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How does labour market history influence the access to hiring interviews? *

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Abstract

We evaluate the effect of labour market history on the current probability to be invited to a hiring interview. We compare the effect of periods of unemployment, part-time job and short-term contracts. Correspondence tests were conducted for accountants and sales assistants. We estimate the discrimination components from the response rate of each candidate by the asymptotic least squares method. We find that men with a part time profile suffer discrimination in both professions. Other differences of treatment are specific: for accountants, we find that the probability of success decreases with the time spent in unemployment, while for for sales assistants the probability of success is smaller with a history of short term contracts.

JEL: C51, C93, J16, J24, J71.
Keywords: Labour market history, Unemployment, Part time job, Discrimination, Hiring, France.

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Introduction

The French labour market entered its sixteenth semester of continuous decline in early 2016. The number of job seekers increased by 2.5 million, an upsurge of 80% since the beginning of the 2008 rise in unemployment. The unemployment rate reached 10.5%, more than three percentage points higher than at the beginning of the crisis. In this context, the duration of unemployment has risen sharply and insecure employment positions have developed (involuntary part-time jobs, short-term contracts, unemployment).

Many studies indicate that the current occupation (employment, unemployment) influences the subsequent trajectory of people in the labour market (Givord, 2005; Fremigacci and Terracol, 2014; Fontaine and Rochut, 2014). Having a poor quality job can reduce the chances of getting a good job in the future. Therefore, the workers who have to take part time or short term jobs may face the risk to fall in a "bad job trap", while the workers who decline these job offers may face long term unemployment. The crisis would amplify the dualism of the labour market between stable (good) jobs and unstable (poor) jobs. This phenomenon has also been identified for decades as an unemployment persistence factor at the macroeconomic level (Blanchard and Summers, 1986). Dualism is the subject of renewed attention in the context of the Great Recession. In the United States, recent studies have shown that among workers who experienced 6 months of unemployment between 2008 and 2012, only 11% have found a stable job 15 months later (Krueger et al., 2014). The chances of returning back to work are highly dependent on the time spent out of work, especially the first eight months of searching and when the local labour markets are in turmoil (Kroft et al., 2013). The crisis may well have reinforced this negative correlation between returning to work and the duration of unemployment (Kroft et al., 2014). It seems to have altered the cyclical properties of the American economy, making it less resilient to shocks.

Theoretically, the relationship between the current occupation and the subsequent trajectory in the labour market can be explained by human capital (Becker, 1994) and signalling (Spence, 1973). According to the first mechanism, employment is a vocational experience that alters human capital, modify the cognitive or non-cognitive abilities, like a person's motivation. According to the second mechanism, even when human capital is unchanged, having a bad job provides information that can be used by future recruiters as far as it can be interpreted as an employability or a productivity indicator. Contextual factors are also at play. The charac-

teristics of the firm (size, line of business) will interfere with the signal sent by the candidate. The same signal can be received very differently from one professional domain to another. The current type of job also provides information on the worker's availability and an employer can balance employability and availability.

In practice it is difficult to distinguish a signalling effect from a human capital effect. The chances of exiting unemployment and getting a high quality job depend on many factors. Among them, it is particularly complicated to identify the specific effect of an individual's previous occupation or past duration of unemployment, both of which depend on the same factors. We must guard ourselves against selection and endogeneity biases. This is the subject of an extensive microeconometric literature, which applies duration models to the analysis of unemployment. It is even more difficult to break down this effect according to the mechanism at play, human capital or signalling. One solution for identifying the cause of discrimination is the use of laboratory experiments. Van Belle et al. (2017) find that a long unemployment period may be interpreted as a lack of motivation by the recruiters.

In order to assess the effect of labour market history, we need to control for human capital. An efficient way to control for it is to collect experimental data, since it allows for treating both the observable characteristics of the job applicants and unobservable heterogeneity. The first study that used an experimental method in order to measure the effects unemployment duration on the chances of obtaining a job was carried out in Switzerland in 1999 (Oberholzer-Gee, 2008). It has been followed by several studies on the American labour market (Kroft et al., 2013). These studies have found both human capital and signalling effects, a weakening in the chances of exiting unemployment after six months only. Birkelund, Heggebø and Rogstad (2017) find a negative effect of long-term unemployment in the Norwegian labour market, stronger for women. Baert and Verhaest (2016) reach a similar conclusion for the Belgian labour market, after one year in unemployment. However, some studies have made other findings. A study carried out in Sweden with the same type of method indicates that the effects of past employment and unemployment situations are rather insignificant compared to the current situation of the applicant (Eriksson and Rooth, 2011). Cahuc, Carcillo and Minea (2017) find that unemployment has no effect on a population of French high school drop-outs. We present the first study for experienced workers in France.

