Monitoring and Sanctions in a Non-Stationary Structural Job-Search Model

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Abstract

We develop and estimate a structural econometric model of job search with monitoring of search effort and sanctions. The earliest moment of the monitoring is announced several months in advance and the judgement of the caseworker is based on cumulated search effort over a reference period. Forward-looking recipients anticipate the threat of a sanction. We disentangle the effect of the threat of being monitored, the impact of the monitoring itself and the ex-post effect of a sanction.

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JEL Classification: J64, J68, C41.

1 Introduction

There is a growing interest in stimulating re-employment of the unemployed by monitoring more closely their behavior and imposing sanctions (i.e. reductions in unemployment benefits in case of noncompliance with the eligibility requirements). In this paper, we develop a non-stationary model of job search with monitoring and sanctions. Individual search effort is endogenous. Monitoring and sanctions depend on the amount of search effort exerted by an individual over a prespecified reference period. Under non-stationarity we understand an exogenous change in search environment that may occur after the end of the reference period as a consequence of being sanctioned. Forward-looking unemployed people anticipate this change and choose their search intensity accordingly. Once uncertainty about the sanction is revealed, search environment becomes stationary forever.

This non-sationary model is generalized to evaluate a complex policy targeted on the long-term unemployed, named the "Activation of Job Search Behavior" (AJSB). This policy is potentially made of three stages, each of them lasting several months. The first one starts with a notification letter announcing a meeting with a caseworker. The meeting cannot take place before a certain point in time. With some discretion, the caseworker decides whether past search effort has been sufficient. If not, a second stage begins with the signature of an agreement specifying a list of research steps to be taken within a given period of

time. This second stage ends with a new meeting. A negative evaluation of search intensity during the second stage leads to a temporary sanction and a new action plan is implemented during a fixed time period (the third stage). A third and last meeting can lead to an end of entitlement to unemployment benefits if search effort is again deemed insufficient. This intricate policy allows to make a distinction between the threat of being monitored, the effect of monitoring itself and the ex-post effect of a sanction. Our goals are therefore to measure and decompose treatment effects and to link them to behavioral parameters through a structural estimation of the model. We also aim at predicting the impact of policy reforms.

AJSB was gradually phased in according to age. In the first year starting in July 2004, only workers younger than 30 years were contacted. In the second year, starting in July 2005, the target group was enlarged to those younger than 40 and, in the third year, those between 40 and 50 years old were included. By the discontinuity at the age of 30 in the first year of implementation of AJSB, we have a quasi-experiment. Our sample contains claimants of unemployment benefits, who on the 1st of July 2004 were between 25 and 34 years old and who satisfy all the criteria to be dispatched a notication letter (except for the age in the case of those aged at least 30). As in the case of PROGRESA (Todd and Wolpin, 2006), people in the "control group" (in our case aged 30 and older) enter the program later on.[1] The "control group" is used for an external validation exercise. We test whether the model estimated on the "treated" (younger than 30) predicts well the exit rate of those older than 30 who are in another "policy regime".

Structural econometric modelling of the job-search model has made progress in several directions. Bloemen (2005), van den Berg and van der Klaauw (2006), van der Klaauw and van Vuuren (2009) and Fougère et al. (2009) among others have estimated stationary models with endogenous job-search intensity. van der Klaauw and van den Berg (2008) have estimated a stationary model of monitoring and sanctions with endogenous job-search intensity. Finally, there has been some research on non-stationary models with exogenous job-search intensity, in particular Wolpin (1987), van den Berg (1990), García Pérez (2006) and Frijters and van der Klaauw (2006). Our contribution, which extends the seminal paper of van den Berg (1990), consists in an explicit treatment of non-stationarity in a model with endogenous search intensity, monitoring and sanctions and in an explicit treatment of the dependence of the "sanction probability" (be it an action plan or a cut in benefits) on the foregone search effort. In contrast to van den Berg (1990), as well as most of the search literature, to formulate and solve the model we resort to optimal control instead of using dynamic programming. This approach allows preserving tractability of the model once the chance of getting sanctioned is dependent on the search effort exerted in the past.

The effects of monitoring and sanctions are surveyed by Fredriksson and Holmlund (2006) and van den Berg and van der Klaauw (2005). Sanctions due to insufficient search are often modelled in the following way.[2] There is a known threshold level of search effort above which the probability of being sanctioned is zero and below which it is positive but lower than 1 (Abbring et al., 2005). As the local employment office staff have some discretionary power when they apply the rules, we find more satisfactory to treat the threshold as random from the point of view of the claimant. According to Lalive et al. (2005), a warning that a sanction may come has already a positive effect on unemployment exit rates. In the case of our policy, the notification letter can be seen as a warning. When search-effort is explicitly treated as multi-dimensional, the advantages of monitoring and sanctions are les clear. van den Berg and van der Klaauw (2006) consider a framework with two search channels. Informal search activities cannot by definition be monitored. Using data from a controlled social experiment, they conclude that counselling and monitoring do not affect the work exit rate of unemployed people with good labour market prospects. In our data, we do not observe the search channels used and hence treat search effort as a scalar.

Other papers have qualified or questioned the advantages of monitoring and sanctions. First, Arni et al. (2009) and van den Berg and Vikström (2009) extend the evaluation of sanctions by looking at job quality. They conclude that benefit reductions lower this quality. In our paper, we use information about trajectories in employment and earnings. Second, in the UK, the Jobseekers Allowance (JSA) replaced the

[1] This occurs two years after the treated in the case of PROGRESA according to Attanasio et al. (2005). In our case, it occurs a year later.

[2] In Ljungqvist and Sargent (1995), rejecting wage offers above a given threshold implies a risk of being sanctioned.

system of Unemployment Benefit and Income Support. Manning (2009) and Petrongolo (2009) argue that the most important change consisted in the job tighter search requirements. Job search activities were monitored fortnightly. According to Manning (2009), the short-run effects of JSA were a sharp reduction in the number of claimants but not an increase in exits to employment. Petrongolo (2009) look at longer-term effects and finds even more negative results.

As often the same policy assists individuals in their job search and monitor their job search efforts, few papers have been able to look at the pure effect of monitoring. For the US, Klepinger et al. (2002) conclude that monitoring may reduce the duration of benefit claim. Ashenfelter et al. (2005) use a field experiment to conclude that work search verification does not significantly reduce benefit payments nor claim durations in the US. According to Klepinger et al. (2002), this would be due to their small sample. In the UK, McVicar (2008) exploits a quasi-experiment by which some unemployed were not monitored. He concludes that exits from claimant unemployed and entry into employment fall. AJSB can be seen as a pure monitoring policy (at least in the geographical area we consider).

The paper is organized as follows. Section 2 introduces to the institutional setting. Then, Section 3 develops the model. Section 4 describes the data set and produces some descriptive statistics. Section 5 develops the econometric model. In Section 6, we discuss the estimation results and assess the incentive effect of the monitoring and sanction programme. Section 7 concludes the paper.

