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April 2014

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ABSTRACT

Customer Discrimination and Employment Outcomes: Theory and Evidence from the French Labor Market*

The paper investigates the link between the over-exposure of African immigrants to unemployment in France and their under-representation in jobs in contact with customers. We build a two-sector matching model with ethnic sector-specific preferences, economy-wide employer discrimination, and customer discrimination in jobs in contact with customers. The outcomes of the model allow us to build a test of ethnic discrimination in general and customer discrimination in particular. We run the test on French individual data in a cross-section of local labor markets (*Employment Areas*). Our results show that there is both ethnic and customer discrimination in the French labor market.

JEL Classification: J15, J61, R23

Keywords: discrimination, matching frictions, jobs in contact, ethnic unemployment, local labor markets

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1 Introduction

Customer discrimination arises in the labor market when a significant share of the consumers do not want to interact with minority workers. The value of such workers' services is reduced, which may lead employers to reject minority applicants, even if such employers are themselves unprejudiced. These discriminatory practices may have important implications for employment odds and career choices of minority workers. This paper proposes a strategy to identify the existence of customer discrimination in the labor market, which we implement on French data.

This country is indeed a good candidate for such an inquiry. In France, African immigrants are both under-represented in jobs involving contact with customers (hereafter, *contact jobs*) and over-exposed to unemployment. The differential rate of occupation in contact jobs between Africans and French natives is about 10 percentage points; the unemployment rate differential amounts to about 11 percentage points. Most of such differentials cannot be explained by the uneven distribution of skills between these two ethnic groups (Aeberhardt et al. (2010)). This leads to the following conjecture, which is tested in this paper: people with African origins are discriminated against in contact jobs, thereby reducing the set of employment opportunities offered to them. Such a conjecture, if it were true, would be worrying because, unlike other forms of taste-based discrimination (e.g. employer discrimination), customer discrimination is rooted in profit maximization (Becker (1957)). Thus it cannot easily be ruled out as a side-effect of pro-competition policies. Furthermore, the decline of manufacturing at the benefit of consumer services in developed economies implies that job opportunities are increasingly exposed to contact with consumers: the share of unskilled contact jobs rose from 31.6% in 1968 to 52.7% in 1999 in France. Improving employment opportunities for African immigrants will prove difficult if they are excluded from an increasing proportion of jobs.

Identifying customer discrimination through its effects on employment outcomes is not an easy task. Under-representation in a specific occupation does not mean that a group is discriminated against. Suppose for instance that Africans and French natives are seemingly identical except for skin color and that there are two types of jobs, with and without contact with consumers. If African immigrants do not like contact jobs as much as French natives, then they will be under-represented in such jobs. In a context of job scarcity, turning down a number of offers in some sectors reduces the overall chances of having a job. This can explain and relate the two facts reported above without appealing to discrimination. For this reason, identifying customer discrimination requires to account for ethnic-specific sectorial preferences.

Section 2 presents a model with two sectors (with and without contact with consumers), two ethnic groups (Africans and French natives), sector-specific abilities that differ across ethnic groups, employer discrimination, and customer discrimination in contact jobs. The model is based on two key identifying assumptions. The first one is that the population of French natives provide the pool of potential prejudiced consumers and employers. The second assumption is that employer discrimination is not larger in the contact job sector than in the rest of the economy. Employers may actually discriminate less in the contact job sector, but not more. Section 4 discusses these

assumptions extensively.

The model predicts ethnic-specific unemployment rates and distribution of occupations as functions of the proportion of jobs involving contact with consumers and the proportion of French-native residents. The model provides a way to test the existence of ethnic discrimination and whether it is at least partly due to consumer tastes. First, if the ethnic differential unemployment probability is positively affected by the proportion of French-native residents, then there is ethnic (either customer or employer) discrimination. Second, there is customer discrimination if and only if there is ethnic discrimination and the ethnic differential probability of working in a contact job is negatively impacted by the proportion of French natives.

Section 3 runs both tests on the 1990 French Census at the Employment Area level (EA, *zone d'emploi*, defined to match local labor markets). We examine how the individual probability of being unemployed and the individual probability of working in a contact job respond to the shares of contact jobs and of French natives. We adopt a two-step procedure. We first regress individual labor market outcomes on a set of individual characteristics, on EA fixed-effects, and on EA fixed-effects interacted with a dummy indicating whether the individual is African or not. We then focus on the estimated EA fixed-effects interacted with the African dummy. We regress them on the local share of French natives and the local share of contact jobs.

We reject the null hypothesis whereby the proportion of French natives has no effect on the unemployment rate differential. According to our model, this is evidence of ethnic discrimination. We also exhibit an interaction effect between the French and the contact job proportions. Therefore prejudice is more harmful for African workers when there are locally more jobs in contact with customers. We also reject the null hypothesis that the French proportion does not impact the differential probability of working in a contact job. This is evidence of customer discrimination, albeit this evidence is slightly weaker than for ethnic discrimination. Moreover the quantitative effects of discrimination are not small. A one-standard-deviation increase in the proportion of French natives widens the ethnic unemployment gap by 24 to 28% of its standard deviation. A one-standard-deviation increase in the proportion of French natives widens the ethnic contact gap by 13% of its standard deviation.

Our paper complements the theoretical literature on discrimination in frictional environments. Without frictions, discrimination only affects wages. Under frictions, discrimination in a number of jobs translate into higher chances of unemployment. Most papers focus on employer discrimination (see Black (1995), Bowlus and Eckstein (2002), Rosen (2003) and Lang et al. (2005)). We rather focus on customer discrimination and its impacts on both unemployment and occupations.

Our paper also relates to the large empirical literature on ethnic discrimination. There are few studies on customer discrimination. An influential literature uses data from professional sports leagues (see Kahn (1991) for a literature review). Nardinelli and Simon (1990) focus on the prices of baseball cards for white and black players, whereas Kahn and Sherer (1988) study the racial compensation differences of professional basketball players. Such data include extensive measures of

athletes' performances, which presents the advantage of directly controlling for skills. The drawback regards external validity and the fact that conclusions would apply to other occupations. As for the general labor market, experimental studies (e.g., Ihlanfeldt and Young (1994) and Kenney and Wissoker (1994)) find evidence of customer discrimination against racial minorities in the US. Closer to our approach, some studies on survey data use the racial composition of residents as a proxy for the racial composition of consumers. Holzer and Ihlanfeldt (1998) analyze the effect of the racial composition of consumers on the race of newly hired employees, whereas Giuliano et al. (2009) and Giuliano et al. (2010) study its impact on firms' sales. We follow this literature and also use the local demographic composition to assess the presence of customer discrimination. Finally, there is a growing literature on ethnic discrimination in the French labor market despite the fact that the French Constitution prohibits the collection of data on ethnic groups. Audit studies show that African workers have a lower chance of being interviewed, all else being equal (see, e.g., Cediey and Foroni (2006); Duguet et al. (2010)). Aeberhardt et al. (2010) and Algan et al. (2010) use survey data and document the over-exposure of African workers to unemployment risk. We document here the under-representation of such workers in contact jobs, and relate it to their over-exposure to unemployment.

The closest paper is Charles and Guryan (2008) who examine how the distribution of employer prejudice affects the residual black-white wage differential in the US. Prejudice is measured from the General Social Survey. It is found that one quarter of the residual racial wage gap is due to prejudice. The French Census does not report individual incomes and alternative datasets do not allow us to study wage differentials at the EA level. However, our model shows that customer discrimination has ambiguous impacts on wages whereas its effects on occupation choices are non ambiguous (see Section 2.2). Moreover, Aeberhardt et al. (2010) and Algan et al. (2010) show that residual unemployment disparity in France accounts for more than half the raw disparity whereas most of wage differentials are explained by underlying differences in observed individual characteristics. One explanation of this fact relies on the French minimum wage. For instance, 40% of low-skilled African immigrants in our sample are paid the minimum wage, which gives little room for wage discrimination. In any case, this puts the impact of discrimination on unemployment high on the research agenda.

The outline of the paper is as follows. First, we present the model. Section 3 is devoted to the presentation of the econometric methodology, the dataset and the results. Section 4 organizes the discussion about the identifying assumptions and provides some robustness checks. We end up with some concluding remarks.

2 Test of customer discrimination: Theory

This section presents a two-sector matching model of unemployment with two types of workers. The model relates sectorial labor demands, the relative share of ethnic groups, and discriminatory forces to ethnic differentials in unemployment rates and probability of working in contact with customers.

We first expose a benchmark model that relies on simplifying assumptions. We then show that the results of the model are robust to relaxing some of them.

2.1 The model

Sector 1 is composed of jobs without contact with consumers, while sector 2 is composed of contact jobs. With probability p, the job is from sector 2. All people start non-employed. Job seekers are either African or French native (j= A,F respectively). Job seekers are homogeneous except as regards their observable ethnic group and by their preferences vis-à-vis the different jobs. Total population is normalized to 1, with n French natives and *1-n* Africans. Job seekers have sector-specific preferences whose distribution possibly differ between ethnic groups. Let ϕ_i^j denote the proportion of individuals j who accept an offer from sector i. For instance, if $\phi_2^j > \phi_1^j$, then group-j individuals have *absolute* preferences for contact jobs (sector 2), whereas $\phi_2^F - \phi_1^F > \phi_2^A - \phi_1^A$ means that French natives have *relative* preferences for such jobs.

Model assumptions. Search frictions forbid workers from finding a job with certainty. We start with the assumption that search is undirected and therefore matching is random. By random matching we mean two different things. First, a worker may apply for jobs in both sectors. This assumption is nonessential as we demonstrate in the robustness section. Second, workers do not perfectly observe the type of employers or consumers in terms of prejudice. This assumption is important. If it were not true, workers could direct their search to non-discriminatory jobs. The probability of having located an available job is m.

French natives do not suffer from discrimination of any kind. By contrast, some French natives have a disutility towards African employees. We also assume that Africans are not prejudice against themselves. Thus the pool of potential prejudiced individuals is limited to French natives. We disentangle the disutility that comes from hiring an African employee (employer discrimination) from the one that comes from being in contact with an African worker (customer discrimination). Let a_e be the proportion of available jobs whose corresponding employer has a taste for discrimination and refuses to hire African employees as a result. We assume that the extent of employer discrimination does not vary across sectors, which makes a_e identical in both sectors. Let also a_c be the proportion of available sector-2 jobs whose customers refuse to interact with an African employee. We can expect that a_e and a_c depends on the proportion of French natives. For any n, employer discrimination arises when $a_e(n) > 0$, and similarly for customer discrimination. By assumption, we also have $a_e(0) = a_c(0) = 0$.

The basic model sets aside wage and profit determination. We implicitly assume that match surplus is shared between employer and wage-earner. Match surplus is negative in three cases: discriminating employer, prejudiced consumers, and when a worker refuses a job offer.

Model outputs. We show that the unemployment rate of French natives is only affected by the global availability of jobs and sectorial preferences. African workers suffer from both customer

and employer discrimination, which affect their employment prospects in specific ways. Let π_i^j denote the probability of employment in sector i for a group-j individual. For a group-j individual, let also q^j be the probability of employment in sector 2 conditional on being employed, i.e. $q^j = \Pr[j \text{ works in sector } 2 \mid j \text{ works}]$ and let u^j be the group-j unemployment rate.

For French-native workers, the probability of employment in sector 1 is $\pi_1^F = (1-p)m\phi_1^F$ while the probability of employment in sector 2 is $\pi_2^F = pm\phi_2^F$. Therefore, the unemployment rate of French natives is

$$u^F = 1 - \pi_1^F - \pi_2^F = 1 - [(1-p)m\phi_1^F + pm\phi_2^F]. \tag{1}$$

The conditional probability q^F is

$$q^F = \frac{\pi_2^F}{\pi_1^F + \pi_2^F} = \frac{p\phi_2^F}{(1-p)\,\phi_1^F + p\phi_2^F}. \tag{2}$$

This probability only depends on the relative supply $p/(1-p)$ of sector-2 jobs and on absolute preference ϕ_2^F/ϕ_1^F of French natives for sector-2 jobs. Neither u^F nor q^F depend on $a_e(n)$ and $a_c(n)$.

African workers may be discriminated against, which reduces their employment probabilities. Discrimination may be due to employers (in both sectors) or to consumers (in sector 2 only). The probability of employment in sector 1 is $\pi_1^A = (1-p)m\phi_1^A(1-a_e(n))$ and it is $\pi_2^A = pm\phi_2^A(1-a_e(n))(1-a_c(n))$ in sector 2. The unemployment rate of Africans is

$$u^A = 1 - [(1-p)m\phi_1^A(1-a_e(n)) + pm\phi_2^A(1-a_e(n))(1-a_c(n))]. \tag{3}$$

The conditional probability q^A is then given by

$$q^A = \frac{p\,(1-a_c(n))\,\phi_2^A}{(1-p)\,\phi_1^A + p\,(1-a_c(n))\,\phi_2^A}. \tag{4}$$

The probability q^A depends on $a_c(n)$, whereas it does not depend on $a_e(n)$. As detailed below, this is what allows us to identify customer discrimination from employer discrimination.

