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## Applications for job vacancies along the unemployment spell

Thomas Le Barbanchon  
Roland Rathelot  
Alexandra Roulet

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Thomas LE BARBANCHON<sup>†</sup>, Roland RATHELOT<sup>‡</sup>, Alexandra ROULET<sup>§</sup>

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## Abstract

This paper describes how job-seekers apply to job vacancies posted at the French Public Employment Service. More precisely, we look at how characteristics of job postings to which the unemployed apply evolve over their unemployment spell. We find that, over a spell, job seekers become more likely to apply to jobs with less protected contracts, while wages barely adjust. These conclusions must be interpreted with caution as recorded job application data at the PES may suffer from various measurement errors, such as partial coverage. Collecting all job application data from the PES website is a promising avenue to reduce such biases and to strengthen our results.

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<sup>†</sup>Bocconi University

<sup>‡</sup>University of Warwick

<sup>§</sup>Insead

# 1 Introduction

Since the Great Recession, the number of long-term unemployed has surged in almost all OECD countries. France is no exception, the number of long-term unemployed has increased from 764,000 in 2008 to 1,194,000 in 2014 according to OECD stats. This evolution raises urgent questions about the employability of these jobseekers and their job search strategy. In this paper, we propose to study how job search evolves along the unemployment spell, how it differs between short and long-term unemployed. More precisely, we are interested about how job selectivity changes as the unemployment duration increases. In economic terms, we seek to document the evolution of the job-seekers' reservation strategy over time. The reservation strategy describes which kind of job offer a given job-seeker is willing to accept.<sup>1</sup> The reservation strategy is multi-dimensional: the job seeker has a reservation wage,<sup>2</sup> but also a reservation job security (permanent vs. short-term contracts), a reservation working time... Documenting the evolution of the reservation strategy has important normative implications. It is essential to the design of non-stationary unemployment insurance schemes. The optimal degressivity over time of the unemployment benefits depends on how the path of employment opportunities of UI claimants unfolds.

The empirical evidence on the evolution of job selectivity along the unemployment spell is scarce and mostly indirect. Reservation wages or reservation contract types are not observed in usual data sets. These are deep economic concepts, almost preferences, that economic agents do not usually report. Usual approaches rather assume structural models which map from accepted wages and unemployment duration the distribution of reservation wages and its evolution (Kiefer and Neumann, 1979). Yet a few papers manage to avoid strong structural assumption by exploiting rather unique data sets, where job-seekers are directly surveyed about their job search strategy or actual application behaviors are recorded. Among the first group, Krueger and Mueller (2014) is particularly noticeable, because job-seekers were surveyed at several point in time and they were asked about their reservation wage at each wave. The second group of papers are very recent and mostly uses application data from online job boards. It comprises the early contribution of Holzer et al. (1991) and more recent work by Marinescu and Wolthoff (2015). Our approach belongs to that second group. We analyze applications of French Unemployment Insurance claimants for jobs posted at the French Public Employment

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<sup>1</sup>The opportunity cost of accepting a job offer is of course the value of a job that could be offered by searching a little bit longer.

<sup>2</sup>The reservation wage is the minimum wage at which an agent is willing to accept a job.

Service (PES - *Pole emploi*) between 2010 and 2012.

Vacancies posted at the PES represent roughly 40% of all hires. Applications to these vacancies thus only cover a fraction of all job applications that job seekers send. Moreover, applications recorded at the PES may be triggered by job counselors rather than by job seekers and some applications to vacancies posted at the PES are not recorded at all by the PES, as job seekers may apply directly for the job. These institutional features introduce bias and measurement error when one aims at measuring the application rate of job seekers or the average characteristics of the vacancies for which jobs seekers apply. However, assuming that this bias and measurement errors are constant over the unemployment spell, our application data are probably more adequate to study the evolution of application behavior as unemployment duration increases. With these caveats in mind, the following results must be interpreted with caution.