2 Institutional setting in Belgium

2.1 Unemployment insurance and assistance schemes

The UI system in Belgium is quite specific because it entitles unemployed individuals to benefits for an, *in principle*, unlimited duration. Moreover, school-leavers[3] without any work history who remain unemployed after a waiting period of 9 months are entitled to unemployment benefits. The level of unemployment benefits (UB) and their time profile vary with family composition. In principle, the replacement rate, as a percentage of gross wage, of a worker with a sufficient employment record is not higher than 55% or 60%, depending on whether or not the worker cohabits with a person earning (replacement) labor income. For those who lost a low-wage job, the replacement ratio can be higher, since the allowance may not drop below some minimum level depending on the household type. The replacement rate can however be lower than 55% or 60% for the following reasons: (i) the level of the allowance is capped if past gross labor earnings exceed a maximum (1676€/month in June 2004); (ii) the allowance remains indefinitely at the same level only for a head of a household and for those receiving the minimum level; for other categories the unemployment benefit declines with elapsed duration to attain eventually a flat minimum at a moment.[4] In addition, school-leavers are entitled to flat rate benefits that are lower than for job-seekers who previously contributed to the financing of the system. In the Belgian legislation, a job duration of two years is required to revise the wage on which the replacement ratio applies. Therefore, we ignore below potential entitlement effects.[5]

Sanctions can be imposed under circumstances such as turning down a suitable job offer, refusal to take up an ALMP and the like. In Belgium the Regional Public Employment Services (PES) are in charge of detecting such behaviour, whereas the sanctioning is the competence of the federal Unemployment Agency (UA).[6] These rules did not change when the new monitoring scheme was introduced. As will soon be clear,

[3] With a vocational technical degree corresponding to lower-secondary education or who have at least finished upper-secondary education.

[4] For claimants entitled by their work experience, Belgium has a two-tier benefit scheme for singles and a three-tier scheme for cohabitants.

[5] For more details about the UI system, see `http://belgium.angloinfo.com/countries/belgium/unemploy.asp` or `www.onem.be`.

[6] According to Gray (2003), the yearly number of sanctions (due to behavior during the benefit period) over the average stock of beneficiaries of UB amounted to 4.2% in 1997, a percentage much lower than in the US, Switzerland, Australia, the UK, Norway and Finland but notably higher than in Canada, New-Zeland, Germany and Japan. According to our own computations,

the latter also generates sanctions.

Social assistance is implemented at the local level according to federal rules. Social assistance guarantees a means-tested minimum income level that varies with family composition. Someone who is sanctioned or no more entitled to UB can apply for social assistance benefits. A flat assistance benefit is then guaranteed as long as the means of the household are below a threshold.

2.2 The new monitoring scheme

The reform assigns to the federal UA the competence to monitor, in a sequence of 3 meetings, the *effort* that UI benefit recipients devote to job search. Consequently, the capacity of the agency to sanction workers for being unavailable for the labor market no longer depends exclusively on the information transmitted by the Regional PES. This monitoring occurs within the so called procedure for the "Activation of Job Search Behavior" (AJSB). Within this procedure the UA sends a *notification letter* explaining the different steps of the AJSB. The letter invites the unemployed to keep record of her job-search effort (such as copies of letters of application, registration in temporary help agencies, proofs of participation to selection procedures) as this will be the basis of the evaluation that is announced to take place eight months later at the earliest. The letter does not impose tighter search requirements. Still, the monitoring of search effort is new. The unemployed are selected to receive this letter when their unemployment duration reaches the threshold of 13 months. The duration counter used by the UA is the result of a complex computation. As the duration counter is only reset to zero after a job spell of at least 12 months, the letter can be received after less than 13 months in the case of interrupted spells of unemployment.

Eight months after sending the notification letter, the UA starts convoking the unemployed to a meeting with a caseworker. In practice, according to our data, no meeting occurs before the ninth month and the delay can be substantial.[7] During this meeting the caseworker evaluates, on the basis of proofs delivered by the unemployed worker, whether the claimant has been actively searching for work during the elapsed period. If the outcome of this evaluation is positive, the worker will not be monitored by AJSB during the next 16 months. If not, the unemployed must sign an action plan and is invited to a new meeting 4 months later at the earliest. The action plan is an agreement listing a number of specific search steps in order to find a job. These steps include e.g. having a new contact with the regional PES to examine participation to an ALMP, applying for at least a given number of jobs found in specified newspapers, applying for jobs offered by the temporary help agency, sending a CV to at least a given number of enterprises.

At the second meeting, a caseworker[8] evaluates to what extent the unemployed has complied with the action plan. If the evaluation is positive, the worker will not be monitored during the next 12 months. Otherwise, the unemployed must sign a new action plan and is invited to a last meeting 4 months later at the earliest. In addition, there is a complete or partial temporary withdrawal of UB according to family composition (with tougher rules for school-leavers). The third meeting looks very much like the second one. If the evaluation is positive, the unemployed gets UB again (at the level before the second meeting) and will be invited to a new meeting 12 months later. However, a negative evaluation now eventually leads to an end of entitlement. According to the levels of UB and social assistance benefit (if any), the penalty can be substantial. To give an example, a head of household with the maximum UB we observe (about 1000 € per month in 2004) would be entitled to a social assistance benefit of about 800 € in case of a negative evaluation. Compared to similar monitoring policies elsewhere in Western Europe, AJSB can be seen as a "soft" monitoring policy as far as the frequency of meetings is concerned. However, the penalty in case of a sanction can be substantial.

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the rate of sanctions has been fairly stable over the period 1997-2003 in Belgium.

[7] If the unemployed does not show up, a sanction applies but the latter is removed (with retroactive effect) if the unemployed can justify the absence or show up within a month. In the data, these cases are very rare (2% of those taking part to the meeting). Hence, we neglect this possibility.

[8] In principle, the caseworker who meets the unemployed should be the same at all meetings. In practice, this is only true in subregions with sufficiently low numbers of unemployed per caseworker. Moreover, the turnover of caseworkers is large given the length of the whole AJSB procedure.

To evaluate whether the amount of search effort is sufficient, the caseworkers have the proofs delivered by the claimants and information about employment experience, if any, during the relevant period. They are instructed to take the personal characteristics of the claimant into account (age, residence,...) but the rules do not specify to what extent these should affect their judgment. In sum, when the caseworker evaluates the amount of job-search effort, she clearly has some discretionary power. The caseworkers do not however have the power to direct claimants to apply for certain job vacancies nor to enter specific ALMP. This remains the task of the regional PES, which in principle send information to the UA.

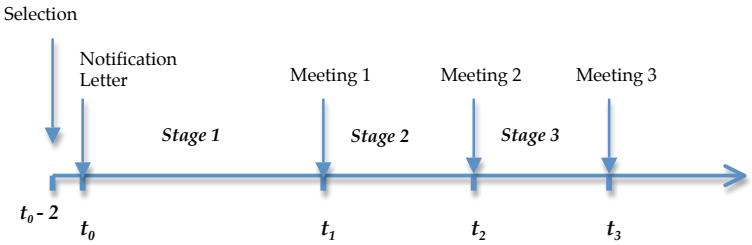

Figure 1: Timing and (potential) stages of AJSB.

3 The model

AJSB consists in three important stages (see Figure 1): (i) from the moment of notification (at t_0) until the first meeting with the caseworker (at t_1); (ii) if negatively evaluated at the first meeting, from the first meeting (at t_1) until the second meeting (at t_2) ; (iii) if negatively evaluated at the second meeting, from the second meeting (at t_2) until the third meeting (at t_3). The optimization problem within each of these three stages has a very similar structure. Each stage consists of three sub-periods: (i) during the first sub-period no meeting can take place and the length of it $(d_k, k = 1, 2, 3)$ is scheduled by the rules: $d_1 = 8$ months between notification and the first meeting and $d_k = 4$ $(k = 2, 3)$ months between the subsequent meetings; (ii) the second sub-period ends with a meeting which takes place according to a random Poisson process; (iii) the third sub-period starts from the moment at which the meeting takes place and its characterization depends on the outcome of the evaluation at the meeting: if the outcome is positive, it is characterized by a stationary job search environment presented in Sub-section 3.1;[9] if the outcome is negative the third sub-period is characterized by the optimization problem of the subsequent stage, except for the last stage, when it is described by a stationary job search problem in which the unemployed individual is no longer entitled to benefits, because she is sanctioned. The corresponding optimization problem will be solved by backward induction.

