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Testing for redlining in the labor market

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Summary[2]

When an employer refuses to recruit a job applicant due to the applicant's place of residence, we speak of redlining in the labor market. There are two justifications for the practice on the part of the employer. The first is associated with the excessive distance between the applicant's place of residence and the workplace, based on spatial mismatch logic. The second is linked to the neighborhood's characteristics based on signal logic. We propose to distinguish between these two mechanisms using a correspondence test conducted in the Paris region for two occupations, servers and cooks. It appears that the distance effect plays a significant role and reinforces the effect of the neighborhood's reputation. The most disadvantaged neighborhoods combine these two types of drawbacks.

Keywords: *Distance from place of employment, testing, redlining*

JEL Codes: C81, C93, J15, J71

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1. Introduction

Redlining[3] is a practice designed to exclude residents of specific geographical areas from access to a service or good. The practice applies to areas characterized objectively or subjectively as having a bad reputation, a high proportion of foreigners, a high level of poverty, or even an overrepresentation of a particular religious denomination or ethnic group. Redlining was studied for the first time in the mortgage granting field, both theoretically (Stiglitz and Weiss, 1981) and empirically (Ladd, 1998). It has since been studied in many other spheres, such as the location of supermarkets or stores (Eisenhauer, 2001; Kwate et al. 2013; Zhang and Ghosh, 2016), or even computerized data processing (Ruggieri et al., 2010).

On the labor market, redlining involves selecting job applicants based on their place of residence. There are two types of theoretical justifications for this behaviour. First of all, employers may prefer applicants who live close to their workplace, when worker productivity depends on the distance from home to work. Zenou and Boccard (2000) were the first to propose a formal redlining model in the labor market based on a pure distance effect in an efficiency wage framework. This foundation of the endogenous nature of the distance effect has been reinforced by two exogenous risks related to the fact that a distant employee may be more frequently absent or late (van Ommeren *et al*., 2011) and that the turnover rate of distant employees may be higher since longer commutes reduce the utility associated with a job for a given salary (Sattinger, 1998).

A second justification for redlining from the standpoint of employers is that place of residence can play the role of signal as regards the productive and unproductive characteristics of the applicant during a recruitment drive, where the employer is in an asymmetric information situation regarding applicants' individual abilities (Phelps, 1972; Fang and Moro, 2011; Rich, 2014). In the absence of perfect information on the productivity of job applicants, employers assign them what they think are the typical characteristics of predominant population groups in disadvantaged neighborhoods, which is to say people of foreign origin with fragile incomes and unstable employment situations. According to these representations, place of residence is perceived as a signal of lesser professional reliability or an undiversified social network. Redlining is then similar to a form of statistical discrimination, independent of distance between place of residence and workplace. This type of neighborhood effect has been the subject of many empirical confirmations (McGregor, 1977; Tunstall *et al.*, 2014).

It is important to distinguish between these two mechanisms because their impact on public policy is very different. To reduce the distance effect, we must bring people closer to jobs or jobs to people, through initiatives such as the "Moving to Opportunity" programs implemented in the United States, (the Gautreaux Project is an example of this) or else develop the transportation network, whereas legal recourse must be sought in order to combat

[3] According to the Chicago Encyclopedia, the federal program Home's Owners' Loan Corporation, in the 1930s, used a colour code to identify in red (i.e. redline) residential areas with a majority African-American and/or impoverished population.

discrimination based on place of residence. The Fair Housing Act of 1968, for example, makes redlining illegal on the basis of race, color, religion or origin (gender was added in 1974). In France, place of residence was introduced explicitly as one of the prohibited grounds for discrimination in February 2014 (Article L. 1132-1 of the Labor Code).

But it is very difficult to empirically distinguish between the two mechanisms based on investigation data or administrative sources. The use of experimental data then provides an alternative methodology. The correspondence test originally used to measure ethnic or racial discriminatory behaviours of employers (Bertrand and Mullainathan, 2004; Riach & Rich. 2002; Heckman, 1998; List & Rasul, 2011; Oreopoulos, 2011) can be used to identify the significance and magnitude of a large number of non-discriminatory behaviors of employers (or other economic agents). It can help identify the effect that the distance of a place of residence brings to bear from an employer's perspective. In the experiment, we use only fictional applications and our outcomes are the call-back rates. Then, the unobservable characteristics of labor suppliers do not affect the results observed, and it is possible to manipulate the location of applicants in an *ad hoc* manner.

