of contract, wage offered, negotiable wage, experience requirement, degree requirement, maximal duration for filling the vacancy, presence of intermediary, number of hour of work,

Variables	Coeff.	Pr > Khi-2	Variables	Coeff.	Pr > Khi-2
1st intercept	-2.52	< 0.001	North African	-0.19**	0.049
Unemployed	-0.20*	0.092	Unemployed*North African	-0.08	0.421
Profession : electrician	0.1	0.449	Profession : plumber	0.31**	0.018
Résumé template : 2	-0.05	0.57	Application by postal service	-0.22*	0.075
Contract : Indefinite term	-0.35***	< 0.001	Wage ≥ 2000	-0.27*	0.061
Presence of intermediary	-0,24*	0.1	Minimal degree : required	-0.49	< 0.001

For greater clarity, we feature only coefficients related to applicant properties and significant coefficients relative to job properties. North African origin and unemployment are associated to significant penalties. However, North African origin negative effect is stronger than the unemployment one. As suggested by the difference in difference estimation, interaction between origin and job status is not significant. The probability of being called back is definitely smaller for indefinite term contracts. The presence of some intermediary between applicants and employer decreseases the chances of being call back and so it is the case for job offers with high wages and for application by postal service. Finally, apply to job offers as a plumber increases the call back rates.

It is possible that the characteristics of the job offers we tested had an impact on the level of hiring discrimination observed. In order to control for these effects, we regress the differences between the callback rates of the applicants on the same set of variables used in the logistic regression. Annex 4 and 5 presents the results. We find significant positive (degree required, wage negotiable) and negative (number of hour of work above 39 hours) effects on origin based discrimination and significant positive (experience required, wage between 1650 and 1800 Euros) and negative (degree required) effects on job status based discrimination.

Summary of the results and potential limits

This field experiment teaches us two things. First, it seems that hiring discrimination based on North African origin is present in construction jobs located in the Paris area. Job status does not modify this finding, even if it introduce some disparity. Secondly, there is hiring discrimination based on the signaling of unemployment only for foreign origin applicants. Thus the features of our model are globally respected even though the lower bond strategy in the selection of professions and in the building of our applicants' profiles makes the effects we estimate probably lower than the one we could observe by investigating others professions or level of skill.

In view of our particular design and more precisely because we give our applicants fictitious workplaces, it may legitimately be asked if our applications have not been perceived as fictitious by recruiters. In response, we can state at the outset that our results do not suggest that this has been the case. Detection can occur in two modes. In the first mode, all the applicants are detected. This mode cannot lead to spurious evidence of discrimination as, the expected behavior of recruiters falls into three categories: announcing to the experiment designers that the experiment has been detected, calling all the applicants or calling no applicants. In the second mode, only some applicants are considered as fictitious. However, it is unlikely that only one kind of applicant have been detected. One may note that the use of fictitious signal is common in field experiment literature[10].

In the same vein, the fact that we did not follow a perfect rotation scheme among all our applicants may have introduced some bias in the results. Although all the productive characteristics of the experiments were built with a strong effort to achieve equivalence and were distributed randomly, this fact does represent a slight flaw in our design. The reasons for not following a perfect rotation scheme are related to simplicity and convenience above all. Some reassuring indirect evidence lead us to think that there is no bias of this kind in our experiment, for example, the fact that all the French origin applicants outperform all the North African origin applicants regardless of the template used and the non significativity of the template effect coded variable in our regressions. Still for all these reasons, our results have to be interpreted with additional care.

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[10] This is for instance the case in the study of Riach and Rich (2010), as the use of real signal is prohibited in England.

Conclusion

In order to assess hiring discriminations based on North African origin and on the signaling of unemployment in Paris area construction jobs, we built a correspondence test. The test consists in the creation of four applications strictly equivalent in productivity sent in response to the same 301 job offers between mid April and mid September 2011.

A first conclusion regards the extent of hiring discrimination based on North African origin. This discrimination is always significant, regardless of whether applicants job status. A second conclusion concerns hiring discrimination based on the signaling of unemployment. Only North African applicants appear to be significantly penalized. However our study does not allow us to affirm that unemployed North African applicants are more penalized by their origin than the employed ones. Given that our measures of hiring discrimination are only partial, punctual and localized, it makes sense to remain cautious in generalizing the results. In so far as they confirm intuitions already found in the economic literature and as we chose job sector and applicant's profiles in order to obtain lower bound hiring discrimination effects, it might be thought that they do not represent a specific feature of our chosen field. However it would be interesting to give several extensions to this experiment. First, it could be transferred to job sectors requiring more skilled applicants and more prone to human capital depreciation. Secondly, the fact that worker turnover in Europe is much less than in the United States, whereas job turnover is roughly the same (Pries and Rogerson, 2005) and the presence of affirmative action policies making hiring easier pleads for a transnational comparison of the results. This comparison could tell us if, contrary to what we observe in France, signaling employment is less valorized for the foreign origin applicants in the USA. Finally, as our results suggest that employment increase the hiring performance of foreign origin applicants, it would be important to determine the specific effect of the contract type (fixed term, indefinite term, subsidized contract) on hiring performance. This point could help to determine a possible positive externality of public intervention.