We have made a correspondence test in order to identify the effect of the past and current occupations on the chances to be invited to a hiring interview. We have selected two profes-

sions with a tight labour market: accountants and sales assistant. Our applicants have five different profiles: long term contracts, short term contracts, short term unemployment, long term unemployment and part time jobs. We find that men with a part time profile suffer discrimination in both professions. For accountants, we find that the probability of success also decreases with the time spent in unemployment. For sales assistants, we find that a history of short term contracts reduces the chances to get a hiring interview.

1 Experiment

We wish to evaluate the answer that an applicant get with his characteristics and the answer he would have get with other characteristics. The most convenient way to collect such data is to perform an experiment. We construct a set of applications with similar characteristics except for the history in the labour market.

Correspondence studies are best suited to measure the effect of an individual characteristic on the chances of getting a job (Riach and Rich, 2002; Neumark, 2012). It consists in building fictitious applications that are practically identical apart from the trait whose effect we want to evaluate and then to send them simultaneously in response to the same job offers. One can then evaluate how the chances of success vary between the fictitious applicants. This method eliminates the unobservable heterogeneity of job applicants and the self-selection bias. Its main limitation is related to the necessarily limited size of the experiment. Evaluations from correspondence tests produce a one-time measurement for specific professions (Heckman, 1998). However, it reveals an information that no other data source can provide: the answers that were given by the recruiters to several competitors for the same job.

Choice of professions. We chose professions which satisfy two criteria: a tight labour market and a large number of offers. A tight labour market, defined as a large number of job offers per job seeker, was chosen both to have a high response rate and to obtain a lower bound estimate of discrimination (Baert et al. 2013). If discrimination occurs in a tight labour market, it should be worse in the professions sharing common characteristics. The second criterion, a large number of job offers, allows for reducing detection by reducing the share of the experimental applicants in the total applicants. This selection criteria have proven useful in a context of economic slowdown.

Choice of candidates. For the two professions, the applicants are male, between 31 and 33 years old, with French sounding first and last names. They live inside Paris (13th, 14th and 15th districts), have a driving licence and a car. We have selected male applicants in order to avoid gender discrimination (Duguet and Petit, 2005), French sounding names in order to avoid ethnic discrimination (Duguet, Du Parquet, L'Horty and Petit, 2015), an address inside Paris in order to avoid address discrimination (Duguet, Gray, L'Horty, Du Parquet and Petit, 2017) and a driving licence for the same reason (Duguet, Du Parquet, L'Horty and Petit, 2017). The candidates have responded to the job adds between February and May 2015. From this basis, we define the five following profiles:

- LTC: Long term contracts profile. It is the benchmark situation, no discrimination is expected in this case. This candidate has 12 years of experience with four long term contracts. These contracts have had an increasing duration over time. The last position is held since 2011.

- PTC: Part time contracts profile. This profile is close to the previous one, with long term contracts only, but includes two periods of part time contract. The worker start with three years and a half on a full time job, then one year on a part time job, then five years and a half one full time job, and moved on a part time job over the last two years before the test period. Overall, it makes only three years with a part time job, but the two last may count more for the recruiter. Since the worker has no child, it could indicate either health problems, or the will to spend more time on leisure or on another business.

- STU: Short term unemployed profile. This profile is similar to the long term contract profile but includes a short unemployment period at the end. The unemployment period starts in October 2014. Since the test is made between February and may 2015, the unemployment duration is between 4 and 7 months.

- LTU: Long term unemployed profile. This profile is similar to the long term contract profile (LTC) but includes a period of unemployment starting in january 2014. The unemployment duration is between 13 and 17 months.

- STC: Short term contracts profile, on full time jobs. This profile is the most different from the baseline case. It includes 7 periods of employment because the contracts are shorter. The worker has started with two short term contracts, moved to a long term contract of

5 years, and then to a series of four short term contracts. The last contract started in May 2014.