The basis of our study is a field experiment conducted between October 2011 and February 2012 in the Paris region, which consisted in filing nearly 3,000 fictitious applications in response to real job offers in the food services sector, for positions as servers and cooks. In an earlier article drawing upon this experiment, we showed that the effect of a neighborhood's reputation substantially impacts the probability of being invited for an interview (Bunel *et al.* 2016). In this previous paper, we measured the effect of the neighborhood's reputation by simply controlling the distance between home and work. The idea here is to go much further by simultaneously measuring both a distance effect and a neighborhood's reputation effect, in order to be able to quantify the joint contribution of these two mechanisms. This article is based on a secondary use of a database derived from a testing, such as Neumark (2012) did when he took over datas from Bertrand and Mullainathan (2004) to propose a new measure of discrimination.

Our aim is to specify the extent and significance of the distance effect in order to test, using experimental data, the redlining hypothesis. Our results show that the distance effect negatively and significantly influences the probability of getting a job and reinforces the effect of an area's reputation. In European cities of a rather monocentric nature, where available jobs are concentrated in city centres, the residents of poor suburbs are both penalized by their distance from the place of employment and due to the reputation of their place of residence.

The article is organized as follows. The first section is a literature review on the respective roles of location and distance on access to employment. We present the experiment's design in the second section, results in section 3, and robustness tests in section 4.

2. Location and distance effect in employment access

In the Paris region, as is the case in most other large metropolitan cities, significant differences in unemployment risk are observed among individuals living in relatively close geographic areas. Adjoining municipalities frequently fall into opposing deciles when it comes to the distribution of unemployment rates or durations. According to a study conducted by Gobillon *et al.* (2011) based on administrative data sources from this region, only 30% of the differences between local unemployment durations are explained by characteristics specific to the individual, while 70% come from characteristics linked to location. In this context, it would seem worthwhile to identify the specific role played by employer expectations as concerns the actual location of their employees' residences or their distance from their place of employment.

In the extensive literature concerning spatial inequalities for access to employment, a number of mechanisms are taken into consideration. According to the spatial mismatch hypothesis, physical distance between place of residence and available jobs complicates the job searching process and lowers the chances of finding work (Kain, 1968; Ellwood, 1986; Gobillon *et al.*, 2007). A number of empirical studies have tested and confirmed this hypothesis. The work of Rogers (1997), Ihlanfeldt and Sjoquist (1998), Johnson (2006), and Hellerstein *et al.*, (2014), for example, concerning the United States, can be cited in this regard. In France, Détang-Dessandre and Gaigné, (2009), Duguet *et al.* (2009), and Korsu *et al.*, (2010) confirm the hypothesis. The theoretical foundations for the link between these two elements are manifold. From an individual point of view, according to Phelps's island parable, searching for a job is more costly given limited access to information for jobs that are far away than for nearby jobs. This phenomenon is reinforced by the presence of intermediaries on the job market (in France, *Pôle Emploi* (national employment centre) and the *Missions locales* (local missions)), which provide a free data-collection service for available jobs and job search assistance, but only within a limited geographic area (Cavaco *et al.,* 2004). Furthermore, accepting a job that is far away is costly in terms of time and money for workers, whether or not they decide to move (Van Ommeren and Fosgerau, 2009, Van Ommeren and Gutiérrez-i-Puigarnau, 2011; Boman, 2012). A number of studies have highlighted the fact that this cost varies widely depending on whether or not an individual owns a car (Gauthier and Zenou, 2010 and Raphael *et al*., 2001) and also as a function of the differences between the quality of transportation services within the same area (Houston, 2005 for a synthesis of these studies). Furthermore, in Europe, many individuals prefer to remain sedentary (Seater, 1979; COE, 2009). For Gobillon *et al.* (2011), distance from work is the main factor explaining differences in unemployment risk for populations of African descent in the United States and France.

Another extensively explored possibility to explain spatial differences involves the socio-demographic make-up of a given area. Neighborhood effects, peer effects and social networks influence the quality of the job search experience and help explain disparities in access to employment (Ioannides and Datcher-Loury, 2004; Galster, 2010; Hellerstein *et al*., 2014). An individual's place of residence is linked to the housing market and to differences in housing from one area to another (Kain, 1968, Patacchini and Zenou, 2005). Furthermore, the

existence of local amenities and especially of local public policies determining allocations of public and assisted jobs influences, in part, an area's dynamism when it comes to employment and unemployment.