Source

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Annex 1 Characteristics of the working population in the building sector according to the birthplace of parents and the occupation

Source : Enquête Emploi en continu 2010. Weighted average of individuals in first wave. Author's calculation. Values are in percent.

Job		Unskilled workers		Masons		Electricians		Plumbers	
Birthplace of parents		French	N. Af.	French	N. Af.	French	N. Af.	French	N. Af.
Share		55.05	11.23	54.07	9.12	74.36	7.26	79.18	7.78
Age	16-25	49.91	26.16	26.04	16.99	14.58	0	32.52	41.08
	25-40	34.29	30.11	40.38	35.37	43.11	42.08	35.92	36.08
	40-55	13.61	32.3	26.56	21.26	38.48	50.15	30.12	15.18
Contract	Temporary	4.92	22.42	4.64	16.95	4.68	23.86	8.02	15.21
	Apprentice	22.14	11.79	1.24	0	2.01	0	4.78	0
	Fixed term	18.46	13.91	7.05	3.35	5.06	8.38	2.64	2.57
	Indefinite term	54.48	51.88	87.08	79.7	88.25	67.76	84.56	82.22
Degree	CAP	33.79	26.06	57.99	18.41	47.57	40.57	62.63	41.81
	Bac pro	8.85	0.00	4.30	4.39	20.07	0	10.21	22.63
	None	35.51	55.58	19.47	69.30	12.57	7.12	3.94	14.03
Seniority	< 1 year	30.48	20.92	16.00	14.67	8.38	11.27	6.37	28.40
	1 to 5 years	48.08	42.39	35.32	52.17	27.31	23.58	44.66	46.08
	5 to 10 years	9.63	22.17	26.89	22.99	18.74	18.55	24.74	11.89
	> 10 years	11.81	14.52	21.79	10.17	45.56	46.60	24.24	13.63
Job search method used to be employed	Unsolicited	45.04	24.41	44.04	36.49	36.30	23.99	36.48	19.74
	Network	36.99	45.40	30.99	39.64	31.17	20.82	44.25	53
	Job ads	0	4.48	3.99	0	3.60	0	1.04	0
	Pôle Emploi	7.53	7.80	4.48	8.09	4.72	11.47	0.58	0
Unemployed	1 month before	1.36	13.32	0.56	6.97	0.00	7.60	1.83	0
	3 months before	1.68	15.04	3.46	16.31	1.40	19.14	0	0
	6 months before	8.61	14.44	4.92	23.37	1.40	9.58	0	0
	11 months before	7.54	14.90	3.47	17.73	1.40	0	1.49	0

Annex 2 Characteristics of the unemployed population in the building sector according to the birthplace of parents

Source : Enquête Emploi en continu 2010. Weighted average of individuals in first wave. Author's calculation. Values are in percent.

Birthplace of parents		French			North African		
Share		69.78			10.27		
Age	20-30	29.52			21.72		
	30-40	30.66			41.24		
	40-50	27.49			28.98		
Unemployment duration	< 1 month	17.99			13.37		
	< 4 months	45.48			34.32		
	< 6 months	53.98			38.16		
	< 1 year	76.80			66.49		
Degree	CAP	60.49			36.61		
	Bac pro	6.15			2.35		
	Without	15.73			41.62		
Job search methods used	Position	1st	2nd	3rd	1st	2nd	3rd
	Pôle emploi	63.96	0	0	100	0	0
	Employment agency	22.07	0	0	0	0	0
	Unsolicited	5.45	32.66	0	0	0	0
	Job ads	8.51	58.76	79.89	0	100	0
	Network	0	8.57	20.11	0	0	0

Annex 3 Corrected discrimination coefficient
(Global sample)

Corrected discrimination coefficients computed from the ordered probit regression presented in the annex 4 and 5 * : significant at 10%, ** : significant at 5%

Comparison by pair on the same job offers	Corrected difference (in % points)	T-statistic
Effect of employment status		
French origin applicants	0.78	1.26
North African origin applicants	3.21	2.64***
Effect of North African origin		
Candidats en emploi	1.85	1.73*
Candidats au chômage	3.58	2.83***