Given that these applications were sent simultaneously in response to the same job offers, the applications had to include elements of differentiation. These differences concern the resume presentations, i.e. font type, font size and page layout, all the while remaining standard in form. The applicants offer experience acquired in real companies; these firms differ, but are comparable in terms of their activities, size, market power, etc. The applicants' leisure activities are different as well, while also remaining very typical and impersonal (team sports, individual sports, cinema, reading, music, etc.). The short emails sent along with the resumes were also worded differently, while remaining standard in style. An address, cell phone number and email address were attributed to each applicant. These resumes were compiled based on the expertise of representatives from each of the vocational fields in question, people consulted for their opinions as to whether or not the applications appear realistic.

Another important point for avoiding detection is the number of candidates who reply on each job post in the real labour market. The more the better. The only reliable data that we could find was about executives. Since the jobs in our study are less qualified than these, we interpret the executives' number of applicants as lower bounds for our professions. According to APEC (2017), each job post for sales executives received on average 44 candidates in the first quarter of 2015 and 54 candidates in the second quarter. For accounting executives, the figures are respectively 57 and 52 for each offer. Overall, considering that these figures are lower bound, our experiment is likely to have avoided detection.

Responses to job offers. We carried out a simple job interview test by sending applications for the same job offer after the job was posted online, at short intervals by email from the email address of each applicant, or by regular mail . By this way, no applicant had to undergo the interview in person. Our outcomes are call-back rates. This method was chosen for two reasons. Firstly, interviews introduce bias on the part of recruiters related to the applicants' physical appearance and personality. These unavoidable biases are not perceptible by researchers and are impossible to control. We assume that since interviews generate a cost, the recruiter would invite for an interview only applicants who objectively have a chance to obtain the position. No photograph were added to written applications. Secondly, since the data collection process is less burdensome and is completed within a given time period, we were able to constitute a

larger sample. Finally, in order to ensure that the formatting or content of a specific application would not systematically influence companies' choices of a particular applicant (in spite of the precautions taken when the applications were created), we interchanged the resume layouts and cover letters between the applicants.

Table 1: Data collection

Profession	Sales assistant			Accountant		
Contract	Full time	Part time	N.A.	Full time	Part time	N.A.
Long term	237	2	0	228	3	1
Short term	57	1	0	57	1	0
N.A.	2	0	1	4	1	5
Post used	294			285		
Observations	1470			1425		
Independence of the recruiter's answer with :*						
Sending order	0.88			0.23		
Paris district	0.57			0.31		
Overall success†	34.2%			36.1%		

N.A. : not available.
∗: p-value of the chi-squared test of independence. †: percentage of posts with at least one positive answer.

In order to implement our estimation method we need both to know the contract term (short, long) and full time jobs. Short term contracts are defined by a duration strictly lower than 12 months. Long term contracts are defined as either undefined term contracts or contracts for 12 months and more. We keep full time jobs because they represent almost all the offers for accountants and sales assistants. Our method could be easily be adapted to part time jobs if there was enough observations. Table 1 summarizes the data available. Most of the posts include enough information for our discrimination analysis. We also report two important independence tests. The first test checks whether the answer of the recruiter depends on the sending order. The second test examines whether the answer depends on the address of the candidates. We find that the rotation of the CVs was efficient since the answers do not depend on the sending order. Similarly, the Paris districts were adequately chosen since the addresses of the candidates did not influence significantly the answers of the recruiters. The overall success rate is close to one third, which indicates a tight labour market in France.

2 Model

We can summarize the success probabilities of the candidates by the following system. The letter L refers to the offers of long term contracts :

$$\begin{aligned}
\Pr(\text{LTC, L}) &= \theta_L + u_{L,i} \\
\Pr(\text{STU, L}) &= \theta_L + \delta_U + u_{L,i} \\
\Pr(\text{LTU, L}) &= \theta_L + \delta_U + \delta_L + u_{L,i} \\
\Pr(\text{PTC, L}) &= \theta_L + \delta_P + u_{L,i} \\
\Pr(\text{STC, L}) &= \theta_L + \delta_S + u_{L,i} \\
\text{E}(u_{L,i}) &= 0
\end{aligned}$$

The candidate with a history of long term contracts, the (LTC,L) case, should experience no discrimination when he replies to a long term contract offer since he has no characteristic susceptible to attract it. His average probability of success is θ_L, a measure of labour market tightness for long term contracts. To this component we add $u_{L,i}$, an unobserved heterogeneity term at the job post level. This heterogeneity term may be correlated with the characteristics of the candidates, so that we have to eliminate it by differencing in order to get unbiased estimates. We set $\text{E}(u_{L,i}) = 0$ without loss of generality because the model includes a constant term θ_L.