We now discuss more deeply the determinants of the ethnic differential unemployment rate, $\Delta u = u^A - u^F$, and of the ethnic differential conditional probability, $\Delta q = q^A - q^F$, given respectively by

$$\Delta u = m[(1-p)\phi_1^F + p\phi_2^F - (1-p)\phi_1^A(1-a_e(n)) - p\phi_2^A(1-a_e(n))(1-a_c(n))], \tag{UD}$$

and

$$\Delta q = \frac{p\,(1-a_c(n))\,\phi_2^A}{(1-p)\,\phi_1^A + p\,(1-a_c(n))\,\phi_2^A} - \frac{p\phi_2^F}{(1-p)\,\phi_1^F + p\phi_2^F}. \tag{PD}$$

Equations (UD) and (PD) provide a way to identify ethnic discrimination, and to disentangle customer from employer discrimination.

Testing ethnic discrimination. The impact of the proportion of contact jobs on the unem-

ployment rate differential is given by

$$\partial \Delta u / \partial p = m[\phi_2^F - \phi_1^F + \phi_1^A(1 - a_e(n)) - \phi_2^A(1 - a_e(n))(1 - a_c(n))]. \tag{5}$$

This complex expression does not allow to disentangle the effect of prejudice from that of preferences. The composition of jobs can alter the unemployment rate differential even though no discrimination takes place: If $a_c(n) = a_e(n) = 0$, then the above expression boils down to:

$$\partial \Delta u / \partial p = m[(\phi_2^F - \phi_1^F) - (\phi_2^A - \phi_1^A)]. \tag{6}$$

The difference in sectorial labor supply due to differences in preferences between French natives and Africans may cause ethnic unemployment gaps. This phenomenon occurs when French natives have a relative preference for contact jobs. For this reason, identifying the existence of discrimination separately from differences in sectorial labor supply requires us to study the effect of the share of French natives n on differential unemployment. It is given by

$$\partial \Delta u / \partial n = m[(1 - p)\phi_1^A a_e'(n) + p\phi_2^A \left[a_e'(n)\,(1 - a_c(n)) + a_c'(n)\,(1 - a_e(n))\right]]. \tag{7}$$

An increase in the proportion of French natives raises the unemployment rate differential through two effects: employer discrimination (when $a_e'(n) > 0$) lowers job opportunities in both sectors, and customer discrimination (when $a_c'(n) > 0$) further deteriorates job chances in sector 2. The sign of the impact of the proportion of French natives on the unemployment rate differential reveals the presence of ethnic discrimination at the margin, either due to the prejudice of employers or customers.

Proposition 1. *If $\partial \Delta u / \partial n > 0$ for some $n \in [0, 1]$ then $a_c'(n) > 0$ or $a_e'(n) > 0$.*

If we assume that the functions $a_c(n)$ and $a_e(n)$ are nondecreasing, then Proposition 1 is enough to conclude to the presence of ethnic discrimination since by continuity $a_c'(n) > 0$ *or* $a_e'(n) > 0$ must be true for some neighborhood of n. However, if we do not impose any restriction on the form of these functions, Proposition 1 does not allow us to conclude. We can go a step further if we know the sign of the impact of the proportion of French natives on the unemployment rate differential on the full interval $[0, 1]$. The following corollary extends Proposition 1 to a potentially non-monotonic setting.

Corollary 1. *If there exists $I \subset [0, 1]$ such that $\partial \Delta u / \partial n > 0$ for all $n \in I$ and there does not exist $J \subset [0, 1]$ such that $\partial \Delta u / \partial n < 0$ for all $n \in J$, then there exists $n^* \in (0, 1)$ such that $a_c(n) > 0$ or $a_e(n) > 0$ for all $n \geq n^*$*

Let us prove the corollary for $a_c(n)$. We deduce the existence of n^* such that $\int_0^{n^*} a_c'(n)dn > 0$ from Proposition 1 and the antecedent of the corollary. The result then follows from $\int_0^{n^*} a_c'(n)dn =$

$a_c(n^*) - a_c(0)$ and the assumption that Africans do not have prejudice against Africans, i.e. $a_c(0) = 0$. The proof for $a_e(n) > 0$ is similar.

Then, under the sole assumption that Africans do not have prejudice against themselves, we can derive ethnic discrimination from the fact that the proportion of French natives positively impacts the unemployment rate differential on some part of the support without observing the opposite elsewhere.

The model also points out the role of the interaction between the proportion of contact jobs and the proportion of French natives:

$$\partial^2 \Delta u / (\partial p \partial n) = m[a_e'(n) \left[\phi_2^A (1 - a_c(n)) - \phi_1^A\right] + a_c'(n)\phi_2^A (1 - a_e(n))]. \tag{8}$$

An additional linearity assumption helps to deduce an overidentification test of ethnic discrimination. Suppose that a_e and a_c are proportional to the French native share n in the population. Namely, $a_e = \alpha_e n$ and $a_c = \alpha_c n$ with α_e and $\alpha_c \geq 0$. In the absence of ethnic discrimination – that is, $a_e'(n) = \alpha_e = 0$ and $a_c'(n) = \alpha_c = 0$ – this cross-effect should be zero. The presence of ethnic discrimination is also evidenced when this crossed partial derivative is nonzero.

Proposition 2. *If* $a_e(n) = \alpha_e n$, $a_c(n) = \alpha_c n$ *and* $\partial^2 \Delta u / (\partial p \partial n) \neq 0$, *then* $a_e(n) > 0$ *or* $a_c(n) > 0$.

The interaction term is positive when

$$\frac{\phi_2^A}{\phi_1^A} > \frac{\alpha_e}{\alpha_e + \alpha_c} \leq 1. \tag{9}$$

The left-hand side increases with the absolute preference of African workers for contact jobs, whereas the right-hand side increases with the weight of employer discrimination in overall discrimination. Then the interaction term is positive when the absolute preference for contact jobs of Africans is larger than the strength of employer discrimination in overall discrimination. However a positive sign is not enough to conclude to an absolute preference of African workers for contact jobs. On the opposite, a negative sign is only compatible with an absolute preference of African workers for jobs without contact.

To sum up, two sufficient conditions of ethnic discrimination emerge: either the unemployment rate differential is increasing with the proportion of French natives or the cross derivative of the unemployment rate differential with respect to the proportion of contact jobs and the proportion of French natives is non zero. The latter criterion is weaker than the former since it relies on a linearity assumption.

Identifying customer discrimination. Consideration of the unemployment rate differential does not allow us to disentangle customer from employer discrimination. In the case of customer

discrimination at the margin only – that is, $a_e'(n) = 0$ and $a_c'(n) > 0$ – we have

$$\partial^2 \Delta u / (\partial p \partial n) = m\phi_2^A a_c'(n) > 0. \tag{10}$$

However, the cross derivative is also positive when there is only employer discrimination provided that Africans have absolute preferences for contact jobs. When $a_c'(n) = 0$ and $a_e'(n) > 0$, we have

$$\partial^2 \Delta u / (\partial p \partial n) = m \left(\phi_2^A - \phi_1^A\right) a_e'(n) > 0 \quad \text{if and only if} \quad \phi_2^A - \phi_1^A > 0. \tag{11}$$

The positive impact of employer discrimination is strengthened by the sectorial preference of African natives in this case. We conclude that the sign of the crossed effect does not allow us to separately identify the role of customer and employer discrimination.

We need to turn to equation (PD) which defines the ethnic differential conditional probability to have a contact job to unambiguously identify customer from employer discrimination. We have

$$\partial \Delta q / \partial n = -\frac{a_c'(n) p(1-p)\phi_1^A \phi_2^A}{\left[(1-p)\,\phi_1^A + p\,(1 - a_c(n))\,\phi_2^A\right]^2}. \tag{12}$$

This derivative is negative if and only if there is customer discrimination at the margin, which leads to our third claim.

Proposition 3. *$\partial \Delta q / \partial n < 0$ for some $n \in [0,1]$ if and only if $a_c'(n) > 0$.*

Employer discrimination is at work in both sectors and does not affect q^A, the conditional probability of working in a contact job for Africans. Conversely, customer discrimination only happens in such jobs and therefore it affects q^A. Moreover, the conditional probability of having a contact job for French natives is not affected by either type of discrimination. The proportion of French natives, therefore, negatively affects the differential conditional probability if and only if there is customer discrimination at the margin.

Proposition 3 allows us to conclude to the presence of customer discrimination under the assumption that $a_c(n)$ is nondecreasing. To go beyond this case, we need to observe the sign of $\partial \Delta q / \partial n$ on the full support of n. Corollary 2 of Proposition 3 can be deduced in the same way as Corollary 1 can be derived from Proposition 1.

Corollary 2. *If there exists $I \subset [0,1]$ such that $\partial \Delta q / \partial n < 0$ for all $n \in I$ and there does not exist $J \subset [0,1]$ such that $\partial \Delta q / \partial n > 0$ for all $n \in J$, then there exists $n^* \in (0,1)$ such that $a_c(n) > 0$ for all $n \geq n^*$.*

Then, under the sole assumption that Africans do not have prejudice against themselves, we can prove the presence of customer discrimination from the fact that the proportion of French natives negatively impacts the conditional probability of working in a contact job for Africans on some part of the support without observing the opposite somewhere else.

Test strategy. We use Propositions 1 to 3 and Corollaries 1 and 2 to test for the presence of discrimination, and then of customer discrimination. Propositions 1 to 3 require stronger identifying assumptions. Namely, they need to assume that $a_e(n)$ and $a_c(n)$ are nondecreasing. We first estimate the impact of n and p and their interaction on Δu. If the impact of n is significantly positive, then there is discrimination. The interaction term provides an over-identification test of the presence of ethnic discrimination, in case it is nonzero. Furthermore, if it is negative, then African workers prefer to work in jobs without contact with the customers or there is customer discrimination. We then estimate the impact of n on Δq. If negative, then there is customer discrimination. If this impact is zero, then there is no customer discrimination. In this case, when the first test concludes to discrimination, it is only due to employers.

The assumption that $a_e(n)$ and $a_c(n)$ are nondecreasing can be seen as too strong. In that case, we use Corollaries 1 and 2, which requires to evaluate the impact of n on Δu and Δq on the full support of n. When the support is the full interval $[0, 1]$, this only requires that minority members are not prejudiced against themselves. However, the empirical support of n is most often a sub-interval of $[0, 1]$, for instance $[n_0, n_1]$. Corollaries 1 and 2 can be easily extended to that case, and the test requires now that $a_c(n_0) \geq 0$ and $a_e(n_0) \geq 0$. Roughly speaking, the discrimination we infer from the observable part of the support must not be undone on its unobserved part.

Demanding that $a_c(n_0) \geq 0$ requires that $a_c'(n) \geq 0$ for some $n \in [0, n_0]$. We can re-write this condition in terms of an elasticity. Let $a_c(n) = r(n)n$, where $r(n)$ is the share of prejudiced individuals among French natives. $a_c'(n) \geq 0$ is now equivalent to $nr'(n)/r(n) \geq -1$. The elasticity of the prejudiced share with respect to the share of French natives must be larger than -1 for the corollaries to hold. Section 2.2 discusses the empirical validity of this assumption.

2.2 Robustness of the test strategy

The test strategy hinges on several other assumptions. We now relax some of them or examine alternative settings.

Sector-specific employer discrimination. Employer discrimination is supposed to be the same in both sectors. We want to let it vary across sectors. We can still apply our test strategy if employer discrimination is not stronger in sector 2 than in sector 1.

Without loss of generality, consider the linear case where $a_e(n) = \alpha_e n$ and $a_c(n) = \alpha_c n$. Suppose that parameter α_e actually differs across sectors, with α_e^1 and α_e^2 for sectors 1 and 2 respectively. Proposition 1 still holds because $\partial \Delta u / \partial n > 0$ requires at least one discrimination parameters to be strictly positive. The if part of Proposition 3 also remains valid. Indeed, we have

$$\Delta q = \frac{p\left(1-\alpha_c n\right)\phi_2^A}{\left(1-p\right)\frac{1-\alpha_e^1 n}{1-\alpha_e^2 n}\phi_1^A + p\left(1-\alpha_c n\right)\phi_2^A} - \frac{p\phi_2^F}{\left(1-p\right)\phi_1^F + p\phi_2^F}. \tag{13}$$

After some computations, we obtain that the sign of $\partial \Delta q / \partial n$ depends on the sign of the following

expression:

$$-\alpha_c(1-\alpha_e^1 n)(1-\alpha_e^2 n)+(\alpha_e^1-\alpha_e^2)(1-\alpha_c^2 n).$$

That $\partial\Delta q/\partial n < 0$ implies $\alpha_c > 0$ is true only if $\alpha_e^1 \geq \alpha_e^2$. Under this restriction, $\partial\Delta q/\partial n < 0$ remains a sufficient condition of customer discrimination. However it is not longer a necessary condition: customer discrimination may also occur when $\partial\Delta q/\partial n > 0$, whereas it is not true in the initial model.