We show that, in the cross section, the long-term unemployed tend to apply to worse jobs in terms of posted wages, number of hours and job security (permanent vs temporary contracts, CDI vs CDD). This is consistent with the standard intuition that as job-seekers become long-term unemployed they become less picky in terms of applications. This could occur through different mechanisms, such as skill depreciation, which could be amplified by employers statistical discrimination on unemployment duration. Policies may also have an effect: as UI claimants approach the exhaustion of their unemployment benefits, the opportunity cost of accepting a job decreases.

However, results inferred from the cross section may be biased by several selection effects. First, the long-term unemployed may have lower unobserved employability since the beginning of the unemployment spell. We address this issue by estimating individual fixed effects models, making use of the longitudinal nature of the application data. Controlling for this selection bias, which we refer as selection *on the level*, it turns out that the previous decrease in the application wages (or in the application working time) over the spell is no longer statistically significant. The only robust result concerns the labor contract type. Second, another selection effect may be *on the path* of the reservation strategy. Job-seekers with steeper reservation strategies, meaning that their job selectivity decreases at a very fast rate with unemployment duration, tend to have lower realized unemployment duration. Then, as the decrease in job selectivity at a given unemployment duration is only identified by the unemployed still looking for a job at this duration, fixed effects models cannot resolve this issue. To address selection on the path, we stratify our estimation by realized unemployment duration groups. We obtain

that the reservation contract type mostly evolves during the first year of unemployment for job seekers who stay at most one year unemployed. All in all, we conclude that the probability to apply for a permanent contract decrease by 5 percentage point after the first year of unemployment, while the average probability at date 0 is around 40%.

Overall, our findings compare well with the longitudinal analysis of Krueger and Mueller (2014). They interviewed unemployed from New-Jersey every week during 24 weeks and find that self-reported reservation wages decrease between 1 and 3.5% over a 6 months period. We find that the decreasing path of reservation wage is not as steep in France as in New-Jersey, but French workers seem to react on another margin: job security. This alternative margin in the French case is quite intuitive as there is much wage compression around the minimum wage. Whatever the margin of adjustment the main take away of our result is that the adjustment in job selectivity is small (compared to what would have been predicted by standard calibrated job search models).

Our ultimate analysis describes the evolution of applications around the date when benefits lapse. Of course, this date is not exogenous, as the potential benefit duration depends on past work experience. Thus, our result is not causal and should be interpreted with caution. That being said, we find a moderate decrease in job selectivity around the exhaustion date. The probability of applying for a job offering a permanent contract decreases by one percentage point. This evidence is consistent with recent work by Caliendo et al. (2013) on the evolution of accepted wages around the benefit exhaustion, while our magnitude is somehow smaller.

Section 2 gives some background about the French Public Employment Service, while it describes our data. Section 3 presents our main empirical findings. Section 4 concludes.

## 2 Institutions and data

### 2.1 Vacancies

There are many vacancies posted at the PES: approximately 2 millions per year. Figure 4 in the Appendix shows how a job posting looks like on the website. Table 1 shows that this is not a negligible number and that these vacancies do not over-represent less desirable jobs. France has a dual-labor market with a big divide between what we refer to as "permanent contract" jobs, i.e jobs from which it is very hard to lay off, and fixed-term contracts (of maximum 2 years). The permanent contract is perceived as the norm but firms are increasingly relying on fixed-term contracts to benefit from their flexibility.

Table 1 shows that almost half of the PES postings are for jobs with permanent contracts. Moreover, in a given year, the number of permanent contract vacancies posted at the PES represents around 75% of all permanent contract hirings (which of course does not mean that 75% of all these hirings correspond to a job posting from the PES). We also see that the type of jobs underrepresented in the PES postings are the fixed-term contracts of very short duration.

Table 1: Vacancies posted at the PES

	PES vacancies in 2012	All hirings in 2012 Source: DARES
Permanent jobs (CDI)	823,568	1,266,267
Fixed-term jobs (CDD)	985,162	5,130,594
Mean duration	6 months	2 months

Source: SAGE (Pole emploi), DMMO (DARES).