The candidate with one year of unemployment (STU,L) faces a specific effect δ_U. Its sign is undetermined: on the one hand, unemployed workers are immediately available in a tight labour market so that firms could prefer short term unemployed workers to candidates with a long term contract because the latter must respect a notice period between one and three months ($\delta_U > 0$) and, on the other hand, unemployed workers could experience a statistical discrimination on their expected productivity ($\delta_U < 0$). The argument may be stronger for the long term unemployed (LTU) and they could suffer from a specific stigma δ_L. The total effect for the long term unemployed workers is $\delta_U + \delta_L$, the sum of the unemployment and stigma effects.

There remains two profiles that we wish to test: long term part time contracts (PTC,L) and the short term contracts (STC,L). δ_P is the potential statistical discrimination against the workers with a long history of part time contracts. According to Pak (2013), the male workers who have decided to work part time dit it for the following reasons: the inability to find a full time contract (37%), another professional or training activity (18%), health problems (11%), the will to have free time (11%) and helping family members (7%). Since there is almost no part time

job offer in the two professions that we test, we can disregard the inability to find a full time job. The four other reasons have one point in common: they imply a lower work involvement in the job than full-time workers. The recruiter may therefore have doubts about the ability of the candidate to shift easily from a part-time to a full-time job or to accept overtime, and rank the candidate with a part-time history below the other workers and we should find $\delta_P < 0$. Last, the workers with a long history of short term contracts (STC,L) could be discriminated against because they have not successfully found a stable job by the age of 30, and this may generate doubts about their professional skills. In fact the issue is a bit more complicated since, in France, short terms contract benefit from a specific legal premium (the "precariousness bonus") equal to 10% of the total wage of the contract period, so that workers could prefer short term contracts because they want to earn more. The workers with these profile would trade their job stability for a 10% wage bonus. We denote the reaction of the recruiter as δ_S.

We go further by considering the job posts for short term contracts (denoted S). Here, we will consider that every candidate with a former long term contract could suffer from a "bad transition" statistical discrimination. On the one hand these workers lose the security of their previous contract and the recruiter may wonder why the candidate accepts this situation but, on the other hand, it may also indicate the will to get the 10% wage bonus at the end of the contract period. We denote δ_R the effect associated with a contract term reduction. The five probabilities become :

$$\begin{aligned}
\Pr(\text{LTC},\text{S}) &= \theta_S + \delta_R + u_{S,i} \\
\Pr(\text{STU},\text{S}) &= \theta_S + \delta_U + u_{S,i} \\
\Pr(\text{LTU},\text{S}) &= \theta_S + \delta_U + \delta_L + u_{S,i} \\
\Pr(\text{PTC},\text{S}) &= \theta_S + \delta_R + \delta_P + u_{S,i} \\
\Pr(\text{STC},\text{S}) &= \theta_S + u_{S,i} \\
\text{E}(u_{S,i}) &= 0
\end{aligned}$$

where θ_S is the tightness in the labour market for short term contracts and $u_{S,i}$ the post level unobserved heterogeneity on the probabilities of success for the short term contracts. One difference appears with the previous case for the short term contracts: it is not a source of discrimination for short run contracts, since it involves a continuity of the labour market status.

The aim of this application is to estimate the interest parameters $(\theta_L, \delta_U, \delta_L, \delta_P, \delta_S, \theta_S, \delta_R)$ from the raw success proportions of the candidate. We explain how in the next section.

3 Method

The method both solves an overidenfication issue and provides a minimum variance estimator. The problem was originally created by the need to separate the posts on short and long run contracts. It had for consequence to provide two estimators for the parameters $\delta_U, \delta_L, \delta_P$. We fix this problem by first testing the equality of the different estimators and, since the test is conclusive in our application, we provide the minimum variance estimates of the discrimination parameters.

This method may be of a more general interest. Indeed, the OLS disturbances of the linear probability models commonly used in the literature are heteroskedastic. Correcting the standard errors allows for a correct inference, but OLS is still not the best estimation method in this case. Using a Probit model estimated by maximum likelihood may provide an asymptotically optimal inference under the normality of the disturbances, but this assumption cannot be tested. With our method, optimality is explicitly addressed, and the normality properties of the estimates results from the law of large numbers, not from an assumption.