In this article, we are interested in the factors that affect labor demand (not labor supply) and that help explain why employers might prefer residents of certain areas compared to others. We focus exclusively on two factors: the effect of the reputation of place of residence and the effect of physical distance between place of residence and work location. On the one hand, poor households and ethnic minorities concentrated in certain geographic areas may be victims of discrimination on the part of employers (Bertrand and Mullainathan, 2004; Hellerstein *et al*. 2008; Duguet *et al.*, 2010), discrimination which varies depending on the degree of homophily that exists between an applicant and an employer (Jacquemet and Yannelis, 2012). On the other hand, according to the effect of distance from the work location, workers who travel long distances every day are at risk of making relatively less effort in their work place. Furthermore, workers who are at the mercy of traffic are more often late for work or absent, and they are generally less flexible when it comes to their work schedules (Van Ommeren *et al*., 2011). In certain countries (Japan and France) employers pay part of their workers' transportation costs, a phenomenon which also reinforces the process described. Finally, employers may take the fact that long travelling times reduce employees' productivity into consideration when they hire workers. Given that workers who live far away are at risk of higher resignation rates, companies hire them less often in order to reduce employee turnover costs (Sattinger, 1998).

As shown by Manski (1993), distinguishing between the various effects likely to have an impact on the relationship between individuals' place of residence and their probability of being employed is an exceedingly complex process when based solely on survey data or administrative records. Correlation, endogeneity and context effects seriously disrupt such identification. The correspondence test method makes it possible to avoid this problem of identification and to test the significance and extent of two particular effects: reputation and distance.

3. Experimental design

Correspondence test consists in putting together entirely fictitious applications, identical in all but the applicants' place of residence, and sending them out in response to real job offers (Bertrand *et al*., 2016; List *et al*., 2011; Riach *et al*., 2002). Our outcome is only the called-back of applicants and our field of investigation covers the food services sector in the Ile-de-France region. As demonstrated by Neumark *et al.* (1996), this sector brings to light the part of discrimination that is due to the clientele by comparing the situation of servers with that of cooks in the same facilities. Another advantage of focusing on the latter is that they are geographically dispersed, thus offering a high variability of distance between the location of the facility and that of our fictitious applicants' homes. The detection risk for our experiment

is low owing to the turnover rate, which is twice as high as that of other occupations (around 110) and to the fact that 50% of employers in the sector claim to have difficulty recruiting.

Applicants were young men with last names that indicated traditional French surnames. For both tested occupations, we provided two different diplomas, a trade certificate (CAP) and a high school diploma (BAC). We sent out 2,988 fictitious applications in response to 498 job offers located in Ile-de-France between October, 2011 and February, 2012. Bunel *et al.* (2016) describe in greater detail the experimental design for this testing campaign (resume and cover letter presentation, type of training and so on). In this paper, we mainly examine the characteristics of fictitious applicants' residence location, and above all, follow-up regarding job offers to which we responded.

3.1. Location of fictitious applicants' place of residence

Six similar resumes of young applicants for server and cook jobs were put together.[4]

The only differences, clearly apparent in the applications, concern their places of residence. The latter were chosen in a way that would allow us to identify three distinct effects on access to employment, all other factors being equal, i.e. the reputation effect of the *département** of residence, the neighborhood effect and the distance effect. We chose two close but contrasting departments: Paris and Seine-Saint-Denis. In these departments, we selected three addresses in areas or neighborhoods that are geographically close but have very different reputations. Proximity in fact makes it possible to measure the neighborhood reputation effect for a given distance from the workplace. A group of three fictitious applicants resides in the 19th *arrondissement*** of Paris, in neighborhoods close to each other but whose signal effect is very different. We chose Place du Tertre, a wealthy and touristic Montmartre neighborhood; Championnet street, in a middling neighborhood; and the very disadvantaged area of La Goutte d'or, which is a so-called priority neighborhood for the city. The discrepancies among these sectors are backed by the socio-economic statistics shown in **Table 1**.

Another group of three fictitious candidates resides in the Seine-Saint-Denis department, which has a rather bad reputation in Ile-de-France. The unemployment rate there is higher, and more residents lack formal education and live in "sensitive urban zones" (ZUS). The median income and the number of taxable households are also lower. However these typical characteristics hide wide disparities. Certain communities are particularly disadvantaged, while others display very positive socio-economic indicators.

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[4] It is difficult to find out the number of resumes sent in response to each offer. According to APEC, for 2011, the average number of resumes per job offer was 41.

*A French administrative division, hereafter referred to as department.

** The closest English equivalent is borough.

We intentionally chose three very different locations in terms of reputation. The first applicant lives in the prosperous Raincy suburb, which does not comprise a single sensitive urban zone (ZUS) neighborhood and whose economic indicators are better than those of Paris in general, and better than those of the 18th arrondissement specifically. The two other applicants reside in the suburban Bondy *commune* (municipality), one in a disadvantaged neighborhood, classified as a sensitive zone (Pavillon building, Blériot avenue), the other in a neutral neighborhood (Allée des Violettes). In the Bondy commune, a third of the population lives in sensitive urban zones (ZUS), where the median income and the portion of taxable households is below the Paris and the French department average, and where the unemployment rate is higher.