Since the structure of the optimization problem is so similar for each stage, this section only formally presents the model of this first stage (with, in footnotes, an intuitive presentation of how the model has to be adapted to deal with later stages). The appendix contains a formal and general presentation of the model for all stages.

Consider homogeneous agents who consume their current income. In a continuous time environment, let τ denote any moment between t_0 and t_1. Given the lack of information about search activities in the data set, search is treated as a scalar capturing effort. Search effort (resp., the reservation wage) at τ is denoted by $s(\tau)$ (resp., $w_r(\tau)$). The transition rate p from unemployment to employment is a function of

[9]So, to keep the problem tractable, we assume that the exact date at which the next series of meetings will arrive is not anticipated.

both decision variables and is written $p(s(\tau), w_r(\tau))$. Next, let $\alpha[s(\tau)] \geq 0$ be the arrival rate of job offers, such that $\alpha'[s(\tau)] > 0$, $\alpha''[s(\tau)] \leq 0$, and let $f(w)$ (respectively, $F(w)$) designate the wage offer density (resp., distribution) function with $\bar{F}(w) \equiv 1 - F(w)$. Then the transition rate to employment can be written down as

$$p(s(\tau), w_r(\tau)) = \alpha[s(\tau)] \cdot \bar{F}(w_r(\tau)) \geq 0 \tag{1}$$

The probability $P(\tau, t_0)$ of staying in unemployment up to τ conditional on being unemployed at t_0 (i.e. the conditional survival or survivor function at τ) is given by

$$P(\tau, t_0) = \exp\left\{-\int_{t_0}^{\tau} p(s(x), w_r(x))\, dx\right\}. \tag{2}$$

Individuals discount future at rate ρ. We assume that their instantaneous utility $u(y(\tau))$ is a function of net income $y(\tau)$, such that $u'(y(\tau)) > 0$, $u''(y(\tau)) \leq 0$. For someone unemployed we define net income as $y(\tau) = b(\tau) - c[s(\tau)]$, where $b(\tau)$ is the benefit level at τ and $c[s(\tau)]$ is a cost of search function, such that $c'[s(\tau)] > 0$, $c''[s(\tau)] \geq 0$. For someone employed net income $y(\tau)$ is simply the net wage w.

According to the legislation, at the meeting, the caseworker evaluates past search efforts. To make this notion operational, we define the average accumulated level of search between t_0 and $\tau \geq t_0$ by[10]

$$\bar{S}(\tau, t_0) = \frac{\int_{t_0}^{\tau} s(x)dx}{\tau - t_0} \tag{3}$$

Next, if $\bar{S}(t_1, t_0)$ exceeds some minimal value $\underline{S}_1$, the evaluation is positive. Otherwise, it is negative. A positive evaluation implies that the unemployed enters a stationary state with a discounted inter-temporal utility level U_h^s defined more precisely in subsection 3.1 (index h indicates that the initial "high" benefit still accrues to the unemployed and superscript s recalls stationarity). If the evaluation is negative, the unemployed signs an action plan to which is associated a discounted inter-temporal utility level defined in Subsection 3.2.2.[11] Since there is discretion in the evaluation, the reference value $\underline{S}_1$ is random. The unemployed is assumed to make her choices on the basis of a subjective probability distribution of $\underline{S}_1$. At t_1, the subjective probability of being negatively evaluated $\pi_1(\bar{S}(t_1, t_0))$ measures the probability that $\underline{S}_1 > \bar{S}(t_1, t_0)$. The problem consists therefore in finding an optimal path for the reservation wage and search effort where the terminal condition is a function of accumulated search all along the $[t_0, t_1)$ interval. Finding this optimum requires an iterative procedure where the probability of a negative evaluation is revised at each iteration. This task is complicated by the following feature.

At an earlier stage of this research, we ignored job destruction (although it is present in the data; see Figures 2 and 3). We then found levels of search effort and hence of cost of search that were much too high. So, in the current version of the paper jobs are dissolved at a Poisson rate δ. If a claimant exits to employment after the notification and before the meeting, the latter will be delayed as long as the person remains employed. If the worker then looses her job and enters unemployment, the duration counter starts again at the value at which the job was found. A descriptive analysis conducted on the outcomes of the evaluation at the first meeting reveals that such a job experience strongly and significantly reduces the risk of being negatively evaluated. When deciding over the reservation wage and search effort, the unemployed should be aware of these induced effects of a transition into employment before the next meeting takes place. However, embedding this in the model raises serious difficulties. For, the decision variables now depend on the inter-temporal value in unemployment in case of a future job loss and the latter is in principle affected by accumulated search effort up to the exit to employment augmented with the accumulation of search after a return in unemployment. For tractability reasons, we therefore assume the following:

[10] At later stages of AJSB, the average is taken over the period between two consecutive meetings.

[11] If someone refuses to sign the action plan, UB are temporarily (at meeting 1) or permanently (at meetings 2 and 3) withdrawn. There are no such cases in our data. Hence, we ignore this possibility.

1. if an individual does not find a job between t_0 and the first meeting ($e = 0$), the probability of negative evaluation decreases with average accumulated search as follows[12]:

$$\pi_1^{e=0} = \pi_1^0 \left[\bar{S}^0 (t_1, t_0)\right], \text{ with } \pi_1^{0\prime} [\cdot] \leq 0, \tag{4}$$

2. if an individual finds a job before the next meeting ($e = 0$), $\pi_1^{e=1}$ is a constant that does not depend on the job-effort accumulation any longer.

We first model the behavior of an unemployed in one of the relevant stationary environments. Second, we model the behavior of someone who receives a notification letter at t_0. This individual faces a non-stationary problem for two reasons. Starting from time t_0, this individual knows that at time $t_1' = t_0 + 8$ his value of unemployment may fall as a result of negative evaluation. Once at time t_1', the individual realizes that the evaluation does not take place immediately (in the data). However, her optimization problem still remains non-stationary if $e = 0$ because the evaluation is affected by average search effort. This makes the problem genuinely non-stationary even if on the delay interval claimants take part to the meeting at a Poisson rate (see Appendix C).

3.1 The stationary problems

This section deals with the model in three cases: before the notification letter is received, after a positive evaluation and after a negative evaluation at the third and last meeting. We assume that the unemployed becomes aware of the programme as soon as she receives the notification letter.[13] b_h denotes the "high" flat benefit to which unemployed are in principle entitled indefinitely. Someone who is negatively evaluated at the third interview is no more entitled to UB. She has then no individual income or receives benefits from an assistance allowance. Let symbol b_l denotes this situation. The inter-temporal utility is then denoted U_l^s where index l refers to low income. The environment is then also stationary as we ignore a possible entitlement effect.[14]

A stationary job-search model with endogenous search intensity is standard (see e.g. Cahuc and Zylberberg, 2004, p. 122). Denote the reservation wage by w_r and search effort by s. Let

$$V (w_r) \equiv \tfrac{1}{\rho+\delta} \int_{w_r}^{\infty} [u (w) - u (w_r)] \, dF (w) > 0$$

denote the expected increase in inter-temporal utility obtained by accepting job offers equal or above the reservation wage. The control variables (s, w_r) verify the following system of equations:

$$u (w_r) = u (b_j - c [s]) + \alpha [s] V(w_r), \tag{5}$$

$$u' (b_j - c [s]) c' [s] = \alpha' [s] V(w_r). \tag{6}$$

where $j \in \{l, h\}$. According to (5), the optimal reservation wage is such that the value of exiting to a job paying this reservation wage equals the value of staying unemployed. According to (6), the marginal disutility of search equals the marginal increase in the job arrival rate times the expected utility gain of such an offer.