## 2.2 Applications

We observe an inflow of new Unemployment Insurance (UI) claimants in 2010 and study their application behavior. The inflow sample is selected from the *Fichier Historique Statistique-D3* (FHS-D3). Application behaviors are observed in the *Fichier Historique Administratif* (FHA). Based on the application identifier, we can observe the characteristics of the vacancy using the SAGE data, which record all vacancies posted through the French Public Employment Services.

Applications can be initiated by different agents: job-seekers, counselors and firms. In the last case, firms browse the CV repository maintained by the PES, they select themselves some potential candidates and they signal their interest through the PES. These applications, which obviously do not reveal the behavior of the unemployed are excluded from the analysis. A large share of applications are coded as initiated by the PES counselors. It is much less easy to decide whether this type of applications actually describe the counselor or the unemployed behavior. First, this type of application seems to be related to situations when job-seekers and counselors meet and when counselors advise specific vacancies to apply for. On the one hand, job-seekers may apply for this advised vacancy, even if they do not look for this type of job, because they feel threatened. In principle, refusing to actively search for a job can trigger sanctions against UI claimants, such as a reduction in unemployment benefits. On the other hand, if the sanction threat

is not credible, then job-seekers would only accept to apply to vacancies that they would have applied anyway, even without the advice of the counselors. Second, applications coded as initiated by counselors also cover situations when the vacancy is *private*. Private vacancies, contrary to public vacancies, do not show the employers' contact details on the PES website. When job-seekers want to apply to private vacancies, they must first send their application to the PES. Then counselors check whether candidates satisfy the firms' requirements (pre-selection), and they transfer the applications of the suitable candidates to the employers. In this situation, whether such applications reveal the candidates or the job counselors behavior depend on the extent to which job counselors pre-selects candidates or whether they just transfer the first batch of applications received without any other rule. In the end, it is very arbitrary to decide whether applications coded as initiated by the counselors only reveal the jobseekers behavior. We thus opt for the conservative option and restrict the analysis to applications coded as initiated by the jobseekers.

70% of UI claimants apply at least once through the PES website, and the average number of applications per person is 7. The main summary statistics can be found in Table 2. An observation is an application so multiple postings can be counted in these figures and the ones that never received applications are excluded. The median wage of the vacancies which UI claimants apply for, is the minimum wage (almost 50% of the posted wages correspond to the minimum wage). Job-seekers apply mostly to full-time jobs and jobs offering fixed-term contracts (note that 46% of vacancies offer permanent contracts). More interestingly, only half of the applications concern jobs located in the same Commuting zone than the job-seekers. One third of applications concern jobs whose occupation is not the one targeted by the job-seekers (at the 3-digit level).

Table 2: Summary statistics: Applications

Average wage	1698 €
Median wage	1474 €
Full-time	74%
Permanent contract	41%
Within commuting zone	49%
Target occupation - 3-digit	66%
Target occupation - 1-digit	83%

Source: SAGE-FHA-D3 (Pole emploi).

Of course, these statistics must be interpreted with caution, as several measurement bias

are at play here. First, we only observe vacancies posted at the French PES. Second, we miss some applications of job-seekers even if they apply for jobs posted at the PES, because they may apply privately. When vacancies are *public*, meaning when they show the contact details of the employers, job-seekers can decide (i) to apply through the PES or (ii) to directly contact the employers. Of course, in case (ii), applications are not recorded in our data. It is likely that job-seekers who have already downloaded their CV on the PES website opt for solution (i), as it is less costly.

Given these measurement issues, we decide to investigate how the characteristics reported in Table 2 vary with how much time has already been spent unemployed when the application occurs. Then our analysis is somehow more robust, as we only need to assume that the above biases are constant over the spell.