3.2. Characteristics and location of offers

To make up our sample, job applications[5] were sent for all server or cook job offers, requiring a CAP trade certificate or a high school vocational diploma, offering either fixed-term contracts or permanent work contracts, located in Ile-de-France. In order to take into account the influence of observable variables that may explain the hiring strategies of employers, we collected the available information on job offer postings (type of facility, location, salary, etc.) and those associated with testing (mailing date, gender of contact person, etc.). What makes this testing campaign unique is its having very specifically taken the location of the offers into account.

According to the stock data recorded by the French statistical services, 60% of Ile-de-France jobs in the food services and hotel sector are located in Paris and only 13% in Seine-Saint-Denis. **Table 2** shows the concentration indicator in the food services and hotel sector, revealing that the number of jobs per 100 workers in this sector is three to four times greater in Paris than in Seine-Saint-Denis. As a result, half the population of Seine-Saint-Denis works in another department than their own, compared to a third for Parisians. The listed job offers for which fictitious applications were sent confirm this concentration of offers. More than 55% are located in Paris (56%), compared to 5% in Seine-Saint-Denis. The concentration is higher for servers than for cooks (63% of offers for servers are located in Paris, compared to 49% for cooks).

Table 2 also shows the distance in kilometers and travel time by car and public transit. These distances were calculated *a posteriori* with the addresses of the job offers. Note that in 25% of cases, the full address was not listed in the posting. In this case, we used the centre of the

[5] The websites of *Pôle d'Emploi* and *L'Hôtellerie-Restauration* that centralize most job offers in the food services sector were used between mid-October 2011 and the beginning of February 2012 to identify potential offers. In total, 498 job offers from different facilities were tested: 253 cook job offers and 245 server job offers. This corresponds to 2,988 applications (6x498) filed.

municipality for which the offer applied. However, no location information was available concerning 2% of postings.

The distances to these job offers in kilometers or in time are very different for the group of applicants located in Seine-Saint-Denis and the group located in the 18th arrondissement of Paris (**Table 2**). The fictitious applicants of the first group are located three times further from the jobs than the second. The median distance is 18 km compared to 6 km. To travel these distances, they must put up with a commute that is two to three times longer. Finally, note that the job offers located outside of Paris and Seine-Saint-Denis are generally closer to the applicants located in Paris (15 km compared to 24 km).

4. Location effect and distance effect

In this section our fictitious applicants' response rates are presented. The response is considered to be positive when the recruiter invites the applicant for an interview or when the recruiter contacts the latter to obtain more information about the applicant's current situation or his or her qualifications. On the other hand, the answer is considered to be negative if the recruiter explicitly rejects the application or does not answer at all.

In 192 cases involving the 498 job offers tested, the employer contacted at least one applicant out of the six fictitious applications, i.e. a response rate of 39%. This positive response rate is somewhat higher for cooks (42%) than for servers (35%), reflecting a lesser degree of labor market tension as regards the latter. According to **Table 3**, in 28% of cases involving positive applications, the employer contacted only one applicant, and in 16% of cases, all our fictional applicants were contacted.

4.1. Effect of distance on employment

The success rates presented in **Table 4** illustrate the extent of the distance effect on employment, when we put aside the reputation of an applicant's place of residence. The results obtained clearly show that distance from a worker's place of employment, whether expressed in terms of kilometers or of transportation time in a personal vehicle,[6] greatly reduces the probability of obtaining employment for cooks and for servers.

Employers tend to prefer hiring workers whose places of residence are located close to their businesses. Given that applicants from Seine-Saint-Denis are structurally farther away from locations where job offers are proposed (about 15 minutes by car and 25 minutes by public transit, according to **Table 2**), part of the difference in the response rate observed may be related to this distance effect. However, the latter effect does not help explain the differences observed between applicants from disadvantaged and non-disadvantaged neighborhoods

[6] We prefer this time measurement given that in the resumes it is mentioned that the applicants have a driver's license and a personal vehicle.

within the same department.[7] The following point clarifies the interrelationships that may exist between these two phenomena.

4.2. Crossed effects of location and distance

We examine the crossed effects of distance and location by looking at the difference between two applicants' commuting time based on three categories. For commuting time by car, we have established a less-than-5 minute journey, which is a difference in favor of Seine-Saint-Denis applicants (difference 1); a difference to the disadvantage of Seine-Saint-Denis applicants, where the journey is between 5 and 15 minutes long; and a difference of over 15 minutes, representing respectively 19%, 29% and 52%.[8] When differences in distance are expressed in kilometers, the considered boundaries are 5km and 10km, representing respectively 16%, 19% and 64%. **Table 5** takes into account all three effects: the effect of distance, the effect of neighborhood reputation, and the effect of department reputation.