The inter-temporal utility of someone positively evaluated is denoted U_h^s since the "high" benefit still accrues to the unemployed. We assume that the perspective of entering AJSB again creates a loss in utility, so that the instantaneous utility is then $(1 - \xi) (u(b_j) - c[s]), \xi \in (0, 1)$.[15] The reservation wage and search effort levels then verify (5), in which $u(b_j) - c[s])$ is replaced by $(1 - \xi) (u(b_j) - c[s])$, and (6).

[12] In the stationary model of Boone et al. (2007), if an unemployed is monitored, the probability of being sanctioned is a (linearly) decreasing function of current search effort.

[13] Cockx and Dejemeppe (2007) provide evidence that the unemployed do not anticipate their entry into AJSB.

[14] This means that the value of accepting a job offer is raised if this entitles to higher UB in case of a future lay-off.

[15] One tries intuitively to capture the probability of taking part to a new series of meetings times the difference between the inter-temporal utility in the AJSB procedure and U_h^s.

3.2 The non-stationary problem

We have to distinguish two sub-periods. The interval $[t_0, t_1']$ is called the "scheduled interval". Then, we consider the period during which a meeting can take place, called the "delay interval".

3.2.1 The problem on the scheduled interval $[t_0, t_1']$

$U_{h,1}^e(\tau)$ denotes the expected inter-temporal discounted value in unemployment for someone at time τ in the scheduled interval of the first stage, $[t_0, t_1')$, with a job experience ($e = 1$) or not ($e = 0$), and a flat "high" benefit level $b(\tau) = b_h$. As shown in Appendix A.1 and A.2, the inter-temporal value evaluated at notification is the sum of two terms. The first one discounts the sum of the instantaneous utility in unemployment and the expected value of exiting to a job, weighted by the probability of surviving in unemployment and the discount factor. The second term, ϕ^e, summarizes the expected value as of t_1'. So, at the time of notification, t_0, where e actually equals 0, one has:

$$U_{h,1}^e(t_0) = \int_{t_0}^{t_1'} \left[u\left(b_h - c\left[s^e(x)\right]\right) + p\left(s^e(x), w_r^e(x)\right) \bar{W}_{h,1}^e(x)\right] P^e(x, t_0)\, e^{-\rho(x-t_0)} dx + \phi^e\left(t_1', t_0\right) \tag{7}$$

where the expected inter-temporal discounted utility of exiting to employment at a moment x is given by

$$\bar{W}_{h,1}^e(x) = \int_{w_r^e(x)}^{\infty} W_{h,1}(w; x) \frac{f(w)}{\bar{F}\left(w_r^e(x)\right)} dw, \tag{8}$$

the value of entering employment at wage w and time x verifies[16]

$$W_{h,1}(w; x) = \frac{1}{\rho + \delta}\left[u(w) + \delta U_{h,1}^1(x)\right], \tag{9}$$

and the value of continuation of unemployment from t_1' onward (also called the Salvage value) is defined by

$$\phi^e\left(t_1', t_0\right) = P^e\left(t_1', t_0\right) e^{-\rho\left(t_1' - t_0\right)} \underline{U}_{h,1}^e\left(t_1'\right). \tag{10}$$

This expression is the present (at t_0) value of continuation of unemployment from t_1' onward. Continuation value is the survival function times the discount factor times the value of unemployment starting from the beginning of the delay interval $\underline{U}_{h,1}^e(t_1')$. The latter will be defined in Sub-section 3.2.2.

The problem consists in maximizing (7) with respect to the controls $\{s^e(\tau), w_r^e(\tau)\}_{\tau \in [t_0, t_1')}$ subject to law of motions for the three state variables: the survival function $P(\tau, t_0)$, the average accumulated search $\bar{S}(\tau, t_0)$, and the inter-temporal utility of an unemployed who lost a job found at τ, $U_{h,1}^1(\tau)$. However, when the unemployed chooses $\{s^e(\tau), w_r^e(\tau)\}_{\tau \in [t_0, t_1)}$, the law of motion of $U_{h,1}^1(\tau)$ is considered as independent of these control variables since $\pi_1^{e=1}$ is unaffected by accumulated search. So, the optimal control on $[t_0, t_1)$ is subject to only two law of motions. Given(2), the first law of motion is

$$\dot{P}(\tau, t_0) \equiv \frac{\partial P(\tau, t_0)}{\partial \tau} = -p\left(s(\tau), w_r(\tau)\right) \cdot P(\tau, t_0)$$

Given (3), the second one writes:

$$\dot{\bar{S}}(\tau, t_0) = \frac{\left[s(\tau) - \bar{S}(\tau, t_0)\right]}{\tau - t_0}$$

[16]The behavior in employment is taken as exogenous. At a rate δ, the job is lost, the unemployment is back into the first stage of AJSB and her inter-temporal utility becomes $U_{h,1}^{e=1}(x)$. For those on a two- or three-tier UB scheme, a job duration of 12 months is required to benefit again from the highest benefit level. We here ignore a potential entitlement effect. At the estimation stage of the model, the trajectories of claimants whose benefit level changes will be right-censored.

As it is shown in Appendix B.1, the first-order conditions of maximization can be written as:

$$W_{h,1}\left(w_r^e\left(\tau\right);\tau\right) = U_{h,1}^e\left(\tau\right), \tag{11}$$

$$u'\left(b_h - c\left[s^e\left(\tau\right)\right]\right)c'\left[s^e\left(\tau\right)\right] = \alpha'\left[s^e\left(\tau\right)\right]V\left(w_r^e\left(\tau\right)\right) + \frac{P^e\left(t_1',\tau\right)e^{-\rho\left(t_1'-\tau\right)}}{t_1'-t_0}\frac{\partial \underline{U}_{h,1}^e\left(t_1'\right)}{\partial \bar{S}^e\left(t_1',t_0\right)}. \tag{12}$$

The messages of (11) and (5) are essentially the same: The optimal reservation wage at τ is such that the value of exiting at τ to a job paying this reservation wage equals the value of being unemployed as of τ (both values being inter-temporal and discounted). The optimality condition (12) is related to (6). On the right-hand side, the marginal expected gain is now made of two terms. The first one is the usual utility gain due to an increase in the transition rate to employment. The second one is less standard. Provided that the individual is still unemployed at t_1',[17] a marginal increase in search effort at τ augments the average accumulated level of search between t_0 and t_1', which influences the inter-temporal discounted value as of t_1' through the risk of being negatively evaluated. This value will be studied in Sub-section 3.2.2. The optimal control paths are given by differentiating (11), (12) and $U_{h,1}^e(\tau)$ with respect to τ (see Appendix B.1).

3.2.2 The problem on the delay interval $(t_1', t_2'']$

At t_1', the unemployed face a new problem as from now on there is a risk of being instructed to take part to the meeting with the caseworker. Despite that the delay duration is exponentially distributed, the problem is non stationary (see Appendix C). It is assumed that the actual moment t_1 at which the interview occurs lies somewhere between t_1' and, for practical reasons, a maximal possible moment t_1''. During this interval of time, the person still participates in the programme in the sense that current search effort continues to influence the average accumulated level of search.