The first thing to do is to eliminate unobserved heterogeneity since its presence can bias the estimates. All the δ parameters will be estimated from differences and are, therefore, corrected for unobserved heterogeneity. Only the θ estimates are obtained from the levels and are influenced by the unobserved heterogeneity, but they do not measure discrimination. In what follow, we focus on the estimation of the discrimination components.

For the long term contracts, the elimination of the unobserved heterogeneity is done by differencing from the baseline case (LTC,L), except for long term unemployment, where differencing with the short term unemployment case is more relevant. We take the following differences, in order to identify the discrimination parameters.

$$\begin{aligned}
\mathrm{D(STU,L)} &= \mathrm{Pr(STU,L)} - \mathrm{Pr(LTC,L)} = \delta_U \\
\mathrm{D(LTU,L)} &= \mathrm{Pr(LTU,L)} - \mathrm{Pr(STU,L)} = \delta_L \\
\mathrm{D(PTC,L)} &= \mathrm{Pr(PTC,L)} - \mathrm{Pr(LTC,L)} = \delta_P \\
\mathrm{D(STC,L)} &= \mathrm{Pr(STC,L)} - \mathrm{Pr(LTC,L)} = \delta_S
\end{aligned}$$

For the short term contracts, we eliminate the heterogeneity terms by differencing from the most relevant case in the same post:

$$
\begin{aligned}
\mathrm{D}(\mathrm{LTC},\mathrm{S}) &= \Pr(\mathrm{LTC},\mathrm{S}) - \Pr(\mathrm{STC},\mathrm{S}) = \delta_R \\
\mathrm{D}(\mathrm{STU},\mathrm{S}) &= \Pr(\mathrm{STU},\mathrm{S}) - \Pr(\mathrm{STC},\mathrm{S}) = \delta_U \\
\mathrm{D}(\mathrm{LTU},\mathrm{S}) &= \Pr(\mathrm{LTU},\mathrm{S}) - \Pr(\mathrm{STU},\mathrm{S}) = \delta_L \\
\mathrm{D}(\mathrm{PTC},\mathrm{S}) &= \Pr(\mathrm{PTC},\mathrm{S}) - \Pr(\mathrm{LTC},\mathrm{S}) = \delta_P
\end{aligned}
$$

Overall, the 8 probability differences allow for the identification of the five discrimination parameters $(\delta_U, \delta_L, \delta_P, \delta_S, \delta_R)$, so that we have 3 degrees of freedom. They come from the fact that there are two different ways to compute the tree parameters $(\delta_U, \delta_L, \delta_P)$. The model is overidentified, and we will have to test that these additional constraints are satisfied.

The previous identification constraints provide our estimating equations. The theoretical relationships can be written under a more convenient matrix form, by stacking all the constraints together :

$$
\underbrace{\begin{pmatrix} \mathrm{D}(\mathrm{STU},\mathrm{L}) \\ \mathrm{D}(\mathrm{LTU},\mathrm{L}) \\ \mathrm{D}(\mathrm{PTC},\mathrm{L}) \\ \mathrm{D}(\mathrm{STL},\mathrm{L}) \\ \mathrm{D}(\mathrm{LTC},\mathrm{S}) \\ \mathrm{D}(\mathrm{STU},\mathrm{S}) \\ \mathrm{D}(\mathrm{LTU},\mathrm{S}) \\ \mathrm{D}(\mathrm{PTC},\mathrm{S}) \end{pmatrix}}_{\pi} = \underbrace{\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}}_{A} \underbrace{\begin{pmatrix} \delta_U \\ \delta_L \\ \delta_P \\ \delta_S \\ \delta_R \end{pmatrix}}_{\beta}
$$

or

$$
\pi = A\beta
$$

where π is the vector of the theoretical differenced probabilities (i.e. the auxiliary parameters in the ALS terminology), A is the identification matrix and β regroups the theoretical discrimination coefficients (i.e. the parameters of interest in the ALS terminology). We easily obtain a CAN estimator of π from the empirical probabilities.[1] It is estimated from the raw success percentages of the candidates. When we replace the theoretical probabilities by they empirical counterpart we get an error term ω defined by: $\hat{\pi} = \pi + \omega$, with $\mathrm{Plim}\sqrt{N}\omega = 0$, where N is the sample size. Reporting in the previous equation, we get :

$$
\hat{\pi} = A\beta + \omega,
$$

[1] CAN: Consistent and Asymptotically Normal.