## 3 Results

### 3.1 Cross sections

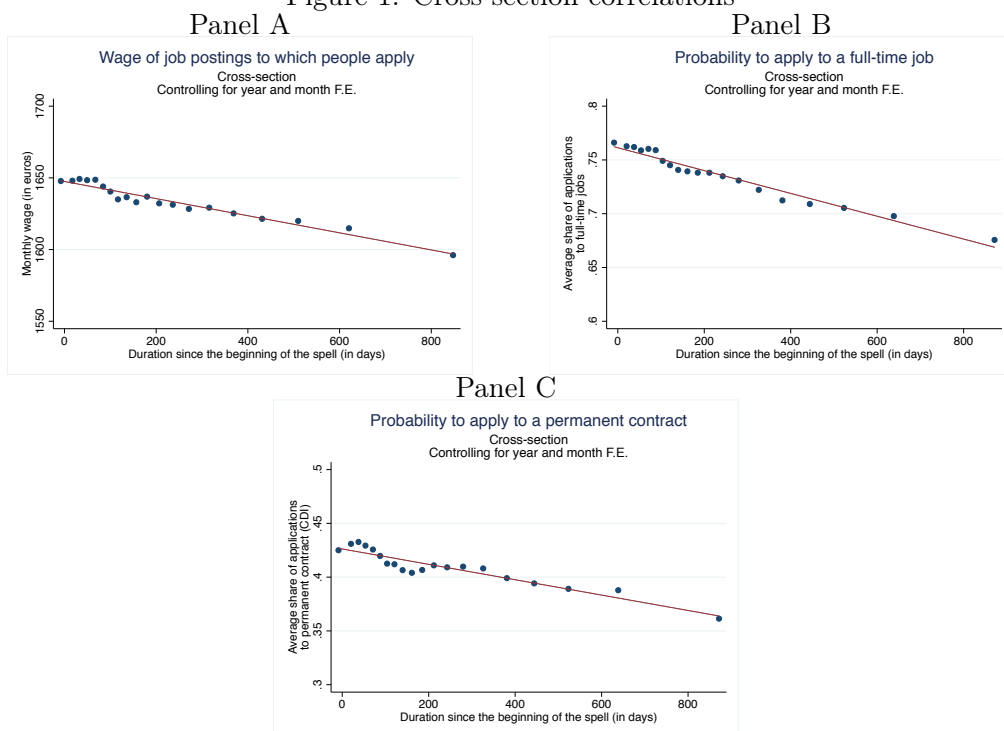
In the cross-section, as can be seen on Figure 1, we observe a negative relationship between time spent unemployed and the quality of job postings to which one applies. This is true along any dimension - the wage, the type of contract, the hours etc. - but the magnitudes are slightly different. Applications that take place after two years of unemployment correspond to wages on average 3% lower than those of applications that take place at registration, whereas the probabilities that it be a permanent contract or a full-time job are around 11 to 12% lower.

Yet these raw cross-sectional correlations suffer from selection biases that prevent us from drawing strong conclusions. There are two types of selection biases that go in opposite directions: one on the level of reservation wages and one on the path. Selection on the level is the most obvious and it is easy to remove with individual fixed-effects. The idea is that if people who stay unemployed longer are less employable for unobserved reasons, they might apply to poorer quality jobs because of these same unobserved factors. This would generate a decreasing relationship between characteristics of applications and time spent unemployed, even if there is no causal effect of unemployment duration on reservation utility. Individual fixed-effects can control for this unobserved heterogeneity.

But there is also selection on the path of reservation wages. If some people have a steeper path of reservation wages than others, and if those people who adjust their selectivity



Figure 1: Cross-section correlations



Source: SAGE-FHA-D3 (Pole emploi).