$\underline{U}_{h,1}^e\left(\tau\right)$ denotes the expected value of unemployment for someone notified at t_0 with a flat benefit level $b(\tau) = b_h$, who is still unemployed at moment τ on the delay interval $[t_1', t_1)$. This value measured at the start of the "delay interval" t_1' is given by (see Appendix A.1):

$$\begin{aligned}\underline{U}_{h,1}^e\left(t_1'\right) &= \int_{t_1'}^{t_1''}\left[u\left(b_h - c\left[s^e\left(x\right)\right]\right) + p\left(s^e\left(x\right), w_r^e\left(x\right)\right)\bar{W}_{h,1}^e\left(x\right) + qEU_{h,2}^e\left(x\right)\right] \\ &\quad \times P^e\left(x,t_1'\right)e^{-[\rho+q]\left(x-t_1'\right)}dx + \underline{\phi}^e\left(t_1'',t_1'\right),\end{aligned} \tag{13}$$

where

$$\underline{\phi}^e\left(t_1'',t_1'\right) = P^e\left(t_1'',t_1'\right)e^{-[\rho+q]\left(t_1''-t_1'\right)}EU_{h,2}^e\left(t_1''\right).$$

At a rate q, the unemployed enters the meeting. $EU_{h,2}^e\left(x\right)$ measures the expected lifetime utility at time x, where the expectation is taken over the outcome of the evaluation:

$$EU_{h,2}^e\left(x\right) = \pi_1^e(\bar{S}^e(x,t_0))\,U_{h,2}^e(t_1) + (1-\pi_1^e(\bar{S}^e(x,t_0))\,U_h^s. \tag{14}$$

The evaluation is negative with probability $\pi_1^e(\bar{S}^e(x,t_0))$. Then, the unemployed signs an action plan and her inter-temporal utility is $U_{h,2}^e(t_1)$, where index h recalls that the benefit level is still "high" (at the first meeting, there are no sanctions in case of a negative evaluation) and index 2 signals that the unemployed has now moved to stage 2 of AJSB.[18] With probability $1-\pi_1^e(\bar{S}^e(x,t_0)$, the evaluation is positive and the inter-temporal utility is U_h^s, defined in Sub-section 3.1.

The continuation value of unemployment $\underline{\phi}^e\left(t_1'',t_1'\right)$ is the survival probability times the discount factor times the value of unemployment starting from t_1''. The latter is given by the last equality if x is replaced by t_1''.

[17] This explains the presence of the survival function at t_1' conditional on being unemployed at τ, $P^e\left(t_1',\tau\right)$.

[18] At the second meeting, in case of a negative evaluation, the lifetime utility should be written $U_{l,3}^e(t_2)$ since the third stage is is characterized by a sanction (index l).

The expected value in unemployment, $\bar{W}^e_{h,1}(x)$, still verifies (8) where the value of entering employment at wage w and moment x now verifies (see Appendix A.2)[19]:

$$W_{h,1}(w;x) = \frac{1}{\rho+\delta}\left[u(w) + \delta \underline{U}^1_{h,1}(x)\right] \tag{15}$$

The first-order optimality conditions can now be written as (see Appendix B.2)

$$W_{h,1}\left(w^e_r(\tau);\tau\right) = \underline{U}^e_{h,1}(\tau), \tag{16}$$

$$\begin{aligned} u'\left(b_h - c[s^e(\tau)]\right) c'\left[s^e(\tau)\right] &= \alpha'\left[s^e(\tau)\right] V\left(w^e_r(\tau)\right) + (1-e)\left[U^e_{h,2}(t_1) - U^s_h\right] \\ &\times \left[\int_\tau^{t''_1} \frac{q}{x-t_0} \frac{\partial \pi^e_1\left[\bar{S}^e(x,t_0)\right]}{\partial \bar{S}^e(x,t_0)} P^e(x,\tau)\, e^{-[\rho+q](x-\tau)} dx + \frac{P^e(t''_1,\tau)\, e^{-[\rho+q]\left(t''_1-\tau\right)}}{t''_1-t_0} \frac{\partial \pi^e_1\left[\bar{S}^e(t''_1,t_0)\right]}{\partial \bar{S}^e(t''_1,t_0)}\right] \end{aligned} \tag{17}$$

The interpretation of (16) and (11) are the same. As far as (17) is concerned, the marginal disutility of search on the left-hand side equals the utility gain due to an increase in the transition rate to employment plus an expression that captures the change in inter-temporal utility via the impact of search effort on accumulated search and eventually on the risk of a negative evaluation. This expression, which is different from zero only if $e = 0$, is proportional to the difference in utility levels whether the unemployed remains in the AJSB after a negative evaluation, $U^e_{h,2}(t_1)$, or the unemployed enters a stationary regime after a positive evaluation, U^s_h. The expression on the last line of (17) is made of two terms. First, one has the sum of marginal changes in the probability of a negative evaluation all along the remaining time in the "delay interval" (weighted appropriately by the survival function and the discount factor). Second, one finds a similar expression if the maximal possible time of participation in the meeting, t''_1, is reached. The optimal control paths are given by differentiating (16), (17) and $\underline{U}^e_{h,1}(\tau)$ with respect to τ (see Appendix B.2).

4 Data and descriptive analysis

Our data set consists of monthly administrative records from the federal UA merged with other Social Security data. The latter gives in particular information about the wage of salaried workers. The first sample contains all recipients of unemployment benefits, who on the 1^{st} of July 2004 were between 25 and 30 years and who satisfy all the criteria to be dispatched a notification letter at the start of AJSB, more precisely between July and October 2004. In addition to the age, the main criterion is the duration threshold of 13 months of unemployment. However, since reliable data on benefit payments are only available with some delay, the claimant status and duration criterion (13 months) are determined on the basis of payments made two months before the (theoretical) moment of dispatch of the notification. So, with the notations of the model, the claimants are unemployed since 13 months at $t_0 - 2$ (the sampling date). Moreover, the targeting rules are such that the notified people are entitled to a flat UB for an indefinite duration except if they are sanctioned.[20] We observe the trajectory of these individuals until the end of 2006. The second sample is made of all claimants aged between 30 and 34 selected according to exactly the same rules as the younger ones. During about a year, they are not targeted by AJSB. We right-censor their trajectories when they are notified.[21] With these precisions in mind, claimants in the first group will be called the "treated" and those in the the second one the "controls".

[19] To avoid clutter, we keep the same symbols $\bar{W}^e_{h,1}(x)$ and $W_{h,1}(w;x)$ on the scheduled and delay intervals.

[20] For cohabitants, this is not always the case. For them, we only keep in the sample those entitled to a flat benefit.

[21] Those who still are UI recipients after June 2005 are at risk of receiving the notification letter. However, as their unemployment duration is typically (much) longer than the threshold considered by AJSB, their entry into the programme is spread over several months.

Both samples are made of UI recipients living in the Northern region of Belgium (Flanders). We ignore other regions because there AJSB was introduced in combination with ALMP targeted on those notified. In Flanders, the average unemployment rate among the 25-49 years old was close to 5.5% in 2004 and 2005 and 4.5% in 2006 according to the labour force survey statistics. Despite these relatively good performances, about 45% of the total stock of unemployed was jobless for more then a year (according to the Eurostat measure of duration).[22]

We focus on transitions between two states: unemployment and employment. From these positions, exits to other destinations are right-censored. About the meetings, we only know whether the evaluation is positive or negative and, in the latter case, we know whether the unemployed has been sanctioned and to what extent. We ignore whether the meetings take place with the same caseworker. No information is available about the content of the individual action plan. Nor do we observe job-search intensity or channels.