since $\hat{\pi}$ and A are observable we can estimate this relationship by FGLS in one stage only.[2] This is the Asymptotic Least Squares method.[3] Let $\hat{\Omega}$ be the estimated covariance matrix of $\hat{\pi}$, we get the optimal estimator of the discrimination coefficients:

$$\hat{\beta} = (A'\hat{\Omega}^{-1}A)^{-1}A'\hat{\Omega}^{-1}\hat{\pi}$$

with estimated covariance matrix:

$$\hat{\mathrm{V}}(\hat{\beta}) = (A'\hat{\Omega}^{-1}A)^{-1}.$$

The overidentification statistic is simply a norm computed on the estimated error term of our relationship, $\hat{\omega} = \hat{\pi} - A\hat{\beta}$, we get :

$$S = \hat{\omega}'\hat{\Omega}^{-1}\hat{\omega}$$

under the null hypothesis ($\omega = 0$), it is asymptotically $\chi^2(3)$ distributed.

4 Results

The raw callback rates are reported in appendix. The ALS results are presented in table 2. The tightness on sales assistant jobs is the same for short term and long term contracts ($\theta_L = \theta_S$). The standard (LTC) candidate has a success rate around 20%. It receives, on average, one positive answer for five applications. We find that two types of candidates suffer from statistical discrimination. The part time contract candidate has much less chances to be recruited (-7.3 points). This may reflect the beliefs of the employers about the reason why these male candidates have a part time jobs. Considering the reasons given by Pak (2013) we may explain this results by the motivations of part time jobs for men: having another job or being in training, the will to have free time, health problems and the need to help family members. This activities could send bad productivity or involvement signals and motivate a rejection since other candidates are available. More precisely, if health is the cause of the previous part time job, one cannot exclude a probability of failure. Baert et al. (2016) provided evidence of discrimination against men with one year of depression. More generally, statistical discrimination, would

[2] FGLS: Feasible Generalized Least Squares.

[3] It was originally developed by Gouriéroux, Monfort and Trognon (1982, 1985) and Chamberlain (1982, 1984).

cause the rejection of the candidate. Last, helping family members can imply to be less available for a full time job. The recruiter may anticipate a potentially lower involvement in the job and prefer another candidate.

The second significant effect affects workers with a previous history of short term contracts. Since the contracts in this profession are mostly long term contracts, 76% of the posts, this history could indicate either a bad potential productivity or a will to get the 10% precariousness bonus. Here the result may be explained by the age of the candidate, around 30, and by firms' common practice of using the short term contracts as trial periods. At this age, the hypothesis of a failure to find a stable job may be favoured by the recruiters. The recruiters may expect that the workers with a long history of short term contracts have failed to convince their previous employers to recruit them on a long term contract. We could not use this argument for younger workers because short term contracts are common at the beginning of the career, but here the candidates have been in the labour market over the last twelve years and the failure hypothesis may be favoured by the a significant part of the recruiters. Overall, we find that it results in a penalty of 4.2 points.

Table 2: Discrimination components estimates - Asymptotic Least Squares

Profession	Sales assistant				Accountant		
Backward elimination	(1)	(2)	(3)	(4)	(1)	(2)	(3)
Levels							
θ_L	0.190*	0.190*	0.190*	0.201*	0.218*	0.200*	0.200*
Std. Dev	0.025	0.025	0.025	0.022	0.027	0.023	0.023
θ_S	0.211*	0.219*	0.219*	0.224*	0.105*	0.105*	0.158*
Std. Dev	0.054	0.051	0.051	0.047	0.041	0.041	0.041
Differences							
δ_U	0.024	0.023	0.016		0.065*	0.074*	0.072*
Std. Dev	0.023	0.023	0.020		0.022	0.020	0.020
δ_L	-0.015	-0.015			-0.071*	-0.075*	-0.080*
Std. Dev	0.020	0.020			0.024	0.024	0.024
δ_P	-0.062*	-0.063*	-0.063*	-0.073*	-0.044*	-0.037†	-0.045*
Std. Dev	0.020	0.020	0.020	0.019	0.021	0.019	0.018
δ_S	-0.032	-0.033	-0.032	-0.042*	-0.019		
Std. Dev	0.024	0.024	0.024	0.021	0.023		
δ_R	0.012				0.042	0.048	
Std. Dev	0.035				0.039	0.038	
Overidentification p-value	0.634	0.684	0.576	0.270	0.081	0.154	0.604
Long term posts	237				228		
Short term posts	57				57		
Total posts	294				285		
Observations	1470				1425		

∗: significant at 5%. †: significant at 10%.