The distance effect appears to benefit the residents of disadvantaged neighborhoods and ill-reputed departments (difference 3 column) but the effect is not symmetrical (difference 1 column). Seine-Saint-Denis and "sensitive urban zone" ZUS residents are no more likely to get a job than other potential applicants, despite a greater proximity to the workplace.

Servers holding a trade certificate (CAP) who apply for employment are called in for an interview even more rarely.[9] When differences in distance are small (difference 2 column), we consistently observe that applicants from disadvantaged neighborhoods are penalized.

4.3. Control of offer and distance characteristics

This last section presents the results of a Probit regression with a random effect on the likelihood of being invited for an interview, applied to our full sample.

Table 6 presents results obtained for various specifications. Dummy variables on location (DEP93, ZUS, DEP93*ZUS); level of education (high school equivalent); and occupation (cook) were introduced in all regressions. They are significant and have the expected signs in all cases. Control variables for offers were also included (type of respondent, type of contact

[7] Given that these applicants even live slightly closer to the jobs than their counterparts from non-disadvantaged neighbourhoods in the same department, the distance effect should work in their favor.

[8] Various boundaries have been tested with no change in results.

[9] When using public transit commuting time, results are largely the same but they are not as pertinent because applicants had mentioned in their resumes that they owned a personal vehicle. Furthermore, the cases where information on commuting time was available and where commuting time differences are limited, are few (7%).

person, source of the offer, type of posting). Models 1 to 5 are characterized by control of the distance variable.

Model 1 does not include this dimension in the regression. Consequently, the department effect is reinforced: it exceeds the diploma effect and is twice as important as the neighborhood effect.

Models 2 to 5 use either a continuous variable (models 2 and 4) or a discrete variable (models 3 and 5) to control the distance effect. Models 2 and 3 refer to commuting time using a personal vehicle, whereas the two following models focus on the distance in kilometers. According to Akaike's criterion, the latter is the most pertinent specification (model 4).

As a general rule, when the commuting-time factor is introduced, the department effect decreases dramatically. The coefficient associated with it is halved. The ZUS effect on the other hand increases slightly, and the coefficients associated with diploma and occupation remain stable.

It should be noted that when we crossed the ZUS and Dep93 variables with distance, the coefficient turned out to be non-significant; hence employers' consideration of the impact of distance does not depend on the applicants' locality of origin.

The marginal effects have been calculated for models 2 and 4. Probability is -2.09 (-2.53) for a medium distance to work (journey by car) for applicants living in Seine-Saint-Denis. The marginal effect is -1.94 (-2.27) for applicants residing in La Goutte d'or. By way of comparison, the marginal effect for a high school diploma is +2.11 (+2.17). The two effects are therefore of the same order of magnitude.

Figure 1 presents the probabilities obtained using the estimates provided in Table 6. The green and blue areas refer to distance away from workplace for 75% of Paris and Seine-Saint-Denis applicants. The overall probability of success drops sharply depending on distance from place of residence to location of workplace. Applicants are three times less likely to get an interview if they reside more than 40km away from the place of employment.

Regarding distance from workplace, the probability of access to employment is equal for residents of Seine-Saint-Denis and of disadvantaged neighborhoods in Paris. However, 75% of Paris residents fall in the green area. Consequently, Seine-Saint-Denis applicants (blue area), are less likely to obtain employment. They are doubly disadvantaged.

5. Conclusions

In this study, we put forward experimental evidence confirming the hypothesis of employer redlining. Two types of mechanisms impact applicants' chances of obtaining employment depending on their place of residence. The first is the reputation of the neighborhood where they reside; the second, the distance between their home and the workplace, is also a powerful factor. Therefore, among the characteristics that are decisive in terms of applicants' chances of getting back into employment and that are specific to the individual, place of residence plays an active role in as much as employers select applicants for recruitment depending on their address.

These conclusions are drawn from a controlled experiment carried out between 2011 and 2012 in the Paris region, focusing on the server and cook occupations. They are not necessarily valid for other locations, time periods or occupations. New tests regarding discrimination are required in order to verify their level of generality. However, these conclusions are in line with previous testing conducted in the Île-de-France region, which highlighted the location-of-residence effect and indicated that the latter is a combined signal effect and distance-from-workplace effect. Our findings also suggest that in European cities, which are spatially organized in a rather monocentric manner and where employment is concentrated at the centre of conurbations, the distance effect reinforces the neighborhood-reputation effect. In Seine-Saint-Denis, undoubtedly like many other disadvantaged outskirts of metropolitan areas, residents suffer two-fold discrimination based on the distance of their home from the workplace and the reputation of their place of residence.