4.1 Descriptive statistics

Table 1 reports descriptive statistics. In spite of having population data, the sampled population is not very large. For the continuous variables, we report the average and the standard deviation, for discrete variables the average proportions. Time-varying variables are evaluated at the sampling date. Table 1 reports information with respect to a number of observed characteristics of the unemployed: the age, the gender, the level of education, the household-type determining the benefit level (head of household, single or cohabitant), the type of entitlement (school-leaver or work experience), the presence of one or more children too young to be in kindergarten and the elapsed unemployment duration.[23] The levels of UB vary between 325€ and 1005€. The composition of the populations varies across age groups. The older group is more often made of less educated people and is more likely to be entitled to benefits because of their employment record. Their mean and median elapsed duration at selection is in addition higher. The data set contains gross earnings while we need net earnings. The latter are simulated. As we do not have all the information needed to compute exact income taxation, the model will take measurement errors into account. The bottom of Table 1 presents information about the distribution of their net monthly earnings. The mean and the quartiles are somewhat higher for the older group.

Table 2 gives the number of "treated" observed at the various steps of the AJSB procedure.[24] Only 166 claimants (23%) among those notified takes part to the first meeting, among which a third is negatively evaluated. A third of them (18 claimants) is monitored a second time, among which two claimants are negatively evaluated and hence sanctioned. Finally, one of these two unemployed takes part to the third meeting and escapes the sanction. These low numbers of participants to the monitoring meetings are a matter of concern to which we return in Subsection 5.1.

Figures 2 and 3 summarize the trajectories in the first unemployment and employment spells respectively for the group aged 25-29 and 30-34. The share of those exiting unemployment to employment is bigger in the former group. The share of those leaving unemployment to inactivity is the same in both groups. Inactivity includes sickness, education and training and "subsidized career breaks".[25] Right-censoring occurs because the ongoing spell is interrupted at the end of 2006 but also if the unemployed category changes so that the level of UB changes as well (say, due to a divorce, the recipient is now considered as single). Among those employed, an equal share (54%) returns in unemployment after a job loss that occurs before the end of the observation period.

[22] This measure is defined e.g. by Cockx and Dejemeppe (2007).

[23] The latter measures the number of months spent without interruption in unemployment at selection. This measure does not match the one that is used within the AJSB procedure nor the Eurostat definition.

[24] Notice that 20% of claimants selected do not receive the notification letter. Someone who is no more a UI recipient two months after her selection does not enter AJSB. Second, our samples have been selected retrospectively by the UA in 2006 with the information available at that time. This information is not necessarily the one used in 2004 by the UA. For more information, see p. 9 of Cockx and Dejemeppe (2007). To avoid any misunderstanding, the "treated" in our sample actually received the notification letter.

[25] In Belgium, as employed people, the unemployed can temporarily withdraw from the labor market for family or social reasons.

The meetings with the caseworker occur with a delay that can be substantial. This is illustrated in the case of the first meeting by Figure 4. The latter displays the conditional probability of attending the first meeting (taking right-censoring into account) as a function of the delay between the actual time at wich the meeting takes place and the scheduled moment (8 months). The risk of such a delay will be included in the model. Figure 5 the monthly exit rate from unemployment to employment as a function of the residual duration of the unemployment spell (number of months spent without interruption in unemployment since selection, ignoring elapsed duration). The hazard rate is higher for the younger population but we have seen above that the observed characteristics of the two samples differ. Except for duration-depence, the exit rates display no clear pattern at specific durations. This is not a surprise since on the one hand meetings take place with a delay and on the other forward-looking agents should anticipate the meetings in their behavior.

5 Econometric model

5.1 Specification

We need to specify functional forms for instantaneous utility, the job-offer arrival rate, the cost of search, the wage offer distribution. Considering women and men separately, let $\mathbf{x}$ denote the vector of observed individual characteristics, namely age (in months), the schooling level (dummy variables) and the presence of one or more children younger than 3. In the case of transitions from unemployment to employment, let ν^{ue} denote an additive unobserved heterogeneity term. For the transition from employment to unemployment, this additive term is denoted ν^{eu}. We assume that the distribution of unobserved heterogeneity is discrete with a finite number J of points of support. Adopting a one-factor specification, let

$$\theta_j = \text{Prob}[\nu^{ue} = \nu_j^{ue}; \nu^{eu} = \zeta \cdot \nu_j^{ue}], \text{ with } \sum_{j=1}^{J} \theta_j = 1,$$

where ζ is a parameter to be estimated. Although somewhat restrictive, this specification is widely used in the literature (see e.g. van den Berg, 2001).

We choose the following parametric forms

$$u(y) = y, \quad c\left[s\left(\tau\right)\right] = \exp[\varepsilon \cdot s\left(\tau\right)] - 1, \quad \alpha\left[s\left(\tau\right) \mid \mathbf{x}_i, \nu^{ue}\right] = s\left(\tau\right) \cdot \exp\left[\mathbf{x}_i'\boldsymbol{\gamma} + \nu^{ue}\right]. \tag{18}$$

When the unemployed cohabits with a partner, we do not know the revenue of the latter. By assuming risk neutrality, the latter revenue does not however affect the problem. This is also true for the unobserved non-wage income and for unobserved income unrelated to unemployment insurance (assistance). Instead of assuming a non linear parametric specification for the cost of search and a proportional one for the job arrival rate, we could have made the opposite choice. However, in (18), we cannot identify simultaneously ε and a multiplicative parameter in $\alpha[\cdot]$. This can be shown in a stationary framework (see van den Berg and van der Klaauw, 2006, p. 903) and turns out to be true in the non-stationary one as well . Hence, $\mathbf{x}$ does not contain an intercept and ν_1^{ue} normalized to zero. It should also be understood that the vector $\mathbf{x}$ and ν^{ue} could have been introduced in the cost of search function instead of the arrival rate.

The separation rate is a function of observed characteristics. For convenience we further apply the following re-parameterizations:

$$\varepsilon = \exp\left[\tilde{\varepsilon}\right], \quad \delta\left[\mathbf{x}_i, \nu^{eu}\right] = \exp\left[\mathbf{x}_i'\tilde{\boldsymbol{\delta}} + \zeta \cdot \nu^{ue}\right], \quad \xi = \frac{1}{1 + \exp[\tilde{\xi}]}.$$

We assume that the wage offer density $f(w \mid \mathbf{x})$ is lognormal: $w \sim \mathcal{LN}\left(\mu(\mathbf{x}), \sigma\right)$. Given the transformation of gross into net wages mentioned in Section 4, we consider that observed net wages w^o are measured with error m, i.e. $w^o = w \cdot m$, and the distribution $h(m)$ a unit-mean lognormal distribution,

$m \sim \mathcal{LN}\left(-\omega^2/2, \omega\right)$. Following Christensen and Kiefer (1994), it can then be shown that the density function of observed wages $f_o(w^o \mid \mathbf{x})$ is given by

$$f_o(w^o; \tau \mid \mathbf{x}) = \int_0^{w^o/w_r(\tau)} \frac{f(w^o/m \mid \mathbf{x})}{\bar{F}(w_r(\tau) \mid \mathbf{x})} \frac{1}{m} h(m) dm \tag{19}$$

and is defined over $\Re_+$.