We turn to the accountant profession. The success for the reference candidate (LTC,L) is higher for long term contracts, but not significantly at the 5% level. The main differences between the candidates come from the unemployment status and the term of the labour contract.

The workers with less than one year of unemployment are the most favoured candidate. They get an advantage of 7.2 points compared to the benchmark candidate. The reason may simply be that, on the one hand, they are immediately available and, on the other hand, their career interruption is too short to generate adverse beliefs about their productivity. We get a different result for the workers who have been unemployed for more than two years. They lose all the availability advantage of the short term unemployed. Compared to them, their hiring probability diminishes by 8 points. However, they do not lose all their capacity to get a hiring interview because these two effects offset each other. The total effect is close to zero and this means that the long term unemployed have the same success probability than the workers with a long term contract. But this very result shows an interesting point: the firms give the same chances to the long term contract and the long term unemployed while the former workers will not be immediately available and the latter workers are immediately available.[4] This may reflect a better opinion about the on-the-job candidates.

Last, we also find a negative effect for part-time workers, at 4.5 points. This results is similar to the one obtained on sales assistants jobs, and should also explain it by the anticipation of the employers about the future health and involvement of the candidate.

5 Conclusion

Labour market history has an impact on the current probability to be invited to a hiring interview. Workers with a profile of part time contracts have a significantly lower probability to be invited in both accountant and sales assistant jobs. this effect can be reasonably attributed to signalling. The workers who have chosen this type of job could be reputed to be less able or less willing to get involved in a full time job. For the sales assistant jobs, we find that the success probability is also smaller with a history of short term contracts. We also interpret it as a signalling effect. The results is different for accountants. Here, the probability of success decreases with the time spent in unemployment. While short term unemployed are favoured, due to their immediate availability in a tight labour market, the long term unemployed lose this

[4] A worker can leave after a compulsory legal notice of 1 to 3 months

advantage. In this case, an anticipated depreciation of human capital could have motivated the recruiters.

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A Additional Statistics

Table 3: Callback rates

Profession		Sales assistant		Accountant	
Path	Shortcut	Prob	Std. Dev	Prob.	Std. Dev
		Long term contract offers			
Long term contracts	(LTC,L)	0.190	0.025	0.218	0.027
Short term unemployed	(STU,L)	0.211	0.027	0.265	0.029
Long term unemployed	(LTU,L)	0.203	0.026	0.176	0.025
Part time contracts	(PTC,L)	0.118	0.021	0.151	0.023
Short term contracts	(STC,L)	0.156	0.024	0.181	0.025
		Short term contract offers			
Long term contracts	(LTC,S)	0.228	0.056	0.211	0.054
Short term unemployed	(STU,S)	0.246	0.057	0.281	0.060
Long term unemployed	(LTU,S)	0.211	0.054	0.193	0.052
Part time contracts	(PTC,S)	0.193	0.052	0.123	0.043
Short term contracts	(STC,S)	0.211	0.054	0.105	0.041

$*$: significant at 5%.

B Constrained estimation

When a parameter is not significant, it means that candidates from different groups have the same success probability. Therefore we should regroup them and estimate a global probability in order to increase the efficiency of the estimation. Interestingly, if we regroup two sets of candidates, we double the number of observations and this diminishes the standard errors of our estimates. The backward selection mechanism in our study is therefore very different from the standard regression case. This appendix gives a full account of the estimation in the case of sales assistants.