Section 4 provides empirical arguments in favor of the restriction $\alpha_e^1 \geq \alpha_e^2$. Note that customer discrimination may imply that employers discriminate more in the contact sector. Employer discrimination is not profit maximizing, although customer discrimination is. A discriminating employer could locate in the contact sector to discriminate and still be just as profitable as before. This argument requires that employers are sufficiently mobile across sectors.

Skills and statistical discrimination. The basic model abstracts from statistical discrimination, whereas such discrimination is very likely and may vary across sectors. In particular, sector-2 jobs require communication and verbal skills that African workers may lack. Lang (1986) shows that language differences, confusion and misunderstanding can occur when people from different cultures meet even when one is fluent in the other's language. If such skills are imperfectly observable, then employers may be reluctant to hire African workers in such jobs.

The consideration of sector-specific statistical discrimination does not affect our test strategy provided that the intensity of statistical discrimination does not depend on the proportion of French natives. Suppose that each African individual suffers from statistical discrimination with probability s_i in sector i. The probability of getting a job in sector 1 is thus $\pi_1^A = m(1-p)\ \phi_1^A(1-s_1)(1-a_e(n))$; similarly, the probability of getting a job in sector 2 is $\pi_2^A = mp\phi_2^A(1-s_2)\ (1-a_e(n))(1-a_c(n))$. Positing $\tilde{\phi}_i^A = \phi_i^A(1-s_i)$, we obtain $\pi_1^A = m(1-p)\ \tilde{\phi}_1^A(1-a_e(n))$ and $\pi_2^A = mp\tilde{\phi}_2^A\ (1-a_e(n))(1-a_c(n))$. The model, therefore, is unchanged and Propositions 1 to 3 remain valid.

Unlike employer and customer discrimination, we cannot identify statistical discrimination from ethnic sector-specific preferences. There is a simple explanation: the lack of contact-job specific skills is also a good reason for minority workers to prefer non-contact jobs. From this perspective, the parameter $\tilde{\phi}_2^A$ can be interpreted as the ability-corrected taste of Africans for contact jobs.

Discrimination vs ethnic networks. Some papers use ethnic population density to capture social interactions within the given ethnic group (see, e.g., Conley and Topa (1999); Patacchini and Zenou (2012)). They show that the higher the percentage of a given ethnic group living nearby, the higher the employment rate of this ethnic group. If we translate this idea to our model, the proportion of French natives would be considered as a lack of social networks for African immigrants. We now discuss the implications of this idea for our test strategy.

Social networks affect the job search prospects through two main effects. They help people of the same ethnic group to overcrowd the others in some job queues. They also provide information on available jobs through word-of-mouth communication for instance. The former effect is

already captured in our model: positive discrimination within ethnic social networks means that minority workers are actually discriminated against by the majority group and that the extent of discrimination diminishes with the size of the minority group.

To discuss the latter effect, we slightly modify our model. We consider that the main impact of the social network is to increase the job search efficiency. The African job-finding probability is thus $m_A = me(n)$, with $e'(\cdot) \leq 0$. The matching probability increases with the number of ethnic ties, and this effect may come on top of ethnic discrimination. The French job-finding probability is $m_F = m$.

The marginal impact of a change in n on the unemployment differential is now:

$$\partial \Delta u / \partial n = m[(1-p)\phi_1^A a_e'(n) + p\phi_2^A \left[a_e'(n)\left(1 - a_c(n)\right) + a_c'(n)\left(1 - a_e(n)\right)\right]] - \frac{e'(n)}{e(n)} u_A. \tag{14}$$

The first term corresponds to the initial derivative. The second term reflects the fact that job search efficiency declines with the size of the majority group. So there are two different reasons why the unemployment rate differential may increase with n: discrimination may increase or job search efficiency may decrease. Proposition 1 is no longer true as result.

However, Propositions 2 and 3 still hold. As for Proposition 2, the derivative of the above expression with respect to p still gives expression (12). Thus it is unchanged. As for Proposition 3, the contact job probability q is not affected by this extension. This probability is conditional on being employed. The factors that affect the overall job-finding probability do not enter its computation. It follows that the consideration of social networks does not affect the rest of the test strategy. Thus finding $\partial \Delta q / \partial n < 0$ still identifies customer discrimination.

Undirected vs directed search. The basic model considers undirected search, which raises the issue of directed search. We show that the test of customer discrimination is robust to the inclusion of directed search, provided that individuals cannot perfectly observe employers' and consumers' types.

We slightly amend our model. People differ in taste vis-à-vis different jobs and reach utility level μ_i when they occupy a sector-i job. Workers self-select on the basis of their comparative advantage. They must choose a sector first and then send an application for one of the available jobs. Consider a French native and suppose that the matching probability per application is m_i in sector i. This person chooses to apply for a sector-1 job if and only if $m_1\mu_1 > m_2\mu_2$. The proportion of French natives who find a job in sector 1 is now $\pi_1^F = m_1 \Pr[m_1\mu_1 > m_2\mu_2]$.

Back to the initial model, we see that the probabilities in the two models coincide when $m(1-p)\phi_1^F = m_1 \Pr[m_1\mu_1 > m_2\mu_2]$ and so $\phi_1^F = \Pr[m_1\mu_1 > m_2\mu_2]$. The reduced-form probability ϕ_1^F is now endogenous. The main implication is that we cannot easily disentangle workers' preferences from matching odds because the latter determines the percentage of people who apply for jobs in each sector.

Africans take into account the intensity of discrimination in each sector. If they perfectly

observe employers' and consumers' types, then they do not apply for discriminatory jobs. The mean employment probability in sector 1 is thus $\pi_1^A = m_1 \Pr[m_1\mu_1 > m_2\mu_2]$. The only difference with French natives comes from the distribution of sector-specific utility levels. Now, if Africans do not perfectly observe employers' and consumers' types, then they choose to apply for sector-1 jobs when $m_1\mu_1(1-a_e) > m_2\mu_2(1-a_e)(1-a_c)$. Only customer discrimination affects this condition; employer discrimination is the same in both sectors and vanishes as a result. The mean employment probability in sector 1 is

$$\pi_1^A = m_1 \Pr[m_1\mu_1 > m_2\mu_2(1-a_c)](1-a_e). \tag{15}$$

Therefore, $\phi_1^A = \Pr[m_1\mu_1 > m_2\mu_2(1-a_c)]$. Here again we cannot disentangle workers' preferences from matching odds; but the novelty comes from the role of customer discrimination that increases the proportion of Africans who apply for jobs in sector 1.

We now have

$$\Delta q = \frac{p\,(1-a_c(n))\,\phi_2^A(n)}{(1-p)\,\phi_1^A(n) + p\,(1-a_c(n))\,\phi_2^A(n)} - \frac{p\phi_2^F}{(1-p)\,\phi_1^F + p\phi_2^F}, \tag{16}$$

where ϕ_2^A decreases with n and ϕ_1^A increases with n whenever there is customer discrimination. Proposition 3 is unchanged because $\partial\Delta q/\partial n < 0$ if and only if $a_c'(n) > 0$. However, customer discrimination now has two effects that reinforce each other: at given participation in each sector, it reduces recruitment in sector 2; it also reduces participation in this sector because minority members expect they will be discriminated against by consumers.

Accounting for wages. The model leaves aside wage setting. The main argument for such a theoretical choice is that according to the empirical evidence we survey (see Aeberhardt et al. (2010)), Africans and French natives seem to receive equal pay when they have similar characteristics. Moreover, a large proportion of African low-educated immigrants are paid at the minimum wage. In addition, there are reasons to believe that customer discrimination has ambiguous effects on wages that could matter more in other contexts than the French one. We now discuss this argument.

Suppose that output is shared between the employer and the employee according to Nash bargaining. In our one-shot random search model, there is no future, and so discrimination does not affect the reservation value of unemployment. Discrimination would leave unchanged workers' statu quo payoff. Thus discrimination would not affect individual bargained wages. Employer discrimination, being similar in both sectors, would not impact the allocation of people to sectors. Not only individual wages, but also sector-specific mean wages, and the unconditional mean wage would stay unchanged. Still, customer discrimination implies that Africans are less represented in contact jobs. Given that output may differ between the two sectors, this may create a composition effect on the African unconditional mean wage. In regressions, this effect would be captured by occupation

or sector dummies.

If we introduce skill heterogeneity, selection effects could be even stronger in our one-shot directed search model. Some individuals with a strong ability for the contact jobs could decide not to search for such jobs. They would seek non-contact jobs, for which they have lower skills. Thus customer discrimination would reallocate such persons to low-paying jobs resulting in lower wages and higher wage dispersion for Africans.

A dynamic version of the random search model would predict that all wages go down when there is employer or customer discrimination. In both cases, the reservation value of unemployment decreases and the bargained wage is lower. In the directed search version, only employer discrimination would affect all wages, whereas customer discrimination would not reduce individual wages in the non-contact job sector.

In any case, adding a binding minimum wage (i.e. a minimum wage higher than bargained wage) would imply that discrimination does not affect individual wages.

Accounting for job creation. The model also leaves aside job creation. However, the ethnic composition of a local labor market could affect the supply of vacancies as well as the relative supply of sector 2 jobs.

Suppose for instance that there is a matching technology with constant returns to scale and that the supply of vacancies responds to job profitability. Both m, the job offer probability, and p, the proportion of sector-2 jobs, depend on n, the proportion of French natives in all generality. Proposition 1 and 2 are not still valid. We have to rely on Proposition 3 directly. That m depends on n is harmless. A glance at equation (PD) reveals that the conditional probability of working in a sector-2 job does not depend on m. That n affects p is more problematic since equation (PD) is modified. Now, a marginal increase in n may impact the conditional probability of working in a contact job through two effects: stronger customer discrimination and a marginal change in the relative supply of contact jobs. The sign of the latter effect is ambiguous.

However, general equilibrium effects induced by the ethnic composition of the population are likely to be very small in our dataset. People with African origins amount to 5% of the total population and they never exceed 8% of the total population in a given local labor market.

3 Empirical strategy and estimations

We now specify an econometric model based on the economic model before presenting the dataset and the results.

3.1 Econometric strategy

The French territory is divided into a partition of local labor markets, each characterized by a particular vector (p, n, m) in our model. We linearize equations (UD) and (PD) and empirically

estimate the contribution of n and p to the individual probability of unemployment u and the conditional probability of being in contact q. For both u and q, we adopt a two-step procedure.

In the first step, the ethnic-specific preference parameters ϕ_j^F and ϕ_j^A for $j = 1, 2$ are captured by an African dummy and by individual characteristics, the return of which are ethnic specific. The matching probability, m, similarly affects both ethnic groups. It is controlled for at the local level by local fixed effects which also apprehend the part of the impact of p and n that is not ethnic specific. The part of the impact of p and n that is specific to Africans is captured by the interaction of local fixed effects with the African dummy. The effect of these interactions represent the differential unemployment rate and the differential probability of occupying a contact job between Africans and French that would have identical individual characteristics. These effects are taken as dependent variables in the second step of the estimation. The differential unemployment is explained by the share of French natives in the local population (n), the local share of contact jobs (p), and the interaction between these two variables. As suggested by Propositions 1 and 2, this allows us to test for the presence of ethnic discrimination. The differential probability of occupying a contact job is explained by the local share of French natives. According to Proposition 3, this tests for the presence of customer discrimination. The two-step strategy presents the important advantage of controlling in the first step for any missing variable that would be specific to each local labor market and would impact the differential unemployment rate and contact probability.

The first-step specification is the following:

$$u_i = \beta_0 + \beta_1 X_i^1 + \beta_2 Afr_i + \beta_3 Afr_i.X_i^1 + \psi_{k(i)}^1 + \varphi_{k(i)}^1.Afr_i + \varepsilon_i^1 \tag{17}$$

$$q_i = \gamma_0 + \gamma_1 X_i^2 + \gamma_2 Afr_i + \gamma_3 Afr_i.X_i^2 + \psi_{k(i)}^2 + \varphi_{k(i)}^2.Afr_i + \rho\widehat{\lambda}_i + \varepsilon_i^2 \tag{18}$$

where u_i is a dummy variable equal to 1 if individual i is employed and to 0 otherwise, and where q_i is the probability of being in contact with consumers. X_i^s for $s = 1, 2$ are the vectors of observed individual characteristics for each dependent variable, which slightly differ for the two of them (see below). Afr_i is a dummy variable equal to 1 for Africans and to 0 otherwise. $\psi_{k(i)}^s$ and $\varphi_{k(i)}^s$ for $s = 1, 2$ are fixed effects for labor market $k(i)$ where individual i works. The latter correspond to the estimates of the residual unemployment and contact gaps between French and Africans. ε_i^s for $s = 1, 2$ are mean-zero stochastic random components representing the influence of omitted variables.