The probability of a negative evaluation at meeting $k \in \{1, 2, 3\}$ is provisionally specified as follows:

$$\pi_k^0 \left[\bar{S}^0 \left(t_k, t_{k-1}\right)\right] = \exp\left[-\beta^0 \cdot \bar{S}^0 \left(t_k, t_{k-1}\right)\right], \text{ with, } \beta^0 \geq 0 \tag{20}$$

$$\pi_k^1 = \exp[-\beta^1], \text{ with, } \beta^1 \geq 0 \tag{21}$$

We have enough observations to estimate β^0 and β_1 on the basis of evaluations at the first meeting. For the two other meetings, due to the lack of observations, we provisionally impose the same specification.

In addition to the parameters appearing above, the unknown structural parameters are the discount rate ρ and the rate q at which the unemployed are instructed to take part to the meetings. Estimation of the discount rate might turn out to be important, in particular since we consider young people. However, for the moment, ρ is set to 0.003 monthly (0.037 on a yearly basis).

5.2 Likelihood function

Our data are discrete. At most one transition can occur per month. We specify the discrete process as in a grouped continuous time model. Let ℓ_e denote the duration elapsed between the month of entry into the unemployment spell and the month of selection in the sample. To deal with initial conditions, we need the marginal survivor function in unemployment until the month of selection, where marginalization is with respect to the distribution of unobserved components. Consider henceforth an individual with observed characteristics $\mathbf{x}$. The marginal survivor function at duration ℓ_e is:

$$\mathcal{S}(\ell_e \mid \mathbf{x}) = \sum_{j=1}^{J} \theta_j e^{-\alpha[s|\mathbf{x},\nu_j^{ue}]\overline{F}(w_r|\mathbf{x})\ell_e} \tag{22}$$

where s and w_r solve the system optimality conditions (5) and (6) in the stationary environment.

Let ℓ_n denote the number of months between selection and notification (often equal to 2). Let ℓ_r denote the residual unemployment duration measured as of the month of notification. Consider first the scheduled interval. Suppose that a transition from unemployment to employment occurs beween month $\ell_e + \ell_n + \ell_r - 1$ and month $\ell_e + \ell_n + \ell_r$. Let $d_1 = 1$ denote that the wage w^o is observed in the data (otherwise, $d_1 = 0$). If the employment duration ends between l_j and $l_j + 1$ months, let $d_2 = 1$. If the employment duration is censored at the end of the observation period, let $d_2 = 0$. Ignoring the superscript e used in the theoretical model and remembering that the unemployed are in stationary environment up to the month of notification, the contribution to the likelihood of such a trajectory is given by:

$$\sum_{j=1}^{J} \theta_j e^{-\alpha[s|\mathbf{x},\nu_j^{ue}]\overline{F}(w_r|\mathbf{x})(\ell_e+\ell_n)} \int_{\ell_e+\ell_n+\ell_r-1}^{\ell_e+\ell_n+\ell_r} \alpha\left[s\left(\tau\right) \mid \mathbf{x}, \nu_j^{ue}\right] \bar{F}\left(w_r\left(\tau\right) \mid \mathbf{x}\right) \left[f_o\left(w^o \mid \mathbf{x}; \tau\right)\right]^{d_1}$$
$$\times \frac{e^{-\int_{\ell_e+\ell_n}^{\tau} \alpha\left[s(z)|\mathbf{x},\nu_j^{ue}\right]\bar{F}(w_r(z)|\mathbf{x})dz}}{\mathcal{S}(\ell_e \mid \mathbf{x})} d\tau \times \left[e^{-\delta\left[\mathbf{x},\zeta\nu_j^{ue}\right]l_j} - d_2 e^{-\delta\left[\mathbf{x},\zeta\nu_j^{ue}\right](l_j+1)}\right] \tag{23}$$

In case of right-censoring during the scheduled interval, the contribution to the likelihood becomes:

$$\sum_{j=1}^{J} \theta_j \frac{e^{-\alpha[s|\mathbf{x},\nu_j^{ue}]\overline{F}(w_r|\mathbf{x})(\ell_e+\ell_n)} e^{-\int_{\ell_e+\ell_n}^{\ell_e+\ell_n+\ell_r-1} \alpha\left[s(\tau)|\mathbf{x},\nu_j^{ue}\right]\bar{F}(w_r(\tau)|\mathbf{x})d\tau}}{\mathcal{S}(\ell_e \mid \mathbf{x})} \tag{24}$$

On the delay interval, there are two competing risks of failure: a job and a meeting. Let T^*_{ue} and T^*_{um} be two latent duration variables respectively for the duration in unemployment with an exit to a job and the duration in unemployment with an exit to a meeting. The sojourn duration in unemployment $T_u = \min_{d\in\{ue,um\}} T^*_d$ and the destination $D_u = \arg\min_{d\in\{ue,um\}} T^*_d$. Let ℓ', $\ell' \leq \ell_r - 1$, denote the duration between notification and the scheduled time of a meeting ($\ell' = 8$ months in the case of the first meeting, 4 months for the others). To write the contributions to the likelihood function,we exploit the property that at most one transition occurs within a month (see Cockx and Ridder, 2001). The contribution to the likelihood on the delay interval when there is a transition from unemployment to employment beween month $\ell_e + \ell_n + \ell_r - 1$ and month $\ell_e + \ell_n + \ell_r$ is:

$$\begin{aligned}
&\sum_j^J \theta_j e^{-\alpha[s|\mathbf{x},\nu^{ue}_j]\overline{F}(w_r|\mathbf{x})(\ell_e+\ell_n)} e^{-\int_{\ell_e+\ell_n}^{\ell_e+\ell'} \alpha\left[s(\tau)|\mathbf{x},\nu^{ue}_j\right]\bar{F}(w_r(\tau)|\mathbf{x})d\tau} \\
&\times \int_{\ell_e+\ell_n+\ell_r-1}^{\ell_e+\ell_n+\ell_r} \alpha\left[s\left(\tau\right) \mid \mathbf{x}, \nu^{ue}_j\right] \bar{F}\left(w_r\left(\tau\right) \mid \mathbf{x}\right) \left[f_o\left(w^o \mid \mathbf{x}; \tau\right)\right]^{d_1} \frac{e^{-\int_{\ell_e+\ell'}^{\tau} q+\alpha\left[s(z)|\mathbf{x},\nu^{ue}_j\right]\bar{F}(w_r(z)|\mathbf{x})dz}}{\mathcal{S}(\ell_e \mid \mathbf{x})} d\tau \\
&\times \left[e^{-\delta\left[\mathbf{x},\zeta\nu^{ue}_j\right]l_j} - d_2 e^{-\delta\left[\mathbf{x},\zeta\nu^{ue}_j\right](l_j+1)}\right]
\end{aligned} \tag{25}$$

If there is instead a transition to a meeting, the contribution to likelihood becomes:

$$\begin{aligned}
&\sum_{j=1}^J \theta_j e^{-\alpha[s|\mathbf{x},\nu^{ue}_j]\overline{F}(w_r|\mathbf{x})(\ell_e+\ell_n)} e^{-\int_{\ell_e+\ell_n}^{\ell_e+\ell'} \alpha\left[s(\tau)|\mathbf{x},\nu^{ue}_j\right]\bar{F}(w_r(\tau)|\mathbf{x})d\tau} \\
&\times \int_{\ell_e+\ell_n+\ell_r-1}^{\ell_e+\ell_n+\ell_r} q \frac{e^{-\int_{\ell_e+\ell'}^{\tau} q+\alpha\left[s(z)|\mathbf{x},\nu^{ue}_j\right]\bar{F}(w_r(z)|\mathbf{x})dz}}{\mathcal{S}(\ell_e \mid \mathbf{x})} d\tau
\end{aligned} \tag{26}$$