Annex 4: Ordered probit regressions used to compute the corrected discrimination coefficients (effect of the employment status according to the national origin)

Explained variable: -1: unemployed applicant preferred 0: equal treatment, 1: employed applicant preferred. Result of a backward elimination procedure at 10%. The following dummy variables have been introduced into the regression: Résumé template used, application by postal service, professions (electrician, plumber), source of the job offer, type of contract, number of hours of work, experience requirement, degree requirement, wage negotiable, wage offered, others extras offered, duration of vacancy filling, presence of intermediary. For more clarity in the following table, only the significant coefficients are presented.

	Effect of the employment status			
	French origin applicants		North African origin applicants	
Variables	Coeff.	T-statistic	Coeff.	T-statistic
1st intercept	-2.77	8.4	-2.42	10.01
2nd intercept	2.30	10.2	1.75	13.17
Resumé template : 2				
Application by postal service				
Profession : electrician				
Profession : plumber				
Source of the job offer : other				
Contract : indefinite term				
Hours of work $\geq$ 39				
Experience : required	-0.58	1.71		
Degree : required	0.88	2.37		
Wage : negotiable				
1650< wage offered < 1800	-0.81	1.7	-0.64	1.9
1800 $\leq$ wage offered < 2000				
Wage offered $\geq$ 2000				
Other extras				
Vacancy has to be filled within : 2 months				
Presence of intermediary				

Annex 5 : Ordered probit regressions used to compute the corrected discrimination coefficients (effect of the national origin according to the employment status)

Explained variable: -1: unemployed applicant preferred 0: equal treatment, 1: employed applicant preferred. Result of a backward elimination procedure at 10%. The following dummy variables have been introduced into the regression: Résumé template used, application by postal service, professions (electrician, plumber), source of the job offer, type of contract, number of hours of work, experience requirement, degree requirement, wage negotiable, wage offered, others extras offered, duration of vacancy filling, presence of intermediary. For more clarity in the following table, only the significant coefficients are presented.

	Effect of the national origin			
	Employed applicants		Unemployed applicants	
Variables	Coeff.	T-statistic	Coeff.	T-statistic
1st intercept	-2.40	10.72	-2.42	10.27
2nd intercept	1.93	12.04	1.71	12.46
Resumé template : 2				
Application by postal service				
Profession : electrician				
Profession : plumber				
Source of the job offer : other				
Contract : indefinite term				
Hours of work ≥ 39	0.64	2.36		
Experience : required				
Degree : required			-0.98	2.74
Wage : negotiable			-0.38	1.66
1650< wage offered < 1800				
1800 ≤ wage offered < 2000				
Wage offered ≥ 2000				
Other extras				
Vacancy has to be filled within : 2 months				
Presence of intermediary				

Annex 6 Binomial tests

The analysis is restricted to job offers for which applicants from compared groups obtained different responses
(1st accepted and 2nd rejected or reversely). Exact * : Significant at 10% ** : Significant at 5%

Comparison by pair on the same job offers	1st group prefered (N1)	2nd group prefered (N2)	P1 = N1/ (N1+N2)	Null hypothesis : P1= ½		
				P-value		
Effect of North African Origin				Alternative P1<1/2	Alternative P1>1/2	Alternative P1≠1/2
Employed applicants	French	N.Af.				
Global sample	10	3	0.769	0.989	0.046**	0.092*
Masons	4	2	0.667	0.891	0.344	0.688
Electricians	2	0	1.000	1.000	0.250	0.500
Plumbers	4	1	0.800	0.969	0.187	0.375
Unemployed applicants	Français	N. Af.				
Global sample	17	4	0.809	0.999	0.004**	0.007**
Masons	7	2	0.778	0.980	0.090**	0.18
Electricians	6	1	0.857	0.992	0.062**	0.125
Plumbers	4	1	0.800	0.969	0.187	0.375
Effect of employment status						
French origin applicants	Employed	Unemployed				
Global sample	6	2	0.750	0.965	0.144	0.289
Masons	2	1	0.667	0.875	0.500	1.000
Electricians	2	1	0.667	0.875	0.500	1.000
Plumbers	2	0	1.000	1.000	0.500	1.000
North African origin applicants	Employed	Unemployed				
Global sample	13	3	0.812	0.998	0.011**	0.021**
Masons	6	2	0.750	0.965	0.144	0.289
Electricians	4	0	1.000	1.000	0.062*	0.125
Plumbers	3	1	0.750	0.937	0.312	0.625