Note: These graphs are binscatter plots. The applications are split in equal sized-bins depending on when in a spell they occurred. For each bin, the graph plots the average wage (panel A), probability that it is a full-time job (panel B) or a permanent contract (panel C), controlling for year and month fixed effects.

downwards more quickly are also more likely to exit unemployment quickly, this would generate an upward bias in the estimated relationship between job characteristics and elapsed duration, even with individual fixed-effects. This selection is harder to remove convincingly. In an attempt to do so, we estimate separate regressions for people with different unemployment duration. More precisely, to avoid any endogenous attrition from our sample of analysis, we restrict attention to people who stayed unemployed at least  $X$  months and we run individual fixed-effect regressions on applications that occurred during the first  $X$  months of the spell.

### 3.2 Dynamic selection on the level of the reservation wage

First, to see the extent to which there is selection on the level, we estimate the following equation:

$$Y_{ijt}^{appl} = \alpha f(dur_{it}) + X_{ijt} + YearF.E. + MonthF.E. + Indiv_i + \epsilon_{it} \quad (1)$$

$Y_{ijt}^{appl}$  is a characteristic of job  $j$  to which individual  $i$  applies at date  $t$  (the wage, the type of contract etc).  $X_{ijt}$  controls for the other characteristics of the job. We also control for year and month fixed-effects and for individual fixed effects  $Indiv_i$ .  $dur_{it}$  is elapsed duration since the beginning of the spell (in months). We tried different functional forms for  $f$ : polynomial or piecewise polynomial. We plot the results in Figure 2 where  $f$  is a linear spline, with 1 knot at the median of  $dur_{it}$  (5 months) <sup>3</sup>.

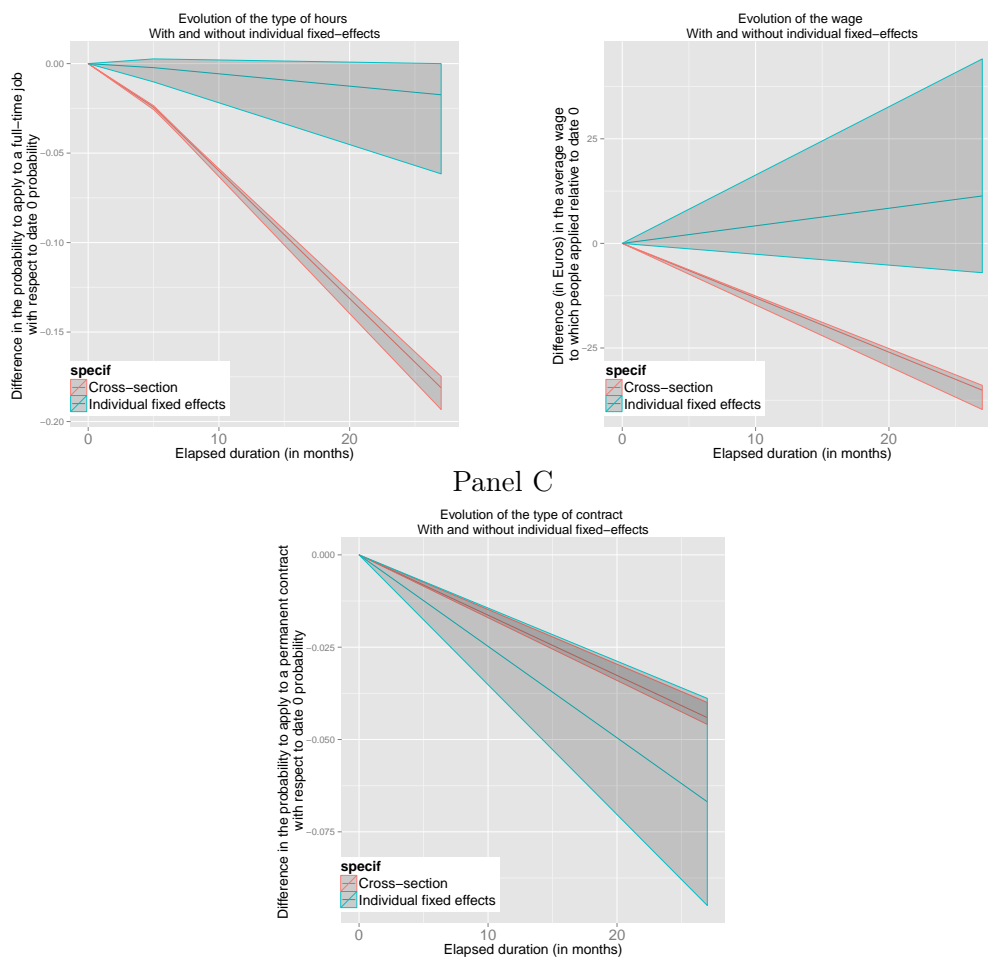
The plots in Figure 2 compare the results of the above Equation (1), with and without individual fixed-effects. In both cases, standard errors are clustered at the individual level and we plot the confidence intervals computed with parametric bootstrap.