Finally, in case of censoring on the delay interval, the contribution is

$$\sum_{j=1}^J \theta_j \frac{e^{-\alpha[s|\mathbf{x},\nu^{ue}_j]\overline{F}(w_r|\mathbf{x})(\ell_e+\ell_n)} e^{-\int_{\ell_e+\ell_n}^{\ell_e+\ell_n+\ell_r-1} \alpha\left[s(\tau)|\mathbf{x},\nu^{ue}_j\right]\bar{F}(w_r(\tau)|\mathbf{x})d\tau} e^{-q(\ell_r-1-\ell')}}{\mathcal{S}(\ell_e \mid \mathbf{x})} \tag{27}$$

6 Estimation results

7 Conclusion

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Figure 2: Spell sample statistics among the "treated"

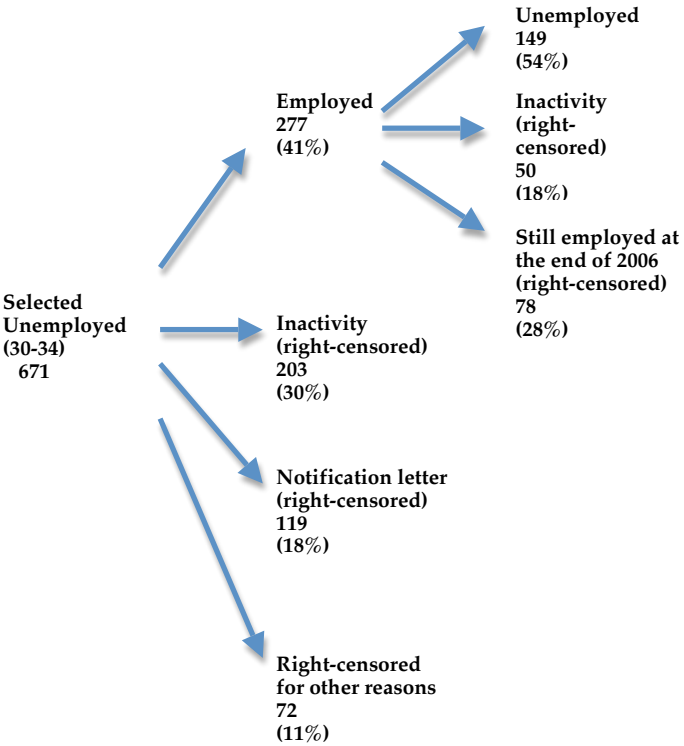

Figure 3: Spell sample statistics among the "controls"

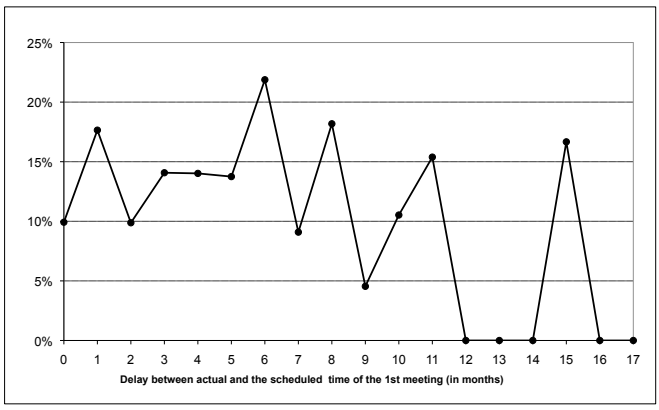

Figure 4: Kaplan-Meier estimate of the discrete hasard to the first meeting.

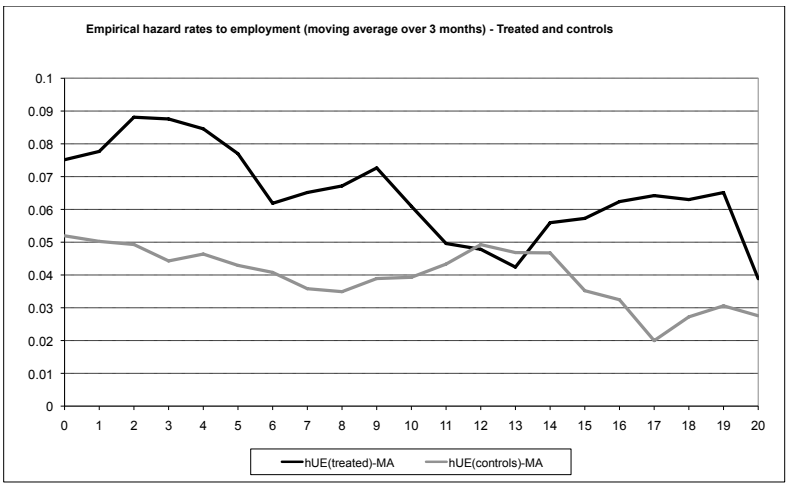

Figure 5: Kaplan-Meier estimates of the monthly hazard rate towards employment for "treated" and "controls" as a function of residual unemployment duration since selection in the sample

Table 1: Descriptive Statistics by Age Group

	25-29 years	**30-34 years**
Number of individuals	908	671
Age		
Mean on July 1, 2004 (years)	26.8	32.1
Standard deviation	(1.4)	(1.4)
Gender		
Women	45.0%	43.7%
Schooling level$^{(a)}$		
Primary or lower secondary	34.9%	45.3%
Upper-secondary	40.0%	40.8%
Higher education	25.1%	13.9%
Type of entitlement$^{(a)}$ **(monthly UB level in 2004€)**		
entitled by work experience	69.4%	97.8%
Head of household ([865€-1005€])	22.1%	44.1%
Single, 2nd period ([725€-835€])	32.9%	43.5%
Cohabitant, 3d period (385€)	14.3%	10.1%
Entitled by schooling	30.6%	2.2%
Head of household (835€)	1.8%	0.4%
Single (595€)	7.2%	0.8%
Cohabitant (325€)	21.7%	1.0%
Presence of children $\leq$ 3 years$^{(a)}$	15.4%	16.0%
Elapsed unemployment duration$^{(a)}$		
Mean (months)	7.7	10.0
Standard deviation	(5.1)	(5.4)
25%	4.0	4.0
Median	5.0	11.0
75%	14.0	15.0
Observed net monthly earnings (1st spell)		
Number of individuals	427	2365
Mean (2004€)	1,199	1,253
Standard deviation	(279)	(295)
25%	1,066	1,136
Median	1,214	1,252
75%	1,358	1,390

(a) At the sample selection date.

Table 2: Steps in the AJSB Procedure in the population 25-29 years old. Numbers and shares *in the population at risk*.

Number of selected individuals	908
Steps of the monitoring procedure	
Notification letter	728
	(80.2%)
First meeting	166
	(22.8%)
in the 1^{st} unemployment spell	122
	(73.5%)
in an unem. spell interrupted by job experiences	44
	(26.5%)
positive evaluation	112
	(67.5%)
negative evaluation	54
	(32.5%)
Second meeting	18
	(33.3%)
positive evaluation	16
negative evaluation	2
Third meeting	1
	(50%)
positive evaluation	1
negative evaluation	0