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Subsidized temporary jobs: lock-in and stepping stone effects*

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June 3, 2009

Abstract

This article evaluates the effectiveness of subsidized temporary jobs as stepping stones to regular employment. We study a French program (*Activité Réduite*) that allows job seekers to work part-time while remaining registered with the unemployment agency. Under this program, insured individuals are allowed to concurrently receive part of their unemployment benefits and wage income. Using an administrative data set, we fit a multivariate duration model correcting for the endogenous nature of the time to treatment, the time in treatment, and the level of the subsidy. We find that subsidized temporary jobs have both a significant lock-in effect and a significant positive post-treatment impact on the hazard rate to employment. Since individuals facing a high implicit tax rate have incentives to self-select into better part-time jobs, we also find that a higher tax rate leads to a weaker lock-in effect and a stronger post-treatment effect. Simulations suggest that the lock-in effect first dominates, but that the overall effect eventually becomes positive. They also point to ways of improving the effectiveness of the policy.

1 Introduction

The efficiency of the labour market crucially depends on the correct allocation of workers to jobs. Usually, the quality of a match is not completely known *ex ante* but must be

*We are grateful to Bruno Crépon, Christian Göbel, David Margolis, Jean-Marc Robin and Joseph Zweimuller for helpful suggestions. We also would like to thank participants at the ESEM 2008, EALE 2008 and JMA 2008 conferences, the Third Workshop on Evaluation of Passive and Active Labour Market Policies, the CREST, CEE, University of Évry, University of Orleans and University Paris 1 - Panthéon-Sorbonne seminars and the Dutch Ministry of Social Affairs for their comments. All remaining errors are ours.

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experienced for a period of time to be fully revealed (Jovanovic (1979)). The idea that a better screening might be achieved though temporary jobs has lately received particular attention (Loh (1994), Nagypal (2001), Boockmann and Hagen (2008)). Under this assumption, fixed-term contracts should facilitate the matching process in the labour market and operate as effective "stepping stones" to permanent employment. Indeed, temporary jobs can be used to reduce employers uncertainty about the employability of job applicants when firing costs are high. At the same time, they allow the unemployed to build up their work experience, prevent skill atrophy and signal their willingness to work. Nevertheless, temporary employment can also crowd out job-search activities and create lock-in effects, thus increasing the duration until a full-time job is found. In a segmented labour market, individuals going through part-time jobs might be caught in temporary employment traps and lower their future chances of entering regular employment. Empirical studies of the effectiveness of fixed-term contracts in providing a better access to regular employment have not succeeded in giving unambiguous results. While Booth, Francesconi, and Frank (2002) for the UK, Lechner, Pfeiffer, Spengler, and Almus (2000) for Germany found evidence of a positive effect of temporary jobs, Autor and Houseman (2005) for the US, Amuedo-Dorantes (2000) for Spain, and Böheim and Weber (2006) for Germany reached the opposite conclusion. Ichino, Mealli, and Nannicini (2008), focusing on methodological issues, argue that the lack of experimental data in Europe and the reliance on matching methods and conditional independence assumptions can sometimes give spuriously positive results.

Partial benefit programs have been implemented in many European countries and North America[1] to foster reintegration into the labour market. The main purpose of those schemes is to encourage unemployed to accept low paid short-term jobs by increasing the related income with additional payments from the UI system. The financial attractiveness of the program heavily depends on the implicit tax rate on wage, which directly affects the take up of temporary work. The ability of such policy designs to maintain sufficient incentives for the participants to actively search for regular employment has, however, often been questioned (Calmfors (1994); McCall (1996)). Indeed, higher replacement rates and prolonged benefit periods associated with these subsidized temporary jobs might produce moral hazard behaviour which could be detrimental to the global efficiency of the program. Besides, there might be a substantial amount of heterogeneity in the "quality" of temporary jobs with respect to human capital accumulation or the willingness of the employer to later hire the unemployed worker for a full time position. Therefore, not all temporary jobs would be effective stepping stones, and governments facing the question of "how much to subsidize", should strike a balance between the share of the unemployed going through temporary jobs and the "quality" of these jobs. The few empirical studies on this subject have mostly found mildly positive

[1]See Munts (1970) and Holen and Horowitz (1974) for early studies of the American partial benefit program.

effects of subsidized temporary employment programs on the transition rate to regular jobs (Gerfin, Lechner, and Stieger (2005) for Switzerland, Cockx, Robin, and Goebel (2006) for Belgium, van Ours (2004) for Slovakia, Kyyrä (2008) for Finland, Kyyrä, Parrotta, and Rosholm (2009) for Denmark).

In this paper, we focus on a French subsidized temporary employment program that allows registered job seekers to concurrently receive part of their UI benefits and wages from short-term and/or part-time jobs known as *Activités Réduites*.[2] Using a rich and unique administrative data set from Unemployment Records, we apply an extension of the "timing of events" method proposed by Abbring and van den Berg (2003) to estimate the causal impact of supplementary benefit receipt and the magnitude of the lock-in effect[3], while accounting for unobserved heterogeneity. Our contribution differs from the previous literature in two important respects. First, the size of the subsidy (or, symmetrically, of the implicit tax rate on wage income) varies between individuals and is perfectly observed in our data set. Unlike most of the programs evaluated in the literature which have a fixed implicit tax rate, this distinctive feature allows us to test whether the unemployed facing more stringent partial benefit rules tend to accept temporary jobs and discuss the sensitivity of participation decisions to financial incentives. Second, detailed information on labour market histories enables us to look not only at the duration of unemployment until a regular job is found, but also the duration until the individuals re-register with the unemployment agency. We can thus evaluate the effet of subsidized temporary employment on both unemployment duration and unemployment recurrence and address the issues of "dead-end" vs. "stepping stone" jobs and temporary employment traps.[4]

Our empirical results show that the partial benefit program involves both a significant lock-in effect and a significant positive post-treatment effect. Both these effects are time-dependant: the lock-in effect gets stronger with time, while the post-treatment effect tends to vanish after a few months. Simulations show that the two effects tend to cancel-out and that the net impact of the program is weak. Other results are also worth highlighting. First, we find strong evidence for a self-targeting effect driven by the level of the subsidy used as an incentive to get the unemployed go through temporary jobs: the larger the subsidy, the lower the "quality" of the temporary job as a stepping stone. Second, individuals with the most unfavorable characteristics experience the strongest treatment effect and the weakest lock-in effect. Our results suggest the following pol-

[2] Hereafter we alternate the expressions "reduced activities" (or RA), "temporary jobs" and "part time jobs" when referring to occasional employment under the French *Activité Réduite* program.