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Table 1: Socio-economic indicators characterizing the different neighborhoods selected for the experiment

	Paris			Seine-Saint-Denis			
	All	18th arrondissement	Disadvantaged neighborhoods of the 18th arrondissement	All	Disadvantaged neighborhoods of Bondy	Bondy	Le Raincy
Unemployment rate (2009)	11%	13.1%	20.1%	16.5%	23.1%	17.7%	9.3%
2006 activity rate of 25-65 year olds	76.6%	83.7%	70.60%	80.3%	65.20%	80.1%	83.5%
Population							
Foreigners (1999)	14.5%	19.1%	32.7%	18.7%	18.3%	18.6%	5.8%
% without diploma (1999)	13.3%	18.1%	28.6%	24.4%	28.1%	24.2%	9.5%
Interdecile ratio	11.5	11.2	n/a	8.5	n/a	8.9	6.3
2009 median tax revenue (in € per CU)	25,040	18,400	13,700	15,080	13,200	14,110	26,630
Mobility							
% of employees working in another department of the region	30.7%	30.4%	n/a	55.5%	n/a	51.4%	48.8%
% of employees working in another region	1.7%	1.4%	n/a	0.8%	n/a	0.6%	1.0%
% of individuals who own a car (2009)	39.9%	29.9%	n/a	63.8%	n/a	67.6%	77.3%
Job concentration and recruitment difficulties							
Indicator of job concentration (2009)	164	93	n/a	87	n/a	64	71
Indicator of concentration in the food services and hotel sector							
cooks	141			43			
servers	132	n/a	n/a	31	n/a	n/a	n/a
Recruitment difficulty:							
cooks	45%			59%			
servers	38%	n/a	n/a	25%	n/a	n/a	n/a

The job concentration indicator is equal to the total number of jobs or to the number for a given occupation in the area for every 100 employed workers or to the number for a given occupation for the area.

Source: Pole Emploi, Insee

Table 2: Distance and travel time between location of offer and applicants' place of residence

	Applicant located in					
	the 18th arrondissement of Paris			Bondy or Le Raincy in Seine-Saint-Denis		
	Q1	Median	Q3	Q1	Median	Q3
Location of offers (weight of these offers)						
Average distance in km						
Paris (56%)	4.1	5.1	6.5	14.0	17.0	21.0
Seine-Saint-Denis (5%)	7.5	11.0	15.0	8.5	15.0	28.0
Other (39%)	5.5	15.0	29.0	16.0	24.0	37.0
Total	**4.6**	**6.6**	**15.0**	**15.0**	**18.0**	**25.0**
Average time in minutes by car						
Paris (56%)	9	11	14	24	29	32
Seine-Saint-Denis (5%)	14	20	27	17	24	39
Other (39%)	14	26	39	26	34	46
Total	**10**	**14**	**25**	**24**	**30**	**37**
Average time in minutes by public transit						
Paris (56%)	24	27	32	44	54	61
Seine-Saint-Denis (5%)	33	43	54	42	56	72
Other (39%)	31	51	71	56	72	91
Total	**26**	**32**	**50**	**48**	**58**	**72**

Interpretation: 56% of offers are located in Paris. The median distance to these offers is 5.1 km for applicants located in the 18th arrondissement and 17 km for those located in Seine-Saint-Denis.

Source: Testing data

Table 3

Characteristics of applications based on response rate

Number of positive responses	0	1	2	3	4	5	6
Number of applications	1,836	318	162	204	102	180	186
Frequency of offers	61%	11%	5%	7%	3%	6%	6%
Frequency of positive offers		28%	14%	18%	9%	16%	16%
Number of positive responses	0	53	54	102	68	150	186

Source: Testing data

Table 4

Gross Success Rate

	Favorable response rate	Confidence interval of 90%		Favorable response rate	Confidence interval of 90%	
		Lower limit	Upper limit		Lower limit	Upper limit
	Cooks			**Servers**		
Distance in km (1)						
Less than 10km	32.2%	28.7%	35.7%	23.6%	20.6%	26.6%
From 10 to 20 km	25.1%	21.8%	28.4%	14.1%	11.5%	16.8%
From 20 to 30 km	19.2%	15.2%	23.1%	16.0%	12.3%	19.6%
From 30 to 45 km	13.7%	8.8%	18.6%	12.7%	7.1%	18.4%
45 km or more	11.7%	6.7%	16.7%	5.7%	1.6%	9.7%
Kruskal Wallis Test	37.52***			27.80***		
Travel time by car (1)						
Less than 15 minutes	31%	27%	34%	24%	21%	27%
15 to less than 30 minutes	27%	24%	30%	15%	12%	18%
30 to less than 60 minutes	20%	17%	24%	14%	11%	17%
60 minutes or more	11%	7%	15%	11%	6%	15%
Kruskal Wallis Test	33.32***			22.44***		