We see that for the type of hours and for the wage, the individual fixed-effects remove the negative relationship that we find in the cross-section. This is not the case for the type of contracts, suggesting that this could be a true margin of adjustment, which is not too surprising in a dual labor market with a high minimum wage. The magnitudes for the cross-section results are slightly bigger than what we found in Figure 1 because we now control for the other characteristics of the job. With individual fixed-effects, the probability to apply to a permanent contract is between 5 and 10% lower after one year than at date 0.

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<sup>3</sup>This means that we fit a linear regression but allow for a change of slope at the knot

Figure 2: Comparing individual fixed-effects v. cross-section results

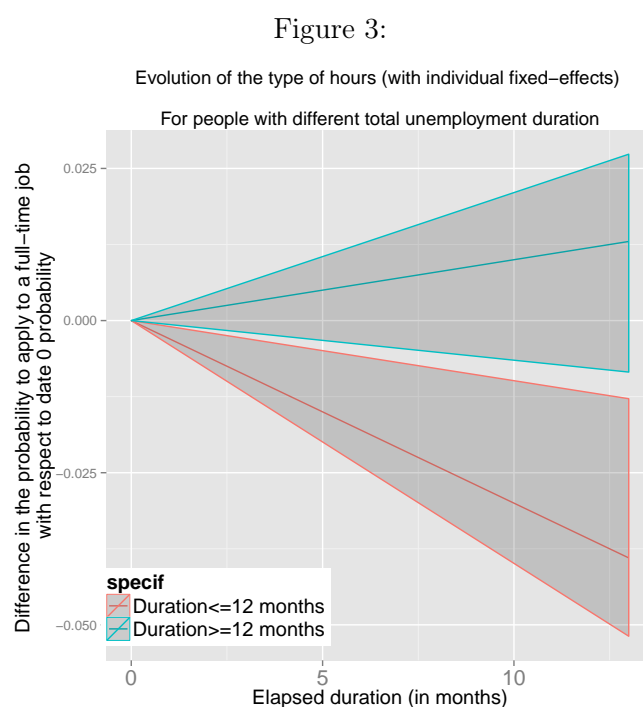


Source: SAGE-FHA-D3 (Pole emploi).

Note: the shaded grey area represents the confidence interval around our estimate of  $f(\cdot)$  in Equation (1).

### 3.3 Dynamic selection on the path of the reservation wage

We now turn to investigating the extent to which there is selection on the path. This question arises mostly in the case of the type of hours: is the flat path that we are observing with individual fixed effects driven by the fact that people with steeper paths have endogenously exited earlier? Figure 3 provides suggestive evidence that this might be the case. Here we restrict attention to the applications that occurred during the first 12 months of a spell and we estimate our previous specification separately for people whose unemployment duration was inferior to 12 months and for people for whom it was superior. We see that the path seems steeper for people who exited sooner. For them the probability to apply to a full-time job decreases between 1.5 and 7% over a year. These magnitudes are similar to those found by Krueger and Mueller (2014) for self-reported reservation wages.



Source: SAGE-FHA-D3 (Pole emploi).

Note: the shaded grey area represents the confidence interval around our estimate of  $f(\cdot)$  in Equation (1).