[3] van Ours (2004); van den Berg, Holm, and van Ours (2002) and Zijl, van den Berg, and Heyma (2004) also focus on the lock-in effect, but use indirect methods to measure its size.

[4] The *Activité Réduite* program was studied by Granier and Joutard (1999) who find that it could increase the hazard rate to employment in some specific cases. Their statistical model, however, did not explicitly consider the lock-in effect nor the effect of the implicit tax rate, and their results are therefore difficult to interpret.

icy implications. In order to trigger a positive treatment effect, the employment agency should, paradoxically, not give too strong monetary incentives, which are likely to encourage the unemployed to accept temporary jobs that do not improve their prospects in the labour market. Instead, it should focus on low ability individuals who are estimated to have the highest treatment effect, but are less likely to go through the partial benefits program.

The reminder of this paper is organized as follows. The next section is devoted to a brief presentation of the French partial benefit program. Section 3 describes the data. Section 4 presents the statistical model. Specification and results are discussed in Section 5, and policy simulations are run in Section 6. Section 7 finally concludes.

2 Institutional Features

2.1 The French Unemployment Compensation System

As in most European countries, unemployment compensation in France combines insurance and welfare programs. The Unemployment Insurance system (UI) is funded by contributions from workers and employers and is jointly administrated by representatives of both parts. To qualify for UI benefits, unemployed must register with the local UI agency and be actively searching for work. Additional restrictions require claimants to be under 60, suffer an involuntary job loss and prove at least 4 months of employment in the last 18 months preceding registration. The level of benefits is fully determined by previous earnings. Since the adoption of the *Plan d'Aide au Retour à l'Emploi* in July 2001, benefits are paid at a constant rate and the replacement ratio lies between 57.4% for the highest wages and 75% for the lowest ones. The duration of the entitlement period ranges from 4 to 60 months depending on the age and the employment history of unemployed workers. Non compliance with the eligibility rules is subject to benefit sanctions[5].

The Unemployment Assistance system (UA) is taken on by the State. It grants supplementary income to individuals who have exhausted UI benefits or do not qualify for receiving them. The solidarity allowances are means-tested against household income and require the unemployed worker to prove 5 years of employment within the 10 previous years before the end of employment. Payments are of fixed amount and may last indefinitely. Workers who do not meet eligibility criteria for unemployment compensation benefits can still apply for other labour market minimum income supports (such as RMI for example).

[5]Claimants who do not prove active job search, refuse suitable job offers, fail to keep the local UI agency informed about their personal situation and to show to summons at the employment office or make incorrect declarations about everything that is relevant to the payment of the UI benefits may face a temporary or a permanent full or partial reduction of compensation.

2.2 The *Activité Réduite* program

In order to foster reintegration into the labour market, the French compensatory system authorizes unemployed individuals to work in part-time and/or temporary jobs (the so called *activités réduites*, or reduced activity) while remaining registered with the National Employment Agency[6,7]. The program is mainly (but not exclusively) targeted at insured job seekers, who are allowed to receive simultaneously their unemployment benefits and part of their wages from reduced activity. Operating as a subsidy for the jobs paying less than the replacement income, the program thus intends to prevent the risk of "unemployment traps".

Specific criteria are to be fulfilled for the combination of UI benefits and earnings from reduced activities to be possible[8]. First, the number of hours worked in occasional employment should not exceed 136 hours per month[9]. Second, the corresponding gross earnings should not go beyond 70% of the "reference wage"[10]. When combination is authorized, the job seeker continues to receive a replacement income, except for a number J of days, defined as the ratio of gross earnings from reduced activity W and the daily reference wage X. Unpaid benefits are shifted to the future[11]. In a given month, the total earnings of an unemployed involved in reduced activity can be written as follows:

$$R = W + b(n - J) = W + b(n - \frac{W}{X}) = nb + (1 - q)W \tag{1}$$

where b denotes the daily amount of unemployment benefit, n is the number of days in the month and $q = b/X$ is the replacement rate. Equation (1) shows that the rule governing benefit payments for individuals involved in reduced activity can be seen as setting an implicit marginal tax rate on wage income while paying full benefits. The total income R generated by this program is always larger than the unemployment benefits, making the program financially attractive for participants[12,13]. To control that involve-

[6] The reduced activity scheme was introduced in 1986 by the French Unemployment Insurance Fund (UNEDIC). Prior to this date, any paid work resulted in suspension of the entitlement to unemployment benefits.

[7] The definition of unemployment used in this paper thus differs from the ILO standards in the sense that people are recorded as job seekers as long as they meet the requirements of the National Employment Agency.

[8] The program explicitly forbids reduced activity contracts with the former employer.

[9] Which amounts to 86% of a full time job.

[10] The "reference wage" is the mean of the individual's wages during the previous 12 months. It is used by the employment agency to calculate the level of unemployment benefit the job seeker is entitled to.

[11] When combination is not authorized, unemployment benefits cannot be collected, but the entitlement period is still maintained and delayed in time.

[12] Uninsured individuals have $b = q = 0$, so that their total income is $R = W$, the wage gain from reduced activity.

[13] The program is also attractive for the placement office which "saves money" by paying less than the

ment in reduced activity does not become permanent, a third additional restriction limits the accumulation of unemployment benefits with earnings from reduced activity to 18 months within the same unemployment spell[14].

Job seekers who do not collect unemployment benefits can also gain from participating in the program. Temporary jobs give them the opportunity to reload their entitlement to unemployment insurance without going through a heavy and time consuming procedure of deregistration/re-registration with the employment agency. Besides, the dual status of unemployed/worker allows them to keep using public services (such as job and training offers, monitoring and personalized follow-up) while searching for regular employment.