(1) It was impossible to determine the location of 11 job offers.
Confidence intervals were calculated using the bootstrap method carried out on 10,000 draws.
*** significant at 1%, ** 5%, * 10%, n.s: not significant
Source: Testing data

Table 5

Comparison of two responses according to discrepancy in commuting time between an applicant from a disadvantaged neighborhood of a department with a negative reputation and an applicant from a privileged neighborhood of a department with a positive reputation

	Variation 1		Variation 2		Variation 3		Total	
	In % points	T Student	**In % points**	T Student	**In % points**	T Student	**In % points**	T Student
Time by car								
Cooks								
CAP trade certificate level	-5.8	-1.0	-7.3	-1.4	-7.3	-1.2	**-6.6***	**-1.95**
High school level	3.2	0.5	**-13.9***	**-1.7**	**-14.4****	**-2.0**	**-7.8***	**-1.85**
Servers								
CAP level	**-8.0****	**-2.1**	**-14.1*****	**-3.0**	-8.1	-1.4	**-10.3*****	**-3.78**
High school level	-0.1	-0.0	-15.0	-1.2	**-18.8*****	**-2.7**	**-14.7*****	**-2.62**
Distance in km								
Cooks								
CAP level	3.8	0.5	**-9.4****	**-1.9**	**-9.3****	**-2.0**	**-6.6***	**-1.95**
High school level	4.9	0.6	-13.1	-1.5	**-12.0****	**-2.1**	**-7.8***	**-1.85**
Servers								
CAP level	Ns		**-12.9****	**-2.4**	**-11.6*****	**-3.0**	**-10.3*****	**-3.78**
High school level	-12.4	0.6	9.9	1.1	**-17.4*****	**-2.7**	**-14.7*****	**-2.62**

(1) It was impossible to determine the location of 11 job offers.

Variation 1: Situation where the time difference is either favorable for residents of Seine-Saint-Denis or less than 5 minutes compared to Parisian applicants

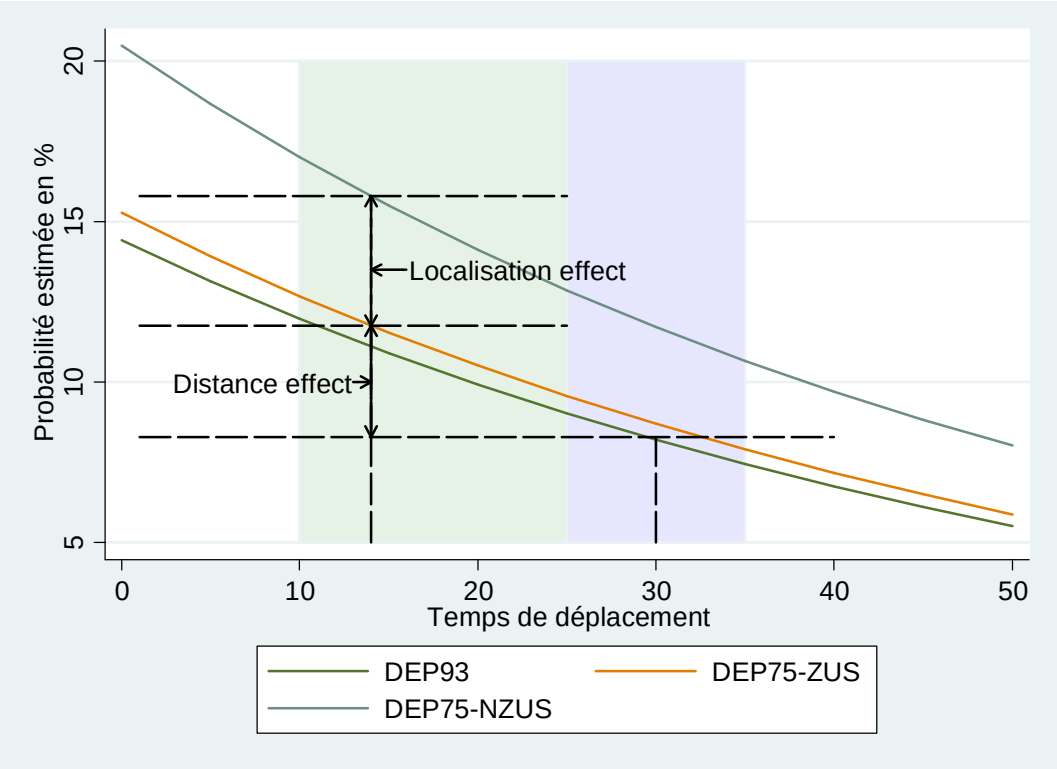
Student statistics were calculated using the bootstrap method carried out on 10,000 draws.