To sum up, we cannot reject that the reservation utility is decreasing over an unemployment spell but we find very small magnitudes, even for the type of contract which is the only margin of adjustment robust to individual fixed-effects and even for people who exit early in their spell. But one question remains to be tackled: is this slight decrease

driven by benefits exhaustion getting closer?

### 3.4 The influence of benefit exhaustion

To gauge the influence of benefit exhaustion, we restrict our attention to people whose spell lasted longer than their period of benefit receipt and estimate the following equation:

$$Y_{ijt}^{appl} = \alpha D(exhaustion = 1) + X_{ijt}\gamma + Year * Month F.E. + Indiv_i + \epsilon_{it} \quad (2)$$

where everything is similar to equation (1), except that a dummy for whether the application took place after benefit exhaustion  $D(exhaustion = 1)$  is now replacing  $f(dur_{i,j,t})$ . The coefficient of interest  $\alpha$  is reported in Table 3 for different outcome variables. We find that benefit exhaustion induces a statistically significant but very modest drop along all dimensions: wages are on average 0.2% (4 €) smaller after benefit exhaustion and the probabilities to apply to a permanent contract or a full-time job are around 1% smaller

Table 3: Effect of UI exhaustion on characteristics of jobs applied to

	Wage	Permanent contract (CDI)	Full-time job
$D(exhaustion == 1)$	-4.23*** (1.14)	-0.0044*** (0.0016)	-0.0067*** (0.0013)
Year*Month F.E	x	x	x
Indiv F.E.	x	x	x
Observations	2,015,959	2,851,162	2,851,162

Source: SAGE-FH-D3 (POle emploi).

## 4 Conclusion

We provided evidence from application behaviors consistent with a very modest decrease in reservation utility over an unemployment spell. In the French context of a dual labor market with a high minimum wage, the main margin through which job seekers adjust their job selectivity is the type of contracts to which they apply. Thus we believe it is a promising route to use applications data, which capture all the characteristics of a job, to study reservation utility. We also find suggestive evidence of individual heterogeneity in reservation wage paths correlated with unemployment duration. However even for

steeper paths and for the probability to apply to a permanent contract, we can rule out decreases larger than 10% over a year and our estimates are closer to 5%.

One main drawback of our analysis is probably the measurement error in the application data due to the partial record of job application through the PES. Analyzing web data that record every application on the PES website is a promising avenue to pursue more robust results.

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# Appendix

Figure 4: Example of job posting on the PES website

Numéro de l'offre **013JLNV** Offre actualisée le **20/02/2014**

**Infirmier / Infirmière en gériatrie**  
Métier du ROME J1506 - Soins infirmiers généralistes

**Description de l'offre**

vous interviendrez au sein d'un EHPAD de 68 lits. vous travaillerez en collaboration avec l'infirmier référent ainsi que le médecin coordonnateur. un weekend sur 3 de travail .reprise d'ancienneté.

**Entreprise**

LES FLEURS DE GAMBETTA

**Détail de l'offre**

Lieu de travail	<b>33 - BORDEAUX</b>
	<a href="#">Localiser avec</a>  Google Maps
Type de contrat	<b>Contrat à durée indéterminée</b>
Nature d'offre	<b>Contrat tout public</b>
Expérience	<b>Expérience exigée de 2 An(s)</b>
Formation	<b>Niveau : Bac+3, Bac+4 ou équivalent Exigé Domaine : Infirmier</b>
Langues	
Permis	
Connaissances bureautiques	
Qualification	<b>Employé qualifié</b>
Salaire indicatif	<b>Horaire de 13,95 euros</b>
Durée hebdomadaire de travail	<b>35h00 HEBDO Horaires normaux</b>
Déplacements	
Taille de l'entreprise	<b>20 A 49 SALARIES</b>
Secteur d'activité	<b>Hébergement médicalisé pour personnes âgées</b>

**Pour postuler à cette offre**