Between 1995 and 2005, the number of unemployed involved in reduced activity has more than doubled and reached 1 212 999 individuals (32.6% of registered job seekers) by June 2005[15]. This evolution appears even more spectacular when considering benefit recipients only. The number of insured individuals going through the program has been multiplied by 3.5 over the same period and reached 837 800 persons (34.8% of benefit recipients) by June 2005. On average, participants have worked 97 hours and earned 1076 euros per month.

3 Data

The empirical analysis is based on two matched administrative data sets: i) the *Fichier Historique Statistique* (from the National Employment Agency) which covers all registered unemployed individuals since 1993[16] and contains exhaustive information on labour market histories, socio-demographic characteristics and, most importantly, reduced activity participation; and ii) the *Segment D3* (from the Unemployment Insurance Fund) which provides some supplementary information on benefits recipients' financial situation such as the previous wage, the replacement ratio (i.e. the implicit tax rate associated with reduced activity), and the duration of the entitlement period. We have a precise knowledge of the timing of events during the unemployment spell, i.e., we observe the exact date of inflow into and outflow out of the register. In order to cope with possible inconsistencies in unemployment registration, we assume that unemployment periods less than one month apart belong to the same spell. Unemployment spells can end through the take up of a new job, withdrawal of the labour force or deregistration for administrative reasons. This latter type of exit can be viewed as non random censoring

regular unemployment benefits.

[14] Since January 2006, the threshold for reduced activity participation was brought down to 110 hours monthly and the duration of authorized earnings accumulation was limited to 15 months.

[15] As a comparison, the share of unemployed involved in training is roughly 10%.

[16] According to Chardon and Goux (2003) estimation based on labor force surveys, 90% of ILO-unemployed would also register at the employment offices.

and will therefore be dealt with in the statistical model.

From the database, we extract a random sample of unemployed who registered between July and December 2001. Job seekers are observed until December 2004. In order to focus on a homogeneous sample, we make a number of additional sample restrictions. First, we drop disabled job seekers as well as people classified as "non immediately available for work". We also exclude people over fifty-five years of age at the time of registration and censor spells when individuals reach that age and become eligible to special programs for older job seekers. Lastly, we eliminate benefit recipients who are covered by a different set of unemployment compensation regulations[17]. The final sample consists of 18 258 spells (among which 7 682 include a period of reduced activity) corresponding to 10 020 individuals. We censor ongoing spells at 36 months because information becomes less reliable after three years. Note that individuals can appear in our sample of job losses multiple times.

Table 1 provides a more precise description of our sample. Table 2 gives descriptive statistics for the main explanatory variables measured at time $t = 1$, first for all spells, then separating completed and censored spells.

Table 1: Sample description

	N	Censored	Exiting	Mean length
Individuals	10020			
Unemployment spells	18258	13212	5046	9.446
To Attrition	18258	9484	8774	9.446
To RA	18258	10576	7682	5.829
In RA	7682	345	7337	3.730
Employment spells	5046	2339	2707	15.447

4 Statistical model

4.1 A multivariate duration model

We wish to assess the impact of the occurrence of *activité réduite* jobs on two dimensions: (a) the duration of the ongoing unemployment spells; and (b) the duration of the subsequent employment spells for individuals exiting to employment. With respect to the first dimension of our evaluation, RA is a dynamically assigned treatment in the sense that it occurs at time t_r after the start of the unemployment spell. In the general case, the timing of entry into RA and the length of the RA spell cannot be assumed to be independent from the unemployment and employment durations. For example,

[17] such as the *intermittents du spectacle* in the entertainment industry.

Table 2: Sample statistics, unemployment spells

	All spells		**Completed spells**		**Censored spells**	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Woman	0.505	0.5	0.504	0.5	0.506	0.5
Age	31.069	9.657	31.347	9.5	30.962	9.714
French national	0.898	0.303	0.937	0.243	0.883	0.322
Couple	0.355	0.478	0.371	0.483	0.349	0.477
Has children	0.361	0.48	0.353	0.478	0.365	0.481
Local unemp. rate	9.428	2.336	9.185	2.331	9.52	2.331
Cum. unemp.	14.195	14.769	12.148	13.853	14.977	15.031
Primary educ.	0.176	0.381	0.117	0.321	0.198	0.399
Secondary educ.	0.382	0.486	0.367	0.482	0.388	0.487
Vocational educ.	0.233	0.423	0.242	0.428	0.23	0.421
Tertiary educ.	0.209	0.406	0.274	0.446	0.184	0.387
UI	0.545	0.498	0.673	0.469	0.496	0.5
Replacement rate	0.321	0.326	0.412	0.313	0.286	0.325
RMI	0.077	0.267	0.031	0.174	0.095	0.293
First entry	0.051	0.22	0.047	0.212	0.053	0.223
Fired	0.125	0.331	0.138	0.345	0.12	0.325
Quit	0.059	0.236	0.056	0.231	0.06	0.237
End of contract	0.483	0.5	0.578	0.494	0.446	0.497
Other reasons	0.282	0.45	0.18	0.384	0.321	0.467

individuals with higher savings or unearned income might be less keen on applying to a tempopary job and, at the same time, have a lower exit rate to employment (Bloemen, 2002). On the other hand, highly skilled individuals with a high exit rate out of unemployment might not wish to get a temporary job that will not improve their human capital, nor their social network. These (or other) unobserved characteristics might also influence their subsequent employment spell. Ignoring such unobserved characteristics creates a selectivity bias and one therefore has to model the timing of RA spells jointly with the other processes under study. Likewise, the time spent in temporary jobs is likely to be correlated with the rate of entry into the program and with the re-employment hazard and must also be modeled jointly. The empirical evaluation of dynamically assigned treatments has been the subject of a growing literature since Abbring and van den Berg (2003) provided a proof of identification of such effects in a multivariate duration models framework (also see Heckman and Navarro (2007) for a more general approach). In this Section, we first present the joint modeling of unemployment spells, time to treatment and time in treatment and then introduce the employment duration and non random attrition processes. Finally, we detail likelihood construction and the specification of the heterogeneity distribution.