**** significant at the 1%, ** 5%, *** 10% threshold*

Source: Testing data

Figure 1

Estimated probabilities of success according to geographical location and distance to employment



« Estimated probabilities of success according to geographical location and distance to employment »

« Location effect »

« Estimated probability in % »

« Travel time »

Table 6

Estimated probability of a positive response with a random effect on offers

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variables	**Coef**	**T Student**	**Coef**	**T Student**	**Coef**	**T Student**	**Coef**	**T Student**	**Coef**	**T Student**
Location of the offer										
Located in a sensitive urban zone (ZUS)	-0.630***	-3.02	-0.699***	-3.32	-0.700***	-3.35	-0.654***	-3.11	-0.647***	-3.07
Located in Seine St Denis (Dep 93)	-1.374***	-7.52	-0.807***	-3.65	-0.867***	-4.13	-0.713***	-3.19	-0.653***	-2.64
ZUS *Dep 93	0.729**	2.39	0.670**	2.19	0.747**	2.45	0.633**	2.06	0.691**	2.24
Distance and commuting time										
Information not available on the distance or time from home to work										
Distance from home to work in km							-0.065***	-4.81		
Distance <10									2.417***	4.52
Distance 10 to 30 km									1.407***	3.03
Distance greater than 30 km									**Ref.**	
Driving time from home to work in minutes			-0.044***	-4.25						
Time<15 minutes					2.747***	4.60				
Time 15 to 50 minutes					1.770***	3.24				
Time longer than 50 minutes					Ref.					
Characteristics of the individual										
Vocational high school level	1.099**	2.52	1.069**	2.47	1.118**	2.59	1.036**	2.37	1.041**	2.38
Offer for a cook (ref. server)	0.937**	2.34	0.985**	2.47	0.967**	2.43	1.020**	2.53	1.028**	2.55
Characteristics of offer and business										
Offer from Pôle Emploi	0.754	1.58	0.926**	1.95	1.041**	2.17	1.028**	2.13	0.940**	1.95
Contact person is a woman	-0.145	-0.29	-0.177	-0.35	-0.206	-0.41	-0.183	-0.36	-0.183	-0.36
Type of business (ref: *brasseries* (French pub-restaurant))										
Asian specialties	-0.697	-0.59	-0.788	-0.68	-0.856	-0.73	-0.823	-0.71	-0.759	-0.65
Creperie (French pancake house))	-0.091	-0.15	0.007	0.01	-0.129	-0.21	0.057	0.09	0.091	0.14
Gastronomic restaurant	0.072	0.04	0.211	0.12	0.081	0.05	0.224	0.13	0.250	0.14
Pizzeria or Italian restaurant	1.187	1.46	1.122	1.39	1.031	1.27	1.197	1.47	1.170	1.43
Traditional restaurant	1.569	1.32	1.699	1.44	1.374	1.18	1.695	1.42	1.731	1.45
Hotel restaurant	0.533	0.85	0.604	0.96	0.495	0.79	0.678	1.07	0.649	1.02
Other	1.203*	1.65	1.471**	2.01	1.409**	1.93	1.671**	2.25	1.533**	2.08
Unknown	1.246	1.48	1.276	1.53	1.241	1.51	1.334	1.58	1.370	1.62
Consistency	-3.975***	-5.94	-3.197***	-4.68	-6.2065	-7.04	-3.369	-4.97	-6.060***	-7.15
sigma	3.299***		3.271***		3.300***		3.302***		3.307***	
Handing out resumes	YES		YES		YES		YES		YES	
rho										
Number of observations	2,922		2,922		2,922		2,922		2,922	
Number of groups	487		487		487		487		487	
Log-likelihood	-981.2		-971.9		-986.2		-968.2		-968.4	
Pseudo-R^2	*4.94%*		5.95%		4.36%		6.35%			
Akaike information criterion	2,002.5		1,985.7		2,017.3		1,978.4		1,980.8	
Schwarz information criterion	2,122.1		2,111.3		2,149.3		2,103.99		2,112.4	

Standard deviations were calculated normally.

**** significant at the 1%, ** 5%, *** 10% threshold*

Note: In this regression we also introduce binary variables corresponding to various resume distributions. These variables appear to be non-significant.

Source: Testing data

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