Regrouping candidates is equivalent to take the average probability because we send exactly the same number of people in each profile. Consider two groups of sample size N with a success dummy variable d_i (1 if success, 0 otherwise), $i \in G_1$ for group 1 and $i \in G_2$ for group 2, with respective success probabilities $\hat{p}_1 = N^{-1}\sum_{i\in G_1} d_i$ and $\hat{p}_2 = N^{-1}\sum_{i\in G_2} d_i$, the global success probability is equal to :

$$\hat{p} = \frac{1}{2N}\sum_{i\in G_1\cup G_2} d_i = \frac{N}{2N}\left(\frac{1}{N}\sum_{i\in G_1} d_i + \frac{1}{N}\sum_{i\in G_2} d_i\right) = \frac{1}{2}\left(\hat{p}_1 + \hat{p}_2\right)$$

and the argument extends to any number of groups. One simply has to take the average of the probabilities. When we estimate the model for sales assistants, we first find $\delta_R = 0$. Replacing δ_R in the identification constraints modifies the equations of the short term contracts only. We get that Pr(LTC, S) = Pr(STC, S), the success is the same on short term contracts for the candidates who already have a long term or a short term contract. Therefore, we take the average of these probabilities and use the following new set of identification constraints :

$$\begin{aligned}
\frac{1}{2}\Pr(\text{LTC},\text{S}) + \frac{1}{2}\Pr(\text{STC},\text{S}) &= \theta_S + u_{S,i} \\
\Pr(\text{STU},\text{S}) &= \theta_S + \delta_U + u_{S,i} \\
\Pr(\text{LTU},\text{S}) &= \theta_S + \delta_U + \delta_L + u_{S,i} \\
\Pr(\text{PTC},\text{S}) &= \theta_S + \delta_P + u_{S,i}
\end{aligned}$$

estimation then proceeds by differencing in order to eliminate the unobserved heterogeneity term $u_{S,i}$ and applying ALS to the differences. We find that $\delta_L = 0$. This time, it has consequences for the two blocks of the identification constraints (long term and short term). For the long term block, the two types of unemployed workers now share the same success probability (Pr(STU, L) = Pr(LTU, L) so that we will use their average value. We get :

$$\begin{aligned}
\Pr(\text{LTC},\text{L}) &= \theta_L + u_{L,i} \\
\frac{1}{2}\Pr(\text{STU},\text{L}) + \frac{1}{2}\Pr(\text{LTU},\text{L}) &= \theta_L + \delta_U + u_{L,i} \\
\Pr(\text{PTC},\text{L}) &= \theta_L + \delta_P + u_{L,i} \\
\Pr(\text{STC},\text{L}) &= \theta_L + \delta_S + u_{L,i}
\end{aligned}$$

for the short term contracts, it will add one average to the already existing one :

$$\begin{aligned}
\frac{1}{2}\Pr(\text{LTC},\text{S}) + \frac{1}{2}\Pr(\text{STC},\text{S}) &= \theta_S + u_{S,i} \\
\frac{1}{2}\Pr(\text{STU},\text{S}) + \frac{1}{2}\Pr(\text{LTU},\text{S}) &= \theta_S + \delta_U + u_{S,i} \\
\Pr(\text{PTC},\text{S}) &= \theta_S + \delta_P + u_{S,i}
\end{aligned}$$

estimation now proceeds by first differencing separately inside each block, because the heterogeneity terms $u_{L,i}$ and $u_{S,i}$ are different in the two blocks, and then applying ALS to the

differences. We find $\delta_U = 0$. The two blocks are strongly modified by this result. For the long term block, we have Pr(LTC, L) = Pr(STU, L) = Pr(LTU, L) and for the short term block, we have Pr(LTC, S) = Pr(STU, S) = Pr(LTU, S) = Pr(STC, S). Averaging the relevant probabilities, we get the following identification constraints for the long term block :

$$\frac{1}{3}\Pr(\text{LTC, L}) + \frac{1}{3}\Pr(\text{STU, L}) + \frac{1}{3}\Pr(\text{LTU, L}) = \theta_L + u_{L,i}$$
$$\Pr(\text{PTC, L}) = \theta_L + \delta_P + u_{L,i}$$
$$\Pr(\text{STC, L}) = \theta_L + \delta_S + u_{L,i}$$

and the following constraints for the short term block :

$$\frac{1}{4}\Pr(\text{LTC, S}) + \frac{1}{4}\Pr(\text{STU, S}) + \frac{1}{4}\Pr(\text{LTU, S}) + \frac{1}{4}\Pr(\text{STC, S}) = \theta_S + u_{S,i}$$
$$\Pr(\text{PTC, S}) = \theta_S + \delta_P + u_{S,i}$$

estimations proceeds by two separate block differencing followed by ALS. All the remaining coefficients are significant at the 5% level.

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