Unemployment duration, time to treatment and time in treatment Let T_u be a non-negative random variable measuring the duration of unemployment. Similarly, let T_r and $T_{\bar{r}}$ be random variables measuring the duration until a RA job is found and the duration of that RA job, respectively. Denote by X and V two vectors of individuals characteristics, where only X is observed by the econometrician. We assume that the joint distribution of T_u, T_r and $T_{\bar{r}}$ may only differ between individuals through differences in X and V.

Following Abbring and van den Berg (2003), we adopt a time to event approach where the causal effect of reduced activity on unemployment duration is modeled through the effect of the realization of T_r and $T_{\bar{r}}$ on the distribution of T_u. These distributions can be characterized in terms of their hazard rates $\theta_r(t|x,V)$, $\theta_{\bar{r}}(t|x,V)$ and $\theta_u(t|t_r,t_{\bar{r}},x,V)$. We further assume that the realization of t_r only affects the hazard $\theta_u(t|t_r,t_{\bar{r}},x,V)$ for $t > t_r$; and the realization of $t_{\bar{r}}$ affects θ_u for $t > t_r + t_{\bar{r}}$. This "no anticipation" assumption rules out that reduced activity affects exit from unemployment before individuals actually enter reduced activity. We argue that this assumption is likely to hold in our context since it is difficult for the unemployed to predict at which date they will find a job that satisfies RA requirements[18]. We specify the hazard rates to have a Mixed Proportional Hazard (MPH) form:

$$\theta_r(t|x,V) = \lambda_r(t)\exp(x\beta_r)V_r \tag{2}$$

$$\theta_{\bar{r}}(t|x,V) = \lambda_{\bar{r}}(t)\exp(x\beta_{\bar{r}})V_{\bar{r}} \tag{3}$$

and

$$\theta_u(t|t_r,x,V) = \lambda_u(t)\exp(x\beta_u + \delta(t|t_r,t_{\bar{r}},x,V_\delta))V_u \tag{4}$$

where $\lambda_u(t)$, $\lambda_r(t)$ and $\lambda_{\bar{r}}(t)$ are the baseline hazard rates for T_u, T_r and $T_{\bar{r}}$. V_u, V_r and $V_{\bar{r}}$ are subsets of V affecting the hazard out of unemployment, to reduced activity and out of reduced activity, respectively. $\delta(t|t_r,t_{\bar{r}},x,V_\delta)$ is a function that will capture the causal effect of reduced activity on the hazard out of unemployment. Since we conjecture that reduced activity is likely to create a lock-in effect when the unemployed are working part-time, and a potential stepping stone effect after the part-time job ends, we further specify $\delta(t|t_r,t_{\bar{r}},x,V_\delta)$ as follows:

$$\delta(t|t_r,t_{\bar{r}},x,V_\delta) = \delta_1(t|t_r,t_{\bar{r}},x,V_\delta)I\{t\in(t_r,t_r+t_{\bar{r}})\} + \delta_2(t|t_r,t_{\bar{r}},x,V_\delta)I\{t > t_r+t_{\bar{r}}\}$$

[18]Note that the non anticipation assumption does not require individuals to have no knowledge of the magnitude of the treatment effect they might face, nor to have no knowledge of the precise timing of entry into treatment, but that they do not modify their behaviour before t_r.

where $I\{.\}$ is an indicator function taking the value one if the condition in curly braces is satisfied, and zero otherwise. $\delta_1(.)$ will thus capture the effect of being in a reduced activity job on the hazard rate out of unemployment, and $\delta_2(.)$ will capture the effect of having experienced a reduced activity spell earlier in the unemployment spell. V_δ is an unobserved heterogeneity component that affects the way RA impacts the hazard rate out of unemployment. Allowing the treatment effect to depend on an unobserved heterogeneity term as well as on observed variables enable us to correctly estimate the evolution of the treatment effect with respect to time since treatment. Indeed, a mover-stayer bias might occur if the variation of the distribution of V_δ among survivors as time unfolds (high V_δ individuals quickly leaving unemployment after RA) is confounded with a decrease in the treatment effect with time (Richardson and van den Berg, 2006).

It is well known that, due to dynamic sorting effects, the distribution of V_r among those who enter RA at t_r will differ from its population distribution. Indeed, individuals with high V_r will tend to enter RA earlier that individuals with low V_r. If V_r and V_u are dependent, then the distribution of V_u for people entering RA at a given time will differ from the distribution of V_u for individuals not in RA. Similarly, if V_u and $V_{\bar{r}}$ are not independent, then the distribution of V_u among people in RA will differ from its population distribution. Therefore, one cannot infer the causal effect of RA on T_u from a comparison of the realized unemployment durations of those who entered RA at t_r and exited RA at $t_r + t_{\bar{r}}$ with the rest of the population, because one would then mix the causal effect of RA on unemployment duration with the difference in the distribution of V_u between these individuals. In this case, $I\{t \in (t_r, t_r + t_{\bar{r}})\}$ and $I\{t > t_r + t_{\bar{r}}\}$ will be endogenous, and T_u, T_r and $T_{\bar{r}}$ have to be modeled jointly to account for the dependance of the unobserved heterogeneity terms. Therefore, we allow V_u, V_r and $V_{\bar{r}}$ to be correlated. Moreover, V_δ is allowed to be correlated to the other heterogeneity components of V. In other words, we allow the size of the treatment effect to be correlated with the unobserved characteristics governing the exit rate from unemployment. Moreover, the inclusion of unobserved heterogeneity in the treatment effect will allow us to correct for the potential endogeneity of explanatory variables in δ_1 and δ_2.

Unemployment recurrence Our data set allows us to observe individuals re-entering registered unemployment after a previous unemployment spell has ended. Since RA might affect the kind of job unemployed individuals can make a transition to, we also model unemployment recurrence as a fourth duration process denoted T_e. The corresponding hazard rate is given by:

$$\theta_e(t|x,z,V_e) = \lambda_e(t)\exp(x\beta_e + z\gamma)V_e$$

where V_e are the individuals' unobserved characteristics affecting unemployment recurrence; z contains variable summarizing the individual's situation with respect to RA during the previous unemployment spell (occurrence of an RA spell, end of the unemployment spell during or after the RA spell). γ is a conformable vector of coefficients that will measure the impact of RA on unemployment recurrence and, indirectly, on the "quality" of jobs found via reduced activity. Again, V_e is allowed to be correlated with the other elements of V.

Non-random censoring Our data set is an extract from administrative records. It has the advantage of being less subject to measurement errors than traditional survey data, but has the drawback of suffering from relatively large rates of attrition. To remain registered with the employment agency, individuals must send a monthly statement on their situation with respect to employment. Failure to send the statement, or to show up to appointments with caseworkers leads to a de-registration of the unemployed with the employment agency, and thus to attrition in the data set. Other causes of de-registration include job or training refusals, as well as search efforts deemed insufficient by the caseworker. Because this attrition is most likely non random, one cannot treat it as standard censoring. To control for its non-random nature, we chose to model it as an additional dependant competing risk. Let T_c be the random variable of time until non-random censoring. The corresponding hazard rate is:

$$\theta_c(t|x, V_c) = \lambda_c(t)\exp(x\beta_c)V_c$$

where V_c are the unobserved characteristics affecting time to non-random censoring. As before, V_c is allowed to be correlated to the other elements of V.

Likelihood function Let $c_h, h = u, r, \bar{r}, e, c$ equal 0 if duration T_h is censored, and 1 if it is completed. Moreover, let $o_{\bar{r}}$ equal 1 if a spell in RA is observed and 0 otherwise. Similarly, let o_e equal 1 if an employment spell is observed, and zero otherwise. We can write the likelihood of an individual's observed labour market spell[19], conditional on X and V as:

$$l(t_u, t_r, t_{\bar{r}}, t_e, t_c|x, V) = l_u l_r l_{\bar{r}}^{o_{\bar{r}}} l_e^{o_e} l_c \tag{5}$$

where

$$l_u = \theta_u(t|t_r, x, V_u, V_\delta)^{c_u}\exp\left(-\int_0^\infty \theta_u(t|t_r, x, V_u, V_\delta)\,dt\right)$$

$$l_r = \theta_r(t|x, V_r)^{c_r}\exp\left(-\int_0^\infty \theta_r(t|x, V_r)\,dt\right)$$

$$l_{\bar{r}} = \theta_{\bar{r}}(t|x, V_{\bar{r}})^{c_{\bar{r}}}\exp\left(-\int_0^\infty \theta_{\bar{r}}(t|x, V_{\bar{r}})\,dt\right)$$

[19] Here, the term "labour market spell" refers to one unemployment spell (including time to treatment, in treatment and to non-random censoring), and possible subsequent employment spells.

$$l_e = \theta_e(t|x,z,V_e)^{c_e} \exp\left(-\int_0^\infty \theta_e(t|x,z,V_e)\,dt\right)$$
$$l_c = \theta_c(t|x,V_c)^{c_c} \exp\left(-\int_0^\infty \theta_c(t|x,V_c)\,dt\right)$$

Multiple spells For some individuals, we observe multiple labour market spells. In this case, we make the assumption that the individual's unobserved characteristics V remain constant across all spells. This allows us to relax some identifying assumptions of the single-spell model. In particular, identification with multiple spells does not require that V be independent of X, an hypothesis that is often hard to justify in empirical studies (van den Berg (2001)). Denoting $t_{h_1}...t_{h_S}$, $h = u,r,\bar{r},e,c$ the S observed spells of a given individual; his (conditional) likelihood can be written as:

$$l(t_{u_1}\dots t_{u_S}, t_{r_1}\dots t_{r_S}, t_{\bar{r}_1}\dots t_{\bar{r}_S}, t_{e_1}\dots t_{e_S}, t_{c_1}\dots t_{c_S}|x,V) = \prod_{s=1}^{S} l_s(t_{u_s}, t_{r_s}, t_{\bar{r}_s}, t_{e_s}, t_{c_s}|x,V) \quad (6)$$

where l_s is defined as in (5).

Finally, we must integrate (6) over the distribution of the unobserved characteristics V to get the individual's unconditional (on V) likelihood :

$$l(t_{u_1}\dots t_{u_S}, t_{r_1}\dots t_{r_S}, t_{\bar{r}_1}\dots t_{\bar{r}_S}, t_{e_1}\dots t_{e_S}, t_{c_1}\dots t_{c_S}|x) = \int l(t_{u_1}\dots t_{u_S}, t_{r_1}\dots t_{r_S}, t_{\bar{r}_1}\dots t_{\bar{r}_S}, t_{e_1}\dots t_{e_S}, t_{c_1}\dots t_{c_S}|x,V)\,dG(V) \quad (7)$$

where $G(V)$ is the joint distribution of V_u, V_r, $V_{\bar{r}}$, V_e, V_c and V_δ

4.2 Specification of the heterogeneity distribution

Allowing for a fully non-parametric distribution for V *à la* Heckman and Singer (1984) would be computationally challenging since the number of parameters increases sharply with the number of mass points and of dimensions. We instead chose to specify $G(V)$ as a two-factor loading distribution. More specifically, we define

$$V_h = \exp(a_h U_1 + b_h U_2)$$

for $h = u,r,\bar{r},e,c$

Here, U_1 and U_2 are the two factors that enter every duration. We impose a scale normalization by assuming that U_1 and U_2 are independently distributed on $\{-1,1\}$

with probabilities $\Pr(U_1 = 1) = p_1$ and $\Pr(U_2 = 1) = p_2$. The covariance matrix of the factors, $Var(U)$, is a diagonal matrix where the i$^{\text{th}}$ diagonal element is $4\left(p_i - p_i^2\right)$. Moreover, to ensure identification, we restrict $b_k = 0$, for some $k \in \{u, r, \bar{r}, e, c\}$. This specification imposes some constraints on the covariance structure of V, but nevertheless allows the correlation coefficients between V_k, and $V_{k'}$ to span the whole interval $[-1, 1]$, while reducing the dimensionality of the model[20]. The covariance matrix of V can easily be computed from the parameters of the factor loading specification. The log-transformed terms are $w = \log(V) = \Xi U'$, where Ξ is the 5×2 matrix formed by the coefficients a_k and b_k; and $U = (U_1, U_2)$. The covariance matrix of w is then $Var(w) = \Xi Var(U) \Xi'$. For computational tractability, V_δ, the heterogeneity parameter of the treatment effect, is specified as a linear function of $\ln(V_u)$:

$$V_\delta = \alpha \ln(V_u)$$

and V_δ is entered additively in $\delta(t|t_r, t_{\bar{r}}, x, V_\delta)$.

5 Specification and results

5.1 Specification

As highlighted in Section 2.2, the main parameter governing the reduced activity program is the implicit tax rate on wage income. This implicit tax rate is equal to the individual's replacement rate, as shown in Equation (1). In our data, we observe this quantity for each individual in each period. The replacement rate/tax rate is likely to have an impact on the processes under study. Indeed, the level of the implicit tax rate determines the incentives to find a temporary job that would act as an effective stepping stone. Consider an individual pondering whether to enter reduced activity. The costs of doing so consist of labour disutility, and of the potential lock-in effect of RA. The benefits consist of the increase in income stemming from wage gain, and of the potential post-treatment increase in the re-employment hazard. Our representative individual will only enter RA if the benefits of doing so outweigh the costs. Since the wage gain from reduced activity is negatively related to the implicit tax rate, individuals facing a high tax rate will only enter reduced activity if they expect a positive treatment effect from that job. Due to this self-targeting mechanism, we expect that individuals facing high marginal tax rates will search for "good" temporary jobs and will refuse offers failing to provide adequate human capital accumulation and/or prospects for permanent hire. The tax rate should therefore have a negative effect on the hazard into RA, and a positive impact on the treatment effect of RA.

We are interested in the variation of the treatment effect of reduced activity on the exit rate out of unemployment along several dimensions. First, the effect of RA might

[20] See Bonnal, Fougère, and Sérandon (1997) for an example of such a specification.

differ for individuals who are currently in reduced activity compared to those who have left RA. Second, within each of the previous cases, the effect can differ with time spent since entry into RA, or since having left RA. We thus define δ_1 and δ_2 as follows. We first divide time in treatment into two sub-periods of, respectively, less than 3 months and more than three months in RA. The post-treatment period is itself divided in three sub-periods: less than three months after the end of the RA spell, between 3 and 6 months after the end of the RA spell, and more than 6 months after. The corresponding dummy variables are then interacted with the replacement rate/tax rate at the date of entry into RA to account for the potential self-targeting mechanism described above. The replacement rate, however, is not an exogenous variable. Its level depends on the "reference wage" while the entitlement period is determined by the duration of the previous employment period, as well as by the age when entering unemployment. The first two determinants are likely to be correlated to the level of human capital and overall "employability" of the unemployed. Those could in turn affect the treatment effect if, for example, individuals with better skills were more keen of taking advantage of temporary jobs to signal their high ability to potential employers. Since the replacement rate is negatively related to the previous wage (arguably a proxy for the individual's ability), then the estimated self-targeting effect of the tax rate will be biased downwards if one does not control for the unemployed's ability. Recall from Equation (4) that the treatment effect includes an unobserved heterogeneity term, V_δ, which is potentially correlated with all the other heterogeneity terms of the model (notably those governing the exit rate out of unemployment, and out of employment). Moreover, since our database includes multiple spells, we can relax the assumption of independence between the covariates and unobserved heterogeneity. This unobserved heterogeneity term will capture the unobservable characteristics correlated with the individual's overall ability (and thus with the replacement rate) that might affect the magnitude of the treatment effect. We thus argue that, if the replacement rate/tax rate is correlated to individual characteristics which influence upon the treatment effect, then these characteristics will be controlled for by this unobserved heterogeneity component that will remove any potential bias in the parameter attached to the replacement/tax rate.

For the equations governing the transition out of unemployment, into treatment and out of employment, we specify a piecewise constant baseline hazard on the following time intervals: $[0,2]$, $]2,4]$, $]4,6]$, $]6,9]$, $]9,12]$, $]12,18]$, $]18,24]$ and $]24,36]$. Spells of reduced activity are typically short (3.6 months on average) and the majority of individuals spend only one month in RA. Therefore, for this equation, we specify a somewhat more constrained baseline hazard, which is piecewise constant in the following intervals: $[0,1]$, $]1,3]$ and $]3,36]$. In the tables of results, the dummies defining the baseline hazard are labeled d1 to d8 (d1 is omitted for identification reasons), and are defined as above.

The treatment effect of reduced activity on the exit rate out of employment (unemployment recurrence) is modeled through a dummy variable taking the value 1 if the individual has experienced an RA spell in his previous unemployment spell, and zero otherwise. To allow for a different effect of RA on the length of the subsequent employment spell according to the replacement rate, we also include an interaction variable between the dummy for the presence of an RA spell, and the level of the replacement rate/tax rate in the beginning of the RA spell. Finally, we include an additional dummy variable indicating whether the individual exited unemployment while in RA, as well as a variable for the length of the RA spell.

Control variables are sex, age, education, nationality, household structure and cumulative unemployment during the last five years. We also control for the reason of entry into unemployment and for receipt of unemployment benefit and a French guaranteed minimum income benefit, the RMI (Terracol (2009)). Local macroeconomic conditions are controlled for *via* the local unemployment rate. In addition to the dummy for UI receipt, we also include the level of the replacement rate[21]. In the employment duration equation, we also add the length of the previously observed unemployment spell to control for the correlation between the two (Belzil, 2001). All variables are (potentially) time-varying.

We estimates four versions of the model. Model (1) only includes the unemployment and attrition durations[22]. Model (2) introduces the time to treatment; Model (3) further introduces the length of the RA spell and Model (4) is the full model described in equations (5) and (7).

5.2 Results

Table 3 presents the estimated parameters of the treatment effects for models (1), (2), (3) and (4). To save space, Table 4 presents the estimated coefficients of the control variables for model (4) only. Factor loadings are displayed for all models in Table 5. Finally, Table 6 presents the estimated covariance matrix of the log heterogeneity terms for model (4). Using coefficients from Model (4), we find that the lock-in effect is small (-14%) and insignificant in the first three months for non UI recipients, then increases to -76% after three months. The effect of the replacement rate/tax rate is positive and significant for both subperiods. For UI recipients with a 75% replacement rate, the initial lock-in effect is in fact slightly positive (+9%), and then drops to -45%. Estimated coefficients show a clear and significant stepping stone effect after individuals leave reduced activity. For non UI recipients, the hazard rate is multiplied by 1.43 in the first three months after RA, then drops to insignificant levels. Again, the impact of the

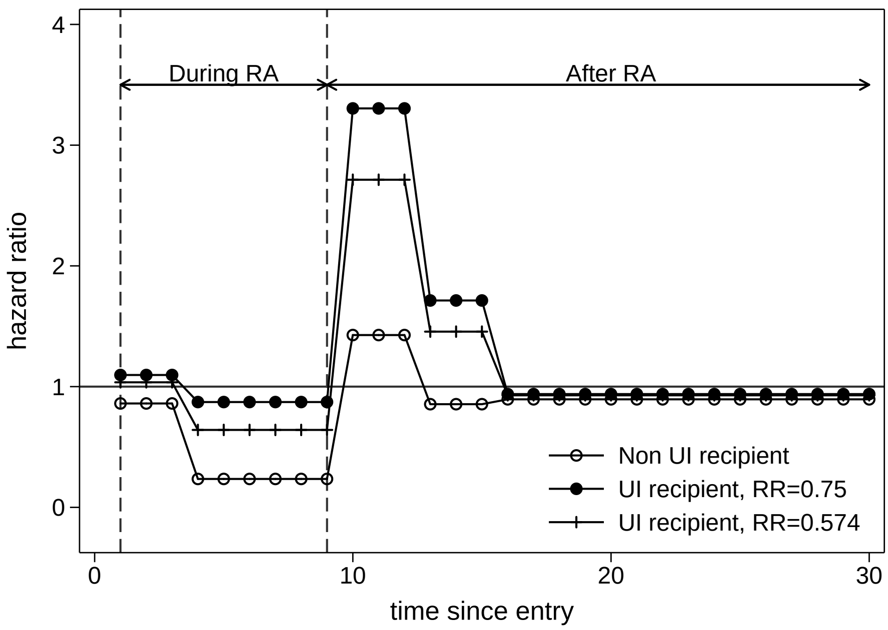
[21]The reader should keep in mind that, although the replacement rate is always defined in the same way, its interpretation vary according to the equation in which it is entered. In the treatment effect equations and in the equation for entry into RA, the replacement rate should be interpreted as the implicit tax rate on additional wage, whereas it should elsewhere be interpreted as the replacement rate.

[22]The timing of entry into treatment and the length of the RA spell are thus assumed exogenous.

tax rate is positive and significant for the first two subperiods after the end of RA. For UI recipients (replacement rate=75%), the initial increase reaches 230%, then 71% and stabilizes at the statistically insignificant level of -6%. Figure 1 presents those results in a more readable way. It shows the hazard ratio for an individual staying 9 months in RA (time is normalized such that the date on entry into RA is zero). The replacement rates are set to zero, 57.4% and 75%, the lowest and highest replacement rates for UI recipients in France.

Substantial unobserved heterogeneity is present in the treatment effect. The estimated parameter of treatment effect heterogeneity, $\hat{\alpha}$, is significant in all four specifications, and ranges between -0.13 and -0.3. The size of the treatment effect is thus negatively correlated with the heterogeneity term affecting exits from unemployment, which implies that the gain from reduced activity is higher for individuals with unfavorable unobserved characteristics. One implication is that employment agencies should target the latter type of individuals and encourage them to enter reduced activity.

Figure 1: Estimated hazard ratios, full model



These results are fully consistent with our hypothesis that unemployed individuals self-select into different part-time jobs according to the implicit tax rate they face. When the tax rate is high, they are less likely to make a transition to reduced activity jobs[23],

[23]The coefficient attached to the replacement ratio in the equation for the duration until treatment is -1.148 and is significant at the 1% level (see the third column of Table 4).

but the jobs they find have a substantially more positive impact on their transition rate to employment. This highlights the trade-off faced by policymakers when deciding on the marginal tax rate to be applied to the additional wage income: a willingness to drive more unemployed to work part-time by reducing the tax rate will lower the quality of the part-time jobs they find. Conversely, inducing individuals to find better part-time jobs will lower the proportion of unemployed that apply for such jobs in the first place. Section 6 will use simulations to explore this trade off.

Turning now to the effect of temporary jobs on the duration of subsequent employment spells, our estimates indicate that the program does not have any significant impact on the "quality" of the jobs found by former participants in the program.

Unsurprisingly, the unobserved characteristics affecting exit to employment are positively and significantly related to both those affecting entry into, and exit from RA. In other words, individuals that tend to have shorter RA spells, earlier in their unemployment spell, also tend to have a higher exit rate from unemployment. As a consequence, estimates from model (1) might be biased and give a larger treatment effect than more complete models.

Table 3: Heterogenous treatment effects

	Model (1)	Model (2)	Model (3)	Model (4)	
	U.→E.	U.→E.	U.→E.	U.→E.	E.→U.
	Coeff. (Std. Err.)	**Coeff.** (Std. Err.)	**Coeff.** (Std. Err.)	**Coeff.** (Std. Err.)	**Coeff.** (Std. Err.)
In RA for less than 3 months	-0.313^{**} (0.097)	-0.391^{**} (0.100)	$-0.186^{\dagger}$ (0.097)	-0.150 (0.097)	
In RA for more than 3 months	-1.761^{**} (0.188)	-1.94^{**} (0.191)	-1.473^{**} (0.187)	-1.446^{**} (0.188)	
In RA for less than 3 months * RR	0.387^{*} (0.172)	0.390^{*} (0.171)	$0.309^{\dagger}$ (0.171)	$0.323^{\dagger}$ (0.170)	
In RA for more than 3 months * RR	1.820^{**} (0.320)	1.849^{**} (0.318)	1.735^{**} (0.312)	1.746^{**} (0.312)	
First 3 months after RA	0.383^{**} (0.074)	0.269^{**} (0.078)	0.327^{**} (0.077)	0.356^{**} (0.079)	
From 3 to 6 months after RA	-0.002 (0.130)	-0.166 (0.133)	-0.179 (0.133)	-0.157 (0.134)	
More than 6 months after RA	0.118 (0.109)	-0.083 (0.111)	-0.127 (0.110)	-0.111 (0.111)	
First 3 months after RA * RR	1.131^{**} (0.113)	1.116^{**} (0.111)	1.106^{**} (0.109)	1.119^{**} (0.108)	
From 3 to 6 months after RA * RR	0.945^{**} (0.226)	0.934^{**} (0.226)	0.915^{**} (0.225)	0.928^{**} (0.225)	
More than 6 months after RA * RR	0.171 (0.183)	0.166 (0.177)	0.055 (0.179)	0.063 (0.178)	
Was in RA when exited from unemp.					0.003 (0.068)
Had an RA spell					-0.033 (0.064)
Had an RA spell * RR					0.005 (0.094)
Time spent in RA					0.008 (0.007)
α	-0.134^{**} (0.048)	-0.214^{**} (0.047)	-0.280^{**} (0.042)	-0.305^{**} (0.041)	

Significance levels : †: 10%; ∗: 5%; ∗∗: 1%
Note: RR stands for Replacement Ratio

5.3 Model fit

In this section, we evaluate the capacity of the model to reproduce the main features of the data. To do so, we simulate a data set using the estimated parameters of the full model. To run our simulation, we draw from the empirical distribution function of the observed explanatory variables in our sample at time $t = 1$. We then compute the evolution of these covariates for 36 months in the following way. Characteristics such as sex, education, household structure, nationality, RMI receipt, local unemployment rate, cumulative previous unemployment and reason for entry into unemployment are assumed to be constant over time. Age at each month is trivially computed from age at $t = 1$. For UI benefit, we use information on the number of months the individual is entitled to, and assume he receives it for as long as his entitlement period runs. The replacement rate is set to its first month value, and then to zero when UI benefits run out. We further draw from the estimated joint distribution of the heterogeneity terms from the full model. We then use the estimated coefficients of Model (4) to simulate the duration processes to reduced activity, in reduced activity and in unemployment. Furthermore, we simulate time to attrition, and censor the previously generated durations accordingly. Finally, we simulate the employment durations of the individuals for whom we had simulated an exit to employment. Figure 2 compares the Nelson-Aalen hazard estimates of the true and simulated data separately for the five duration processes under study and shows that our model is able to closely replicate the marginal distributions of the true data.

6 Simulations

The overall effect of reduced activity depends in a complex way on the estimated treatment effects, their interactions with the baseline hazard and the evolution of the distribution of observed and unobserved characteristics among the survivors at each point in time. The efficiency of the program is thus assessed by means of simulations ran as described in Section 5.3. Since we are interested in the true distribution of the unemployment duration, and not in the (non randomly) censored one, we do not include the attrition process in this section's simulations.

Two quantities might be of interest to the policymaker. The first is the difference in the proportion of a cohort of unemployed that have left unemployment after t months when RA is available, compared to when it is not. It is similar to the "intention to treat" parameter. Following Crépon, Dejemeppe, and Gurgand (2005), we define it as:

$$IT(t) = \int_x \left(\Pr\left(t_u < t | x, \delta(t) = \hat{\delta}(t)\right) - \Pr\left(t_u < t | x, \delta(t) = 0\right) \right) dF(x)$$

where $F(x)$ is the joint distribution of the explanatory variables. To compute $IT(t)$, we simulate the spells to reduced activity and in reduced activity. We then simulate the unemployment spells twice, first using the estimated coefficients of Model (4), and second setting $\delta(t|t_r, t_{\bar{r}}, x, V) = 0$. For each t, $IT(t)$ is then the difference between the two simulated cumulative distribution functions of unemployment duration.

The second quantity of interest is the difference in the probability of having left unemployment at time $t_r + t'$ (i.e. t' months after entering RA) compared with the probability of having left unemployment at the same time when RA is not available. Formally, this quantity, similar to the "treatment on the treated" parameter, is:

$$TT(t) = \int_x \left(\Pr\left(t' < t|x, \delta(t) = \hat{\delta}(t)\right) - \Pr\left(t' < t|x, \delta(t) = 0\right) \right) dF(x|t_r < t_u)$$

$TT(t)$ is calculated as above, except that we compute the difference of the two simulated cumulative distributions t periods after the (simulated) entry into the program. $TT(t)$ is thus calculated only for the individuals for which we simulate a spell of reduced activity. It should also be noted that $TT(t)$ averages over the different times of entry in our simulated data set.

We run several hundred simulations and compute the mean values of $IT(t)$ and $TT(t)$, as well as the 2.5 and 97.5 percentiles of the simulated data sets. The results are shown in Figure 3. They suggest that, if the impact of reduced activity eventually becomes positive, it does so only after several months. Among a cohort of unemployed ("Intention to treat" parameter), the initial lock in effect dominates the stepping stone effect up to 26 months after the beginning of the unemployment spell. This is because the lock-in effect lasts for as long as the individual is in reduced activity, while the stepping stone effect only lasts for three to six months. As individuals enter reduced activity, the drop in their hazard rate more than offsets the rise in the hazard of those who have left RA. Turning now to the "Treatment on the treated" parameter, the bottom part of Figure 3 shows that an individual who finds a part-time job after t months of unemployment will have a greater probability of having found a regular job only 11 months later. While significant, the long term effect of reduced activity remains quite small, typically lower than a percentage point.

One of the main parameters governing entry into reduced activity, and therefore the size of the treatment on the treated parameter, is the implicit tax rate on additional gains from RA (which is equal to the replacement rate in the current implementation of the policy). Indeed, a higher tax rate means that fewer individuals will choose to start a reduced activity spell, but will look for part-time jobs that are more likely to improve their employability. Another policy parameter is the maximum duration of RA spells, which was