We follow Heckman (1979) to correct for the possible sample selection bias in (18) due to the fact that occupying a contact job is conditional to being unemployed. Therefore, specification (18) also includes $\widehat{\lambda}_i$, the inverse of Mills' ratio for a Probit estimation of equation (17). Our model predicts that sector-specific preferences and consumer discrimination affect both the unemployment probability and the probability of working in a job in contact with consumers. However the relevant characteristics in each case do not need to be identical. We identify our parameters thanks to the non-linearity of Mill's ratio and the introduction into the selection equation of variables that are

supposed to have an impact on the unemployment probability but not directly on the probability of contact with consumers. These variables are the marital status and the presence of children.

The second step for the differential unemployment rate and the contact probability are, respectively:

$$\hat{\varphi}_k^1 = \delta_0 + \delta_1 \%\text{French}_k + \delta_2 \%\text{Contact}_k + \delta_3 \%\text{French}_k.\%\text{Contact}_k + \upsilon_{1k} \tag{19}$$

$$\hat{\varphi}_k^2 = \omega_0 + \omega_1 \%\text{French}_k + \upsilon_{2k} \tag{20}$$

where $\%\text{French}_k$ is the share of French natives and $\%\text{Contact}_k$ the share of contact jobs in labour market k. In equation (19), we test the null hypothesis $\delta_1 = 0$ under the assumption that the proportion of discriminatory jobs does not decrease with the majority group at the margin. Rejecting this hypothesis means that there is ethnic discrimination. $\delta_3 = 0$ provides an over-identification test of the same hypothesis. In equation (20), we test the null hypothesis $\omega_1 = 0$. Rejecting this hypothesis means that there is customer discrimination under the assumption that the proportion of discriminatory *contact* jobs does not decrease with the majority group at the margin.

We also introduce a quadratic term for the %French in the two above equations to allow a more flexible form. In that case, we estimate:

$$\hat{\varphi}_k^1 = \delta_0 + \delta_1 \%\text{French}_k + \delta_4 (\%\text{French}_k)^2 + \upsilon_{1k} \tag{21}$$

$$\hat{\varphi}_k^2 = \omega_0 + \omega_1 \%\text{French}_k + \omega_2 (\%\text{French}_k)^2 + \upsilon_{2k}. \tag{22}$$

This enables to test whether the relationship between the differential unemployment rate (respectively, the differential contact probability) and the proportion of French is increasing (resp. decreasing) on the full support of the latter variable ($[0,74, 0,99]$). If it were true, then we could conclude to ethnic and customer discrimination under a weaker identification assumption, as suggested by corollaries 1 and 2.

The two-step procedure requires that there is a sufficiently large number of observations in each area (see Fernández-Val (2009) for the Probit case) and we need more generally local effects to be sufficiently precisely estimated to carry out enough relevant information. In any case, given that the second-step dependent variables are estimated in the first-step, they are affected by measurement errors, which biases the standard errors of ordinary-least square estimates. First we provide descriptive statistics on local fixed effects that show that they are pretty precisely estimated. Second, to correct for measurement errors in the second step, we follow Card and Krueger (1992) and use weighted-least squares, where weights are given by the inverse of the first-step variance of the dependent variables. Finally, we drop in the second step the local labor markets with less than 40 Africans.

Estimations presented in the text correspond to ordinary least squares in the first step because they are supposed to be more robust to the inclusion of fixed effects than the Probit model that could be used to estimate (17). In the Online Appendix, we present estimates for the unemployment

probability that consider a Probit model in the first-step. We also present estimates from single-step estimates for both the employment and the contact job probabilities. In all cases, estimates are qualitatively very similar to the ones we report here and they confirm our conclusions about the presence of discrimination.

3.2 Data

We use individual data from the 1990 French Census collected by the French National Institute for Statistics and Economic Studies (Insee). We supplement it with the FQP (Formation et Qualification Professionnelle) survey performed in 2003 by Insee to compute the probability of working in a job in contact with consumers for each occupation. The spatial classification we consider is composed of 341 mainland "Employment Areas" (hereafter EA). The average employment area covers 1,570 km2, which is equivalent to splitting the U.S. continental territory into over 4,700 units. Insee defines EAs to maximize the coincidence between residential and working areas. Therefore, EAs are consistent local labor markets. According to the 1990 French Census, more than 80% of employed individuals work in their EA of residence. The French Census provides information on actual and former citizenship, which allows us to identify minority groups. Second-generation immigrants who automatically obtain French citizenship cannot be identified separately from people whose parents are French. We distinguish Africans and French and drop from the sample other individuals.

We only keep males to avoid a number of questions related to family arrangements, residential choices, and female labor market outcomes. We focus on individuals who have at most a high-school diploma because they are the most exposed to unemployment and the least mobile across EAs. They are three times more likely to be unemployed than those with a university degree and while 67% of high-skilled individuals moved between 1982 and 1990, the rate falls to 52% for low-skilled. We also drop from our sample all individuals who were not living in France in 1982, as such newcomers may face specific integration difficulties that could bias our empirical results. Appendix A details the identification of French natives and African immigrants, defines more precisely our sub-sample of non-newcomers, and gives the number of observations dropped by each criteria.

The Census details occupations at the four-digit level but it does not indicate whether the worker is in contact with consumers or not. In any case, being full-time or not at all in contact with customers might be not very realistic. Therefore we evaluate for each worker a probability to be in contact with customers. For that purpose, we use information from FQP to compute the fraction of contact jobs in each occupation. FQP is an individual-level database coming from a survey on a representative sample (39,285 persons) of the French population. In face-to-face interviews, working individuals, or people who stopped working less than 5 years ago, answer yes or no to the question: "Was your job in direct contact with the public?". FQP also details occupations at the four-digit level. Therefore, we can compute the proportion of contact jobs for each occupation. We consider the three-digit classification because there would be too few persons in a number of occupations at the four-digit level. For each employee in the Census, the probability of working in a contact job is

equal to the empirical proportion of contact jobs in the worker's occupation. Appendix B provides the proportion of contact jobs in each occupation.

Table 1 presents summary statistics for African immigrants and French Natives. The first two columns relate to the whole sample and the next four columns correspond to the sub-sample we use in our analysis. African workers are over-exposed to unemployment risk. The overall ethnic unemployment rate gap is about 11 percentage points. Part of the gap is explained by skill differences: first-generation Africans are less likely to reach the highest educational levels than French natives, and they are more likely to have no diploma at all. The last line of the table also show that 48% of French have a job in contact while this rate falls to 38% for Africans.

Table 1: Summary statistics: Observable characteristics across ethnic groups

	Whole Sample		Low-Skilled Men		LSM, employed	
	Africans	French	Africans	French	Africans	French
Unemployment Rate	18.79	7.18	19.29	7.85	-	-
	(0.011)	(0.014)	(0.12)	(0.019)		
Employment Rate	74.39	89.05	73.86	87.39	-	-
	(0.12)	(0.017)	(0.13)	(0.023)		
Mean age	42.69	38.56	43.77	39.83	43.75	39.47
	(0.13)	(0.027)	(0.15)	(0.035)	(0.17)	(0.037)
University Diploma	4.13	8.11	-	-	-	-
	(0.054)	(0.015)				
Two-year graduate Diploma	2.29	6.42	-	-	-	-
	(0.040)	(0.014)				
High-School Diploma	3.80	12.04	3.81	14.81	3.97	15.87
	(0.052)	(0.018)	(0.057)	(0.025)	(0.068)	(0.028)
Vocational Diploma	12.16	32.32	11.8	37.62	12.30	39.38
	(0.088)	(0.026)	(0.097)	(0.034)	(0.11)	(0.037)
Medium-School Diploma	3.02	6.82	2.89	8.04	2.97	8.33
	(0.046)	(0.014)	(0.050)	(0.019)	(0.060)	(0.021)
No Diploma	74.59	34.29	81.49	39.53	80.75	36.43
	(0.12)	(0.027)	(0.12)	(0.035)	(0.14)	(0.036)
Proportion of being in contact	-	-	-	-	37.99	47.87
					(0.18)	(0.046)
Observations	137,801	3,169,975	110,977	1,981,213	81,971	1,731,433
Proportions			80%	63%	59%	55%

Notes: (i) Sample of the first two columns: All men who participate in the labor market (excluded: enrolled in school, retired, and less than 15); (ii) Sample of the next four columns: Sample of the first two columns restricted to low-skilled men (who have a high-school diploma or less) between the ages of 25 and 60 and who participate in the labor market; (iii) Sample of the last two columns: Sample of the previous columns restricted to low-skilled salaried men (who have an high-school diploma or less) between the ages of 25 and 60; (iv) Standard errors are in brackets; (v) The last lines give the number of observations for each column and the corresponding share in the complete sample.

The location of employees corresponds to their work place. When the person is unemployed, we use residential location. The local proportion of contact jobs is the mean individual probability of

being in contact with consumers computed over all persons working in the EA. This corresponds to the proportion of *occupied* contact jobs when the theoretical model actually considers the proportion of *vacant* contact jobs, which is unavailable unfortunately. The share of French individuals is directly computed from the Census.

Table 2 displays summary statistics at the EA level for our dependent and main explanatory variables. Differential unemployment and contact probability match on average the conclusions derived at the individual level but they present pretty large spatial variations. Typically negative differential unemployment and positive differential contact probability are sometimes observed. Both are more volatile than the proportion of French natives and the proportion of contact jobs, the former variability being pretty low. The implications of these differences in spatial variability will be discussed below.

Table 2: Summary statistics: Local ethnic differentials and discriminatory forces

	Mean	Std. Dev.	Min	Max	Coeff. of variation
Differential unemployment	0.208	0.1040	-0.116	0.548	0.500
Differential contact probability	-0.127	0.0604	-0.288	0.100	0.475
%French	0.926	0.0452	0.742	0.993	0.049
%Contact	0.479	0.0628	0.331	0.625	0.131

Notes: (i) Reported statistics give equal weight to each EA; (ii) All statistics are computed on EAs that contain at least 40 African immigrants.

Figure 1: Proportions of African immigrants (left panel) and of low-skilled contact jobs (right panel)

Figure 1 (left panel) maps the residential location of African immigrants. They are concentrated

in dense areas, especially in the Paris region and in the South-East. This pattern is explained by the historical destinations of first-generation immigrants (in the largest and harbor cities) and possibly by the unequal distribution of public housing. Most of public housing in France is located in the deprived outskirts of large cities while, according to the 1990 French Census, near 50% of Africans live in HLM compared to about only 15% of French.

Figure 1 (right panel) maps the spatial distribution of low-skilled contact jobs. Unskilled jobs are concentrated in dense EAs, especially in the Paris region and in areas that attract tourists: South-East, South-West and Brittany. An explanation can be the proportion of low-skilled jobs in services (restaurants, hotels, shops) that is disproportionately high there.

3.3 Results

First-step regressions. Table 3 and Table 4 display first-step results for the unemployment equation (17) and the contact probability equation (18), respectively, while Appendix C details all estimated parameters.

Table 3: Probability of unemployment: First-step results

	OLS	
	(1)	(2)
Individual controls	Y	Y
African	0.12***	0.13***
	(0.0021)	(0.0021)
EA fixed effects		
Inter-decile		[−0.048-0.071]
Number (share) above mean (signif. at 5%)		140 (47%)
Number (share) below mean (signif. at 5%)		155 (53%)
EA fixed effects × African		
Inter-decile		[−0.061-0.13]
Number (share) above mean (signif. at 5%)		118 (40%)
Number (share) below mean (signif. at 5%)		140 (47%)
R^2	0.10	0.12
Observations	1,411,278	1,411,278

Notes: (i) Marginal effects are reported; Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) Individual controls are age and age squared, education dummies, marital status, presence of children. All of these controls are also interacted with the African dummy.

Individual characteristics have expected effects in both regressions. Education and age reduce exposure to unemployment but African workers have lower returns to education and higher returns for age. Married men and individuals without kids are less unemployed than single men and those who have kids. For both groups, higher education increases the probability of being in contact

with consumers while age increases it for French while it decreases it for Africans. Controlling for occupations at the two-digit level may be justified if individuals, and Africans in particular, sort across job types depending on ethnic specific preferences independently of the presence of discrimination. When occupations are chosen, anticipating possible discrimination, controlling for occupation can create interpretation problems and endogeneity issues. We present the two sets of estimations, with and without ethnic-specific two-digit occupations dummies. While the former option largely increases the first-step explanatory power of the model, second-step estimates are left unchanged as we will see below. R^2 are rather low but this is somewhat implied by the use of ordinary least square on a dummy variable. As reported in the Online Appendix, when estimating a Probit model, pseudo-R^2 are similar but the number of correct predictions of the unemployment status (typically assuming that the individual is employed when the prediction is above 0.5 and unemployed when it is below) is 0.82, which is pretty decent and in the usual range obtained in the literature.

Tables 3 and 4 also report summary statistics for EA fixed-effects. EA fixed-effects do not much increase the explanatory power of the model but they are strongly significant (and therefore precisely estimated), and large. An African moving from the EA at the first decile to the EA at the last decile of fixed effects would increase his unemployment rate by 19% points and increase his contact probability by 10 to 12% points by comparison with a French. Figures 1 to 4 in the Online Appendix plot local fixed-effects against their dependent variable netted out of the impact of individual characteristics. This visually depicts that for both ethnic groups location is a key determinant of employment and contact probabilities.

Second-step regressions. Table 5 presents second-step regression results for differential unemployment. The share of French natives has a significant positive effect on African unemployment. According to Proposition 1, this proves the presence of ethnic discrimination in the French labor market. Column (4) highlights a positive interaction effect between the proportion of French natives and the proportion of contact jobs. As Proposition 2 states, this represents an over-identification test for the presence of discrimination. Moreover it implies that discrimination tends to be stronger in EA where there are many contact jobs. The model shows that such a positive effect is compatible with customer discrimination but it may also indicate that Africans have absolute preference for contact jobs with or without simultaneous customer discrimination.

The evidence of ethnic discrimination is reinforced by the results in column (5) which delivers the estimates of the quadratic specification. The linear coefficient is negative non-significant, while the quadratic coefficient is positive significant (1% level). The corresponding curve is drawn on the scatter diagram (See Online Appendix) and exhibits a positive slope on almost the full support. A slightly negative slope is observed only on a part of the support where there are few observations. According to Corollary 1, this testifies to the presence of ethnic discrimination in employment under weaker assumptions than the previous tests. Overall, we conclude that the empirical evidence of ethnic discrimination on the French job market is strong.

Table 4: Probability of being in contact: First-step results

	OLS			
	(1)	(2)	(3)	(4)
Controls : age, diploma	Y	Y	Y	Y
Controls : occupations	N	Y	N	Y
African	-0.054^{***}	-0.018^{***}	-0.103^{***}	-0.063^{**}
	(0.0016)	(0.0018)	(0.0389)	(0.0352)
EA fixed effects				
Inter-decile			[−0.041-0.084]	[−0.029-0.048]
Number (share) above mean (signif. at 5%)			142 (51%)	146 (53%)
Number (share) below mean (signif. at 5%)			136 (49%)	132 (47%)
EA fixed effects × African				
Inter-decile			[−0.055-0.062]	[−0.049-0.055]
Number (share) above mean (signif. at 5%)			120 (43%)	120 (43%)
Number (share) below mean (signif. at 5%)			113 (41%)	105 (38%)
R^2	0.05	0.23	0.09	0.25
Observations	1,130,837	1,130,837	1,130,837	1,130,837

Notes: (i) Marginal effects are reported; Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) Specifications are corrected for sample selection bias, using column (1) of Table 3 to compute the inverse of Mill's Ratio; the Wald test indicates that the correlation coefficient between error terms is significant at 1%; (iii) Individual controls are age, a quadratic in age and education dummies. Occupations correspond to occupation dummies at the one-digit level. All of these controls are also interacted with the African dummy.

The effect is also economically significant. A one-standard-deviation increase in the proportion of contact jobs increases the unemployment rate differential by .15-.21 of its standard deviation. Similarly, a one-standard-deviation increase in the proportion of French natives widens the ethnic unemployment gap by .24-.37 of its standard deviation. When we account for interaction effects, the impact is even larger. A one-standard-deviation increase in the French proportion raises the unemployment rate differential by .29 of its standard deviation when contact jobs amount to 48% of all jobs, its mean over all employment areas. The figure is only at .20 when contact jobs amount to 36% of all jobs (two-standard errors below the mean), but it reaches .56 when contact jobs amount to 61% of all jobs (two-standard errors above the mean).

Table 6 reports second-step regression results for the differential contact probability. The share of French natives has a significant negative effect on the differential probability of working in a contact job. According to Proposition 3, this negative impact proves that there is customer discrimination against African immigrants in the French labor market. Controlling or not for occupations on top of education in the first step barely affects the conclusion. A one-standard-deviation increase in the proportion of French natives widens the ethnic contact gap by .13 of its standard deviation. Column (3) displays the estimation of the quadratic specification. The linear coefficient turns much more

Table 5: Probability of unemployment: Second-step results

	Differential unemployment gap				
	(1)	(2)	(3)	(4)	(5)
%Contact	0.231***		0.332***	0.108	
	(0.085)		(0.083)	(0.112)	
%French		0.517[a]	0.617***	0.795***	−0.001
		(0.112)	(0.112)	(0.126)	(0.221)
%Contact×%French				4.656***	
				(1.569)	
%French Squared					4.336***
					(1.595)
Constant	0.169***	0.131***	0.138***	0.133***	0.122***
	(0.006)	(0.008)	(0.008)	(0.008)	(0.011)
R^2	0.03	0.07	0.12	0.14	0.091
Observations	294	294	294	294	294

Notes: (i) Weighted least squares regressions using as weights the inverse of estimated variance of coefficients from first-step regression reported in Table 3; (ii) Continuous variables are centered with respect to Africans' means ; (iii) Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

negative, so much that a positive quadratic coefficient, less precisely estimated than the former (5% level instead of 1%), is needed to capture the convexity of the effect at the upper part of the support (see Online Appendix). As a result, the slope of the French impact is negative up to a proportion of 91% for the French population before becoming slightly positive on the upper part of the support. Overall, the test based on Proposition 3 delivers a clear message about the presence of customer discrimination on the French job market. This is corroborated under weaker assumptions (Corollary 2) on most of the support of the French proportion but could be disputed for the highest values of the French proportion.

The Online Appendix proposes to distinguish immigrants from North Africa and from sub-Saharan Africa. Estimations are performed using a single-step strategy because the number of individuals per area would be too small in a too large number of locations. All previous conclusions hold for each group of immigrants separately.

4 Robustness checks and limits of the empirical strategy

Results presented in Tables 5 and 6 provide some evidence of customer discrimination in contact jobs. We start this robustness section by discussing the two main identifying assumptions required by our test, namely, that the pool of prejudiced people is given by the majority group and that employer discrimination is not stronger in contact jobs than in the rest of the economy. We then turn to sorting and endogeneity concerns. We finally discuss the way the contact probability is

Table 6: Probability of being in contact: Second-step results

	Differential contact gap		
	(1)	(2)	(3)
%French	-0.153^{***}	-0.154^{***}	-2.16^{***}
	(0.039)	(0.035)	(0.823)
%French Squared			1.18^{**}
			(0.483)
Constant	0.025^{***}	0.035^{***}	0.032^{***}
	(0.002)	(0.002)	(0.003)
R^2	0.05	0.07	0.08
Observations	277	277	277

Notes: (i) Weighted least squares regressions using as weights the inverse of estimated variance of coefficients from first-step regression reported in Table 4; (ii) Continuous variables are centered with respect to Africans' means ; (iii) Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (iv) Column (1) is estimated using column (4) of first-step regression in Table 4, while columns (2) and (3) are estimated using column (3).

computed.

The link between prejudice and the majority proportion. Our test strategy requires a measure of prejudiced individuals at the employment area level. Unfortunately, this measure is unavailable in France. We discuss the plausibility of the two identifying assumptions we use to interpret the empirical results as evidence of ethnic and customer discrimination.

First, we assume that the pool of prejudiced consumers does not include members of the ethnic minority. Unfortunately, we cannot test this assumption at the French level. However, there is US evidence suggesting that black consumers discriminate less than whites, and that black employers are more likely to hire black employees. Giuliano et al. (2009) show that the probability that a new hire is black is between 3.5 and 4.0 percentage points lower under non-black managers than it is under black managers. Holzer and Ihlanfeldt (1998) show that the presence of black or Hispanic customers at an establishment increases hires from these two groups, especially in contact jobs.

We actually need another identifying assumption. Our results reveal that the proportion of discriminating jobs increases with the proportion of French natives. This finding is valid for the empirical support of the French-native proportion distribution across EAs. To establish ethnic discrimination, we need to extend this relationship to the full interval [0,1]. As explained in Section 2.1, this requires that the elasticity of the prejudiced proportion within the majority group with respect to the majority group size is larger than minus one. Formally, if $a(n) = r(n)n$, then $nr'(n)/r(n) \geq -1$. In other words, it means that reducing the share of Whites does not make the remaining Whites too prejudiced against the other groups.

This assumption is related to the literature in psychology and sociology that discusses the link between prejudice in the majority group and the minority proportion. This literature emphasizes

two main opposite arguments. According to the Contact Hypothesis (Allport (1954)), interpersonal contacts are an effective way to reduce prejudice. A larger minority group offers more contact opportunities to majority members. As a result of new understanding, the proportion of prejudiced individuals should shrink in the majority population. By contrast, according to the Realistic Conflict Theory (Jackson (1993)), inter-group hostility may arise in a situation where there is perceived scarcity of a resource. If there is common belief that there is a fixed number of jobs, then increasing the size of the minority may be perceived as a threat by majority members. According to this theory, the proportion of prejudiced individuals should increase among the majority when its size decreases.

Several empirical studies try to confront these two opposing theories to data (see, e.g., Adida et al. (2012), and references therein). European studies analyze the effect of the share of immigrants on some measures of anti-immigrant attitudes, while US studies focus on the effects of the share of African Americans on racial prejudice. Both types of studies use qualitative and quantitative methods. A quick glance at results shows considerable heterogeneity although most authors prove the existence of the Conflict Theory. However, these studies show that the relationship between the prejudiced majority and the proportion of minorities is complex. For instance European studies use survey data (European Social Survey, European Values Study and Eurobarometer Survey) at the country level and assume that prejudice takes place at the national scale, whereas the presumed effects emerge at the local level in our view (see McLaren (2003), Schneider (2008), Scheepers et al. (2002) and Strabac and Listhaug (2008)). Some US studies assume that more blacks monotonically favor negative attitudes toward them but other contributions show that the relationship is non-linear, while no relationship is found for Northern states for example (see Fossett and Kiecolt (1989), Giles (1977), Quillian (1996) and Stephens-Davidowitz (2012)).

For the US, we perform estimates of the relationship between prejudice and the majority share at the state level. We compute the proportion of prejudiced individuals from the General Social Survey (1972-2004) and the 5%-sample Public Use Micro Data Series (1980, 1990, 2000) as the State's share of whites who positively respond to the question "Do you think there should be laws against marriages between blacks and whites?". We then regress the log of this share on the log of the share of whites within the population.

Table 7 displays the estimates of the elasticity of the prejudiced share with respect to the share of whites. Such estimates do not support that this elasticity is lower than minus one. The raw elasticity is slightly negative but far and significantly different from -1. It is non-significantly different from zero actually and its explanatory power is virtually zero. Once we control for state fixed-effects in column (2), to account for time invariant factors that would affect permanently prejudice in some states, and also in column (3) for decade fixed effects that account for the national evolution of prejudice over time, the negative correlation disappears and the elasticity even turns positive (though weakly in column (3)). Finally, in column (4) we show that one can obtain an explanatory power similar to the model with both state and decade fixed effects (and a non significant positive

Table 7: Elasticity of the share of prejudiced whites with respect to the proportion of whites

	Racial prejudice (log)			
	(1)	(2)	(3)	(4)
Share of Whites (log)	−0.170	7.780***	2.050*	1.905
	(0.52)	(0.89)	(1.12)	(1.15)
State FE		Yes	Yes	
Decade FE			Yes	
Slave state				3.033***
				(0.46)
Year1980×Slave state				−0.088
				(0.16)
Year1990×Slave state				0.030
				(0.16)
Constant	−1.666***	1.791***	−0.415	−3.488***
	(0.11)	(0.36)	(0.44)	(0.38)
R^2	0.001	0.782	0.866	0.867
Observations	118	118	118	118

Notes: (i) Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) Slave States : Delaware, Georgia, Maryland, South Carolina, Virginia, North Carolina, Kentucky, Tennessee, Louisiana, Mississippi, Alabama, Missouri, Arkansas, Florida, Texas; (iii) The share of racial prejudice is computed at different time periods : 1976-1985, 1986-1995 and 1996-2004 for corresponding decennial Census 1980, 1990 and 2000, respectively.

elasticity) by simply adding a dummy variable for the states where slavery was still legal in 1861, just before the abolition in 1865, and specific time trends for these states. In line with these results, Sundstrom (2007) argues that counties where Blacks are a large share of the workforce used to be plantation farming areas and that they are characterized by a strong tradition of hierarchical race relations where voters expressed segregationist preferences in the 1948 presidential election. In any case, we show that prejudice does not significantly decrease with the share of whites, which implies that the above-mentioned elasticity is larger than -1.

Overall, US data do not invalidate our identifying assumption regarding the extension of the relationship between the importance of prejudice and the proportion of French natives.

Controlling for another measure of prejudice. As a robustness check, we use for France what seems a more direct measure of prejudice at first glance, the share of votes in favor of the far-right party, Front National (FN), at the first-round of the 1995 French presidential election[1]. At this election, 14.8% of electors have voted for FN and there is considerable spatial variation in this share across EAs. The standard deviation is 5%, with a minimum value at 3% and a maximum

[1]This data was made available by the Center for Socio-Political Data of Sciences-Po.

at 30%. This additional test may seem appropriate since the program of the Front National is notorious for promoting discriminating policies against the minority coming from Africa. However and as more documented below, it is not obvious that people vote for them mostly for this dimension of their program, and therefore that the share of FN votes is a better measure for local prejudice than the share of French natives.

Tables 8 first replicate in columns (1) and (3) previous results adding the local share of FN votes, and its interaction with the contact variable when needed, as a control variable. The impacts of the French proportion, and of its interaction with the share of contact jobs for unemployment, keep the same sign and order of magnitude. It still positively affects the differential rate of unemployment, and its interaction with contact jobs also, and it impacts negatively the differential probability of working in a contact job. In columns (2) and (4) the FN local share replaces the French local share. It has in that case an unexpected negative impact on the unemployment rate differential, and the expected negative impact on the differential probability of working in a contact job.

Table 8: Second-step results - Far-right Party as control

	Unemployment		Contact	
	(1)	(2)	(3)	(4)
%FN	-0.351^{**}	-0.639^{***}	-0.220^{***}	-0.237^{***}
	(0.138)	(0.125)	(0.043)	(0.044)
%Contact	0.095	0.148^{*}		
	(0.114)	(0.084)		
%Contact×%FN	-2.551	-4.132^{**}		
	(1.784)	(1.734)		
%French	0.620^{***}		-0.138^{***}	
	(0.143)		(0.033)	
%Contact×%French	3.541^{**}			
	(1.655)			
Constant	0.135^{a}	0.160^{***}	0.035^{***}	0.032^{***}
	(0.008)	(0.006)	(0.002)	(0.002)
R^2	0.16	0.11	0.15	0.10
Observations	294	294	277	277

Notes: (i) Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (ii) Continuous variables are centered with respect to Africans' means.

Our previous conclusion on the presence of customer discrimination in France is confirmed when the FN local share is controlled for and when the FN local share replaces the French proportion as regards the differential contact probability. The results are slightly puzzling for differential unemployment, which seems to be negatively correlated with the FN local share. One possible explanations is that the FN local vote share is not a relevant measure of prejudice. As said above, if FN politicians are clearly prejudiced, it does not mean that their voters are. For instance, during

the 2002 French presidential election, the far-right leader Jean Marie Le Pen arrived second behind conservative candidate Jacques Chirac but above Lionel Jospin from the socialist party who was supposed to be Chirac's strongest challenger. This surprising result was explained by Perrineau (2003), and many political analysts, as a 'protest vote' and not a 'racist vote'.

To further elaborate on that, we regress the local share of FN votes on the share of Africans for the largest two French cities, Paris and Marseilles, at the district level. Districts correspond to spatial units that are smaller than EAs and should better correspond to the one where interactions between Africans and French, and therefore possible prejudice, are the strongest. When introduced alone, the local share of Africans explains 43% of the FN vote variance for Marseilles, and 72% for Paris, and the two figures are 57% and 29% for the total share of foreign people. However, when we regress the local share of FN votes on local unemployment and education, R^2 are very large, at 0.94 for Marseilles and 0.88 for Paris. The R^2 does not vary when the Africans share is removed. Moreover, neither the local share of Africans or foreigners is significant. Therefore, we think that votes for the FN do not mainly reflect racial prejudice, as commonly acknowledged. They are induced by distrust in traditional parties, or political support for protectionism, and more generally by concerns about unemployment in less educated areas. Such findings as these can dramatically reduce the interest of choosing the local FN vote share as a measure of local prejudice. Typically, when local differential unemployment is regressed on the local FN vote, we are very close to trying to estimate the impact of local unemployment on local differential unemployment, thereby leading to an endogeneity issue. To sum up, beyond the interpretation issue, the econometric arguments make it very difficult to interpret the estimates obtained when the share of FN votes is used as a measure of local prejudice. This is why our favorite proxy for prejudice population remains the local share of French natives.

Sector-specific employer discrimination. Section 2.2 argues that the test is compatible with sector-specific employer discrimination if it is not larger in contact jobs than in other jobs. To test this assumption, we use information coming from the French Diversity Charter.[2] This is a written commitment that can be signed by any company that wishes to ban discrimination at the workplace. It expresses a company's willingness to improve the degree to which their workforce reflects the diversity of the French society. The 3,473 signatory companies of the Diversity Charter work in a wide range of business sectors and are quite representative of the French economy. We assume that these companies are unprejudiced as they promote ethnic diversity. To test whether there is sector-specific employer discrimination, we compute the share of contact jobs in each group of firms. We take advantage of the fact that the Diversity Charter distinguishes 15 sectors. We first compute contact rates using the 2003 FQP survey for these 15 sectors, which then allows us to compute the average, weighted by employment in each sector, over the firms which sign the charter. We obtain an average share of contact jobs equal to 61.7%. When we do the same exercise on the 1999 Census, the average share is 62.1%.

[2] Available at www.diversity-charter.com/.

These proportions are almost the same. This shows that employer discrimination does not seem to be strongly distorted toward some sectors, and in particular those with larger contact jobs.

Spatial sorting. So far, residential choices have not been discussed. In France, workers, and especially Africans, are not very mobile across local labor markets. However, it is unlikely they allocate randomly across all possible locations. Therefore, endogeneity concerns due to reverse causality could affect the relevance of our estimates when African residential choices respond to discriminatory forces. Africans might choose to locate in EAs characterized by a low ethnic unemployment rate differential or a low proportion of contact jobs. The OLS estimate of the impact of the proportion of French natives would then over-estimate the effect of discrimination due to such endogenous residential responses. Moreover the spatial sorting of immigrants can also be driven by some unobservable skill variables that we cannot control given the absence of a panel dimension. If less skilled immigrants locate in EAs that contain a small proportion of immigrants, the differential unemployment gap could be again spuriously attributed to discrimination.

Let us first evaluate the risk of facing the second bias. Introducing individual controls in both the unemployment and the contact gap specifications in first step estimations provides a first way of reducing the possibility of such bias. It turns out that the correlation between the EA share of French natives and the share of Africans with no diploma is largely negative, at -0.38. Hence, failing to control for observed individual characteristics, the sorting effect on observed characteristics would tend to bias our test of discrimination downward, and not upward. As a result, unobserved characteristics would need to be largely negatively correlated with observed characteristics to generate an upward bias. We see such a negative correlation between the two types of skills as implausible.

Still, to further address this sorting issue and simultaneously consider some endogeneity bias due to omitted variables, we use an instrumental variable approach. Given the very large majority of French people in each EA, changes in the proportion of French natives are governed by changes in the group size of the different immigrants, mostly Africans and Europeans. The location of European immigrants should be more exogenous to African unemployment and contact gaps. Thus we emphasize the behavior of African individuals to derive a set of possible instruments. We discuss the use of these variables by resorting to a two-period version of our statistical model. The two periods refer to 1968 and 1990.

Sticking to the notations in Section 3.1, we rewrite equation (19) by adding a component c^1_{k90} that reflects the role of unobserved variables on the unemployment gap:

$$\hat{\varphi}^1_{k90} = \delta_0 + \delta_1 \%\text{French}_{k90} + \delta_2 \%\text{Contact}_{k90} + c^1_{k90} + \nu^1_{k90}, \tag{23}$$

where ν^1_{k90} is i.i.d. and orthogonal to all other variables. Endogeneity problems arise because $\%\text{French}_{90}$ is possibly correlated with c^1_{90}. In line with our theory, suppose that African workers choose where to reside as a function of African-specific unemployment risk and contact job proportion $\%\text{Contact}_{90}$. In addition, we consider that African location choices are influenced by

the following variables: the 1968 proportion of French natives $\%\text{French}_{68}$, which reflects the local absence of ethnic networks, the 1990 local homeowner proportion $\%\text{Owner}_{90}$, which is negatively related to social housing, and a set of geographical characteristics *Geo*. This intuition leads us to assume that

$$\%\text{French}_{k90} = a_0 + a_1\%\text{French}_{k68} + a_2\%\text{Contact}_{k90} + a_3\%\text{Owner}_{k90} + a_4\text{Geo}_k + c^F_{k90} + \nu^F_{k90}, \quad (24)$$

where c^F_{k90} is again an unobserved component while ν^F_{k90} is i.i.d. and orthogonal to the other variables. This mobility equation suggests some instruments for $\%\text{French}_{90}$, namely $\%\text{French}_{68}$, $\%\text{Contact}_{90}$, $\%\text{Owners}_{90}$, and *Geo*. We now discuss them in turn.

The use of $\%\text{French}_{68}$ to instrument $\%\text{French}_{90}$ follows a number of contributions in the literature, as Card and DiNardo (2000), Card (2001), or more recently Peri (2012), who propose to use past immigrant flows to instrument current ones and assess their impact on local labor markets. Spatial patterns of immigrant rates are stable over time: at the EA level, the correlation coefficient between $\%\text{French}_{68}$ and $\%\text{French}_{90}$ is 0.83. This high correlation is possibly driven by the effect of ethnic networks on the location choice of immigrants. In the US, Bartel (1989) shows that immigrants are more geographically concentrated than similar natives and reside in cities with a larger ethnic population (see also Edin et al. (2003), Bauer et al. (2005), Aslund (2005) and Damm (2009)). In France, Hunt (1992) finds that the predominant factor in explaining the location of repatriates from Algeria is the location of earlier repatriates. She estimates that a 1% increase in the proportion of earlier repatriates at *département* level implies a 2.4% increase in the proportion of subsequent repatriates. There is another reason to use the past value of the native stock in the French context: African immigrants seem to face discrimination in the rental sector (see Combes et al. (2011)), which increases their moving cost. Thus they tend to stay where they arrived in the first place.

The validity of this instrument rests on the assumption that the distribution of African immigration across EAs in 1968 is not correlated with the unobserved factors that affect the 1990 unemployment gap. Formally if we assume that the same relation (24) is as valid in 1968 as in 1990, we can write

$$\%\text{French}_{k68} = b_0 + b_1\%\text{Contact}_{k68} + b_2\%\text{Owners}_{k68} + b_4\text{Geo}_k + c^F_{k68} + \nu^F_{k68}. \quad (25)$$

The problem occurs when c^F_{k68} is highly correlated with c^1_{k90}. This arises when there is a permanent component that codetermines c^F_{k68} and c^1_{k90}, or when there is a common autoregressive component in c^F_{k90} and c^1_{k90}. In such a case, equation (25) suggests a substitute instrument: $\%\text{Contact}_{68}$. Unfortunately, we lack the data to compute this proportion. Thus we use a proxy, which is one minus the 1968 proportions of jobs in the manufacturing sector, where the contact job proportion is notoriously low. Borjas (2001) and Hunt (1992) also use the industrial composition of jobs to instrument migrants' location. In the context of inter-state migration in the US, Collins (1997) argues that

the first wave of black migration northward was induced by the growth in industrial employment during World War I. In the postwar period, Rosenbloom and Sundstrom (2003) and Boustan (2010) show that black migrants settled disproportionately in central cities of large Metropolitan Statistical Areas as they were attracted by economic opportunities in the manufacturing sector. Note that $\%\text{Contact}_{68}$ and $\%\text{Contact}_{90}$ are strongly positively correlated. This raises the risk that $\%\text{Contact}_{68}$ is a weak instrument conditional on having also $\%\text{Contact}_{90}$, but this can be tested.

The homeowner proportion $\%\text{Owner}_{90}$ captures the lack of a large housing market for tenants and of social dwellings. To reduce the risk of correlation with the 1990 unemployment gap, we actually use $\%\text{Owner}_{68}$. African immigrants are strongly over-represented in social housing as they face ethnic discrimination in the private rental sector (see Combes et al. (2011)). Several papers argue that the local provision of social benefits (see, e.g., Borjas (1999), for the US, and De Giorgi and Pellizzari (2009), for Europe) and the local supply of social housing (Bertrand et al. (2000), and Verdugo (2011), for France) strongly influence the immigrants' location choices. We cannot compute the 1968 share of social housing. However, the 1990 homeowner proportion is strongly negatively correlated with this share in 1990 (the correlation coefficient is -0.67). Thus $\%\text{Owner}_{68}$ should be a reasonable proxy of the 1968 share of social housing. This instrument is less correlated with African immigrant flows than $\%\text{French}_{68}$. However, it should also be more exogenous to the unemployment and contact probability gaps.

The final set of instruments *Geo* regards real geography, which is also known to influence location choices. We use the distance to Algiers and a dummy equal to one when the EA is on the Mediterranean sea. The first instrument borrows from Angrist and Kugler (2003) who, in the spirit of the gravity equation, instrument the presence of immigrants in European countries in the 1990s (a large share of whom came from the Balkans due to conflicts there) by the distance to Sarajevo. We compute the distance to Algiers as many African immigrants in 1990 France are Algerian. Moreover, and this is also valid for the second instrument, immigrants from North Africa are especially attracted to Southern France and especially to the Mediterranean area. Hunt (1992) shows that cultural and climatic considerations led the repatriates to settle disproportionately in the South of France. She points out the role of temperature: a one-degree increase in annual temperature is associated to a 0.25 percentage point increase in the proportion of repatriates.

Unlike African immigrants, European immigrants are unlikely to locate in reaction to changes in African unemployment and contact gaps. However, just like the Africans, we cannot exclude there is a common factor influencing these gaps and the spatial allocation of European immigrants. This leads us to consider two other instruments: a dummy equal to 1 when the EA is on the border, and the longitude in degrees. There is a large literature arguing that migrants for neighboring countries tend to locate at the border or very close to (see, e.g., Lewer and Van den Berg (2008), Pedersen et al. (2008) and Mayda (2010) for European migration, and Chiswick and Miller (2004) for the US). The underlying idea is that traveling involves monetary costs and foregone earnings that limit the distance made once the border is crossed. Jayet and Ukrayinchuk (2007) also document the over-

representation of European immigrants at the border. The border, and especially the Eastern one, also hosts a large number of African immigrants who entered France by transiting to a neighboring country. To account for the case where $\%\text{French}_{68}$ is itself correlated with c^2_{k90}, we also consider first-stage regressions with only $\%\text{Owners}_{68}$ and *Geo*, or even only *Geo*.

We can elaborate a similar discussion on the relevance of instruments by extending similarly the specification for the contact probability:

$$\hat{\varphi}^2_{k90} = \omega_0 + \omega_1 \%\text{French}_{k90} + c^2_{k90} + \nu^2_{k90}, \tag{26}$$

where c^2_{k90} is an unobserved component. The previous discussion leads us to consider the same list of instruments but without the contact job proportion $\%\text{Contact}_{68}$. Thus potential instruments are now $\%\text{French}_{68}$, $\%\text{Owners}_{68}$ and *Geo*.

Table 9 presents the results for the unemployment gap. Both $\%\text{French}_{90}$ and the interacted variable $\%\text{French}_{90} \times \%\text{Contact}_{90}$ keep their significant positive impact. The Cragg-Donald statistics is above 10, largely in most cases, which indicates that our instruments are not weak.

First-stage regressions are displayed in Appendix D. They reveal that the most powerful instrument is $\%\text{French}_{68}$. This variable seems reasonably exogenous: the J-stat p-value is close to 20% with high Cragg-Donald tests. The 1968 homeowner proportion also has a large positive impact, in line with the view whereby it is negatively associated to the extent of social housing. The variable $\%\text{Contact}_{90}$ has a positive impact when $\%\text{French}_{68}$ is included, whereas its impact turns negative when it is not. In the same line, $\%\text{Contact}_{68}$ has a positive impact. This suggests that more recent immigrants tend to avoid EAs with many contact jobs. However, they prefer to be close to the former immigrants who themselves decided to locate in EAs with many contact jobs, probably for geographical reasons. The longitude and the border dummy tend to be negatively associated with $\%\text{French}_{90}$, in line with the idea that European immigrants locate at the border, and most particularly in the East part of France. The Mediterranean dummy has a positive sign when added to $\%\text{French}_{68}$ (columns (1) and (2)), but the sign turns negative when $\%\text{French}_{68}$ is removed (columns (3) to (8)). This goes along with the role played by Mediterranean geographical amenities in the location of repatriates from Algeria.

The coefficient of $\%\text{French}_{90}$ is roughly similar to OLS estimates. However, in columns (7) and (8) the coefficients are twice the coefficients in columns (1) and (2). A first reason is due to the fact that the instrument set is reduced to geography variables, possibly the most exogenous but also the weakest instruments as reflected by the lower Cragg-Donalds' statistics. This reduces the precision of estimates. A different reason can arise from $\%\text{French}_{90}$ having heterogeneous effects across locations. The EAs that are the most responsive to the geography instruments are also such that $\%\text{French}_{90}$ could have stronger effects than average. This is because IV estimators have a local validity and correspond to a local average treatment effect only (LATE, see for instance Imbens and Angrist (1994)). In our case, geography instruments tend to put more weight on specific areas: the East part of France with a special focus on the South-East. African immigrants in the South-East

Table 9: IV Regression - Unemployment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
%French$_{90}$	0.780***	1.043***	0.363**	0.697***	0.555**	0.726***	1.569***	1.802***
	(0.143)	(0.176)	(0.184)	(0.209)	(0.215)	(0.222)	(0.297)	(0.307)
%Contact$_{90}$	0.426***	−0.163	0.356***	−0.280	0.388***	−0.192	0.557***	−0.168
	(0.088)	(0.182)	(0.091)	(0.215)	(0.092)	(0.277)	(0.106)	(0.397)
%Contact$_{90}$×%French$_{90}$		7.184***		7.854***		6.905**		8.670*
		(2.032)		(2.421)		(3.093)		(4.593)
Constant	0.116***	0.099***	0.148***	0.126***	0.133***	0.124***	0.055**	0.042*
	(0.013)	(0.015)	(0.016)	(0.017)	(0.018)	(0.018)	(0.024)	(0.024)
Shea p. R^2 [%French]	0.718	0.700	0.440	0.509	0.318	0.446	0.202	0.262
Shea p. R^2 [%Cont×%Fr]		0.663		0.480		0.290		0.148
J-stat p-value	0.239	0.255	0.165	0.897	0.319	0.740	0.683	0.438
Cragg-Donald	184.2	67.9	56.9	24.8	45.0	11.8	24.5	6.2
%French$_{68}$	Y	Y	N	N	N	N	N	N
%Owner$_{68}$	Y	Y	Y	Y	Y	Y	N	N
Mediterranean Sea	Y	Y	Y	Y	Y	Y	Y	Y
Border	Y	Y	Y	Y	Y	Y	Y	Y
%Contact$_{68}$	N	N	Y	Y	N	N	N	N
Longitude	N	N	N	N	N	N	Y	Y

Notes: (i) In column (1), the 1990 proportion of French natives is instrumented by the 1968 proportion, the 1968 homeowner proportion, the proximity to the Mediterranean sea and the proximity to borders; in column (3), the 1990 proportion of French natives is instrumented by the 1968 homeowner proportion, one minus the 1968 share of workers in the industrialized sector, the proximity to the Mediterranean sea and the proximity to borders; in column (5), the 1990 proportion of French natives is instrumented by the 1968 homeowner proportion, the proximity to the Mediterranean sea and the proximity to borders; in column (7), the 1990 proportion of French natives is instrumented by the proximity to the Mediterranean sea, the proximity to borders and longitude; in columns (2), (4), (6) and (8), the proportion of French natives and the interaction variable are instrumented by the same variables as in columns (1), (3), (5) and (7), respectively, and their interactions with the share of contact jobs; (ii) Continuous variables are centered with respect to Africans' means; Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

are disproportionately coming from Maghreb, and especially Algeria. Prejudice against such people may be stronger for historical reasons, and in particular the difficult decolonization process.

Table 10 presents the results for the differential probability of working in contact with consumers (the corresponding first-stage regressions are displayed in Appendix D). It contains two sets of similar estimates, whether we control for occupation in the preliminary individual regression (columns (1) to (3)) or not (columns (4) to (7)). The main message is that the effect of %French$_{90}$ is significantly negative, and even larger than the OLS estimates displayed by Table 6. This suggests that there is a permanent component in the different EAs that both stimulates the creation of contact jobs and attracted African immigrants. By neglecting selection effects, OLS regressions

Table 10: IV Regression - Contact

	(1)	(2)	(3)	(4)	(5)	(6)
$\%\text{French}_{90}$	-0.209^{***}	-0.317^{***}	-0.320^{**}	-0.201^{***}	-0.293^{***}	-0.288^{***}
	(0.049)	(0.062)	(0.108)	(0.044)	(0.055)	(0.096)
Constant	0.026^{***}	0.028^{***}	0.028^{***}	0.036^{***}	0.038^{***}	0.038^{***}
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Shea p. R^2	0.624	0.422	0.138	0.624	0.422	0.138
J-stat p-value	0.005	0.415	0.131	0.004	0.140	0.147
Cragg-Donald	151.3	100.2	21.8	151.3	100.2	21.8
$\%\text{French}_{68}$	Y	N	N	Y	N	N
$\%\text{Owner}_{68}$	Y	Y	N	Y	Y	N
Border	N	N	Y	N	N	Y
Distance to Algiers	Y	Y	Y	Y	Y	Y

Notes: (i) Column (1) to (3) follow the individual regression displayed by column (3) of Table 4, while the last three columns are based on column (4) of Table 4. (ii) In columns (1) and (4), the 1990 proportion of French natives is instrumented by the 1968 proportion, the 1968 homeowner proportion and the distance to Algiers; in columns (2) and (5), the instruments are the 1968 homeowner proportion and the distance to Algiers; in columns (3) and (6), the instruments are the distance to Algiers and the proximity to borders; (iii) Continuous variables are centered with respect to Africans' means; Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

under-estimate the impact of $\%\text{French}_{90}$ and the associated phenomenon of customer discrimination. Another implication is that $\%\text{French}_{68}$ should not be used as a reliable instrument for this regression, contrary to the unemployment gap estimation: the p-value of the J-stat test is very close to 0 in column (1). Finally, the Cragg-Donald statistics are well above the usual thresholds in all columns, including columns (3) and (6) where we only use geography instruments in the first-stage regression.

Overall, IV estimates are close to OLS ones, and if anything reinforce the conclusions obtained from OLS and the presence of customer discrimination. One of the likely reasons relates to the low mobility of the population in France, which precludes people's location choices responding to market pressures. This low mobility is due to cultural factors and housing market regulations. As in other Latin countries, the use of local social capital and networks is pervasive in finding jobs, partners, and housing in France. Investing in local social capital plays against spatial mobility (see David et al. (2010)). Housing regulation also hampers mobility. Procedural formalism in the case of judicial dispute raises the cost of the tenant's default for the landlord. In turn, the supply of rentals is kept low, which further increases equilibrium rents and search delays. The tax system also makes moving very costly for homeowners. Finally and more importantly, social housing reduces the mobility of low-skilled workers. Social housing represents 15% of all dwellings. While it is relatively easy to move within the same city, selection rules quasi forbid inter-city moves. African immigrants

are hugely over-represented in social housing (close to 50% of African immigrant households live in such dwellings according to the Housing Survey). They may also suffer from discrimination in the private rental market (see Combes et al. (2011)). As a result, the mobility rate is roughly the same between low-skilled French natives and low-skilled African immigrants, but mobile Africans tend to stay in the same city. From the 1990 census, we compute that only 22% of low-skilled Africans moved to a different city while the rate reaches 34% for low-skilled French natives over an eight-year period.

Computation of the contact job probability. We do not observe whether each individual works in a contact job or not. We rather apply to each worker the occupation-specific probability of having a contact job. The main drawback of this variable is that even in high-contact-rate occupations, African workers might interact less than others with consumers. Let us consider two occupations that are particularly well represented among African workers. Occupation '561' includes waiters, cooks, kitchen helpers, hotel desk clerks, maids and housekeeping cleaners. Occupation '631' includes electrical and electronics repairers/installers, electronic equipment installers and repairers (home appliance). In occupation '561', 85% of French-native workers are in contact with consumers, whereas this rate falls to 61% for first-generation Africans. Similarly, in occupation '631', 76% of the French natives are in a contact job, while the rate falls to 29% for first-generation Africans. This means that even though employers hire African immigrants in occupations '561' or '631' that are characterized by a relatively high rate of contact, African immigrants are less exposed to customers than French people (for instance, they are cleaners, kitchen helpers, or repairers in a repair shop with no home services).

Fortunately, the fact that our measure of contact probability seems to be biased upwards for Africans does not affect the relevance of the test of customer discrimination. Actually this could lead us to underestimate the extent of discrimination but should not increase the risk of 'false positives' – situations where we conclude there is discrimination while there is not.

Conclusion

The paper investigates the link between the over-exposure of African immigrants to unemployment in France and their under-representation in jobs in contact with customers. From a methodological perspective, we provide a simple and original test strategy to detect ethnic and customer discrimination in survey data which relies on two weak identification assumptions. We run the test on French individual data in a cross-section of Employment Areas. Our results indicate that there is ethnic discrimination in the French labor market for contact jobs and that it is related to customer behavior.

Our work could be extended in several directions. On the theoretical side, wage setting and the labor demand could be made endogenous so as to predict the sectorial composition of jobs by areas. We could use such an enriched model to instrument (or to justify existing instruments

for) the proportion of contact jobs in second-step regressions. The demand for goods from the contact job sector could also be analyzed. Individual demand should depend on income. Customer discrimination would then respond to aggregate income of the minority population. On the empirical side, the test strategy could be applied to alternative datasets. For instance, we could test whether black workers suffer from customer discrimination in the US.

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Appendix

A Dataset

The French Census (1990) is available both at the individual and city level. The 1990 Census full sample includes a quarter of the total French population (1,417,6821 observations). Table 11 describes the ethnic groups that we use. Information on actual and former individual citizenship allows us to identify minority groups. Unlike the Labor Force survey, the Census does not provide this type of information for the parents. Consequently, we only consider first-generation African immigrants: persons who were born in Africa with an African country citizenship at birth. Unfortunately, second-generation immigrants belong to the group of French natives. Table 12 describes the construction of the male low-skilled worker sample used in this paper.

Table 11: Ethnic groups in the 1990 French Census (Full sample)

Ethnic groups	Observations	Percentage
French natives	12,726,437	91.64%
Africans	412,659	2.97%
Europeans	632,531	4.55%
Others	115,392	0.84%

Notes: (i) French natives are born French at birth; (ii) Africans that we consider are born in Africa and can either have foreign citizenship or have French citizenship (by acquisition); (iii) Europeans considered are born in Europe and can either have foreign citizenship or have French citizenship (by acquisition); (iv) Source: 1990 French Census.

Table 12: Restricted sample of the 1990 French Census

Full Sample	**14,176,821**
Restrict to men who live in France between the ages of 25 and 60	3,318,643
Exclusion criteria	
Neither African nor French	263,493
Non working (Retired, military, enrolled in school)	164,700
Diploma sup High-School level	518,366
In Public Sector	736,779
Self-employed	446,183
Not in France in 1982	68,419
Not in relevant occupations	699,175
Final sample	**1,411,278**
French natives	1,311,647 (92.94%)
Africans	99,631 (7.06%)
Low-skilled workers in the private sector	1,153,596 (81.74%)
Unemployed individuals	257,682 (18.26%)

Notes: (i) The exclusion criteria are not mutually exclusive, so many observations show up in multiple rows; (ii) Irrelevant occupations include public occupations or high-skilled occupations; (iii) French natives are born French; (iv) Africans are born in Africa and can either have foreign or French citizenship (by acquisition); (v) Source : 1990 French Census.

B Proportion of contact jobs by occupation

We exclude one-digit category 1 (managerial functions) and one-digit category 2 (crafts occupations). In the former case, there are too few low-skilled individuals. In the latter case, the number of low-skilled individuals is sufficiently large, but there are too few low-skilled wage-earners.

Table 13: Proportion of contact jobs by occupation

Occupation	**%Contact**	**#**	**Occupation**	**%Contact**	**#**
Liberal Professions (3)					
Journalists/ Writers	0.571	7	Managers (Hotel & food service)	0.8	10
Managers (publishing, entertainment)	0.524	21	Technical Directors/managers	0.5	6
Craft artists, Musicians, Dancers	0.821	28	Engineering Managers (R & D)	0.560	107
Managers	0.638	47	Engineering Managers (production)	0.486	190
Administrative services Managers	0.483	44	Engineering Managers (maintenance)	0.522	23
Public Relations & Sales Managers	0.776	134	Engineering Technicians (electrical)	0.93	29
Managers (Bank & Insurance)	0.660	103	Engineering Technicians (logistics)	0.5	18
Intermediate occupations (4)					
Nurses	0.935	31	Medical technicians and specialists	0.809	84
Medical & Public health social workers	0.84	100	Exec Secretaries & Admin Assistants	0.526	302
Sales Agents/Representatives	0.869	659	Technical Assistants (communication)	0.641	39
Transportation Admin Managers	0.638	58	Technical Assistants (insurance)	0.712	146
Technical Assistants (Hotel)	0.638	58			
Technicians					
Agricultural	0.667	18	Electricians	0.426	101
Mechanical	0.189	164	Construction and Building	0.647	51
Metal	0.189	164	Printing	0.381	21
Production	0.468	231	Miscellaneous	0.625	72
First-Line Supervisors					
Agricultural	0.412	51	Electricians	0.400	10
Mechanical	0.439	82	Construction and Building	0.641	128
Chemistry, Food Industry	0.284	95	Metal	0.284	95
Distribution	0.341	44	Maintenance	0.438	105
Miscellaneous	0.571				
Clerks / Office Workers (5)					
Secretaries	0.705	695	Accountants, financial officer	0.398	855
Clerks (Bank, Insurance)	0.543	151	Transportation clerks	0.832	82
Shop clerks	0.949	1146	Gas pump attendants	0.958	24
Waiters, Cooks, Desk Clerks	0.807	388	Hairdressers, Manicurists	0.986	148
Child/Home Care Workers, Concierges	0.748	1325			
Operators/workers (6)					
Skilled (industrial)					
Maintenance	0.247		Electricians	0.112	98

Continued on Next Page

Table 13 – Continued

Occupation	**%Contact**	**#**	**Occupation**	**%Contact**	**#**
Production : Metal	0.124	290	Production: Mechanical	0.111	244
Production : Construction & Building	0.445	155	Production: Processing	0.098	284
Production : Processing	0.033	91	Production: Textile	0.171	251
Production : Printing	0.171	251	Production: Woodworking	0.239	221
Skilled (Craft)					
Gardeners	0.644	59	Electricians	0.724	98
Mechanical/Metal	0.674	224	Woodworking	0.553	85
Construction & Building	0.600	610	Food Industry	0.520	275
Textile	0.378	45	Artists	0.456	46
Drivers (Bus, Truck, Taxi)	0.770	681			
Skilled (Misc)					
Handling	0.316	415	Transportation	0.417	30
Ship & Boat Captains	0.400	5			
Unskilled (industrial)					
Electricians	0.082	61	Mechanical/Metal	0.061	261
Construction and Building	0.216	51	Processing	0.057	322
Woodworking/Recycling	0.078	519	Textile	0.0826	173
Unskilled (Craft)					
Mechanical/metal	0.606	66	Construction and Building	0.405	215
Food Industry	0.357	14	Janitors/Misc	0.378	473
Agricultural/Fish Workers					
Farm workers	0.198	282	Fishers	0.133	15

Notes: (i) Sample: low-skilled (who have a high-school diploma or less) wage-earning men in the private sector; (ii) One-digit occupations in bold.

C First-Step Results

Table 14: Probability of unemployment: First-step results with detailed dummy effects

	(1)	(2)
African	0.822***	0.653***
	(0.013)	(0.054)
Age	−0.022***	−0.022***
	(0.000)	(0.000)
Age Squared	0.00032***	0.00032***
	(0.000)	(0.000)
Junior HS Diploma	−0.059***	−0.057***
	(0.001)	(0.001)
Vocational Diploma	−0.093***	−0.089***
	(0.000)	(0.000)
HS Diploma	−0.109***	−0.103***
	(0.000)	(0.000)
Married	−0.184***	−0.184***
	(0.000)	(0.000)
No Kid	−0.021***	−0.018***
	(0.000)	(0.000)
African×Age	−0.031***	−0.029***
	(0.001)	(0.001)
African×Age Squared	0.00029***	0.00027***
	(0.000)	(0.000)
African×Junior HS Diploma	0.033***	0.036***
	(0.004)	(0.004)
African×Vocational Diploma	0.031***	0.018***
	(0.002)	(0.002)
African×HS Diploma	0.057***	0.057***
	(0.003)	(0.003)
African×Married	0.024***	0.031***
	(0.002)	(0.002)
African×No Kid	−0.018***	−0.019***
	(0.001)	(0.001)
Constant	0.647***	0.604***
	(0.003)	(0.007)
EA fixed effects		yes
EA fixed effects×'African'		yes
R^2	0.10	0.12
Observations	1,411,278	1,411,278

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 15: Probability of being in contact: First-step results with detailed dummy effects

	(1)	(2)	(3)	(4)
African	0.266***	−0.006	0.187***	−0.70*
	(0.011)	(0.010)	(0.040)	(0.037)
Age	0.001***	−0.004***	0.0011***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Age Squared	−0.000	0.000***	−0.000	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Junior HS Diploma	0.127***	0.021***	0.108***	0.015***
	(0.001)	(0.001)	(0.001)	(0.000)
Vocational Diploma	0.030***	−0.001**	0.023***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
HS Diploma	0.143***	−0.014***	0.119***	−0.019***
	(0.000)	(0.000)	(0.000)	(0.000)
African×Age	−0.014***	−0.002***	−0.012***	−0.001*
	(0.001)	(0.000)	(0.001)	(0.000)
African×Age Squared	0.000***	0.000***	0.000***	0.000[c]
	(0.000)	(0.000)	(0.000)	(0.000)
African×Junior HS Diploma	0.003	0.023***	0.005*	0.026***
	(0.003)	(0.003)	(0.003)	(0.003)
African×Vocational Diploma	0.018***	0.029***	0.026***	0.034***
	(0.002)	(0.001)	(0.002)	(0.001)
African×HS Diploma	0.028***	0.030***	0.028***	0.033***
	(0.003)	(0.003)	(0.003)	(0.003)
Occupation group 3		0.273***		0.260***
		(0.000)		(0.000)
Occupation group 4		0.223***		0.216***
		(0.000)		(0.000)
Occupation group 5		0.333***		0.321***
		(0.000)		(0.000)
African×Occupation group 3		0.036***		0.024***
		(0.004)		(0.004)
African×Occupation group 4		0.049***		0.041***
		(0.002)		(0.002)
African×Occupation group 5		0.122***		0.110***
		(0.002)		(0.002)
Constant	0.373***	0.470***	0.257***	0.384***
	(0.002)	(0.002)	(0.005)	(0.005)
EA fixed effects			yes	yes
EA fixed effects×'African'			yes	yes
R^2	0.05	0.23	0.09	0.25
Observations	1,130,837	1,130,837	1,130,837	1,130,837

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

D First-Stage Regressions

Table 16: First stage regressions for IV estimates - Unemployment

	(1) IV1	(2) IV1	(3) IV2	(4) IV2	(5) IV3	(6) IV3	(7) IV4	(8) IV4
$\%\text{Contact}_{90}$	0.126***	2.803***	−0.218***	−0.097	−0.039	−0.199	−0.172***	−0.161**
	(0.025)	(0.344)	(0.040)	(0.209)	(0.036)	(0.135)	(0.039)	(0.064)
$\%\text{French}_{68}$	0.569***	0.455***						
	(0.028)	(0.030)						
$\%\text{Owner}_{68}$	0.080***	0.115***	0.109***	0.134***	0.202***	0.214***		
	(0.014)	(0.015)	(0.021)	(0.025)	(0.019)	(0.022)		
Mediterranean sea	0.049***	0.032***	−0.030***	−0.026*	−0.017	−0.019	−0.021*	−0.023
	(0.008)	(0.009)	(0.010)	(0.013)	(0.011)	(0.015)	(0.012)	(0.016)
Border	−0.003	−0.006	−0.009	−0.009	−0.025***	−0.023***	−0.007	−0.004
	(0.004)	(0.004)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)	(0.008)
$1\text{-}\%\text{Manufacturing}_{68}$			0.200***	0.161***				
			(0.025)	(0.036)				
Longitude							−0.007***	−0.007***
							(0.001)	(0.001)
$\%\text{Contact}_{90}\times\%\text{French}_{68}$		−3.210***						
		(0.411)						
$\%\text{Contact}_{90}\times\%\text{Owner}_{68}$		0.576***		0.418		0.319		
		(0.191)		(0.269)		(0.283)		
$\%\text{Contact}_{90}\times$Mediterranean Sea		−0.419***		0.139		0.153		0.074
		(0.201)		(0.296)		(0.321)		(0.341)
$\%\text{Contact}_{90}\times$Border		−0.080		−0.013		0.048		0.070
		(0.049)		(0.077)		(0.082)		(0.095)
$\%\text{Contact}_{90}\times[1\text{-}\%\text{Sector 2}]_{68}$				−0.514***				
				(0.334)				
$\%\text{Contact}_{90}\times$Longitude								−0.008
								(0.016)
obs.	294	294	294	294	294	294	294	294

Notes: The Table displays the first-stage regressions corresponding to Table 9; all regressions include a constant term; Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 17: First stage regressions for IV estimates - Contact

	(1) IV1	(2) IV2	(3) IV3	(4) IV1	(5) IV2	(6) IV3
$\%\text{French}_{68}$	0.515^{***}			0.515^{***}		
	(0.030)			(0.030)		
$\%\text{Owner}_{68}$	0.047^{***}	0.224^{***}		0.047^{***}	0.224^{***}	
	(0.017)	(0.019)		(0.017)	(0.019)	
Border			-0.025^{***}			-0.025^{***}
			(0.007)			(0.007)
Distance to Algiers	-0.062^{***}	0.058^{***}	0.046^{**}	-0.062^{***}	0.058^{***}	0.046^{**}
	(0.013)	(0.015)	(0.018)	(0.013)	(0.015)	(0.018)
obs.	277	277	277	277	277	277

Notes: The Table displays the first-stage regressions corresponding to Table 10; all regressions include a constant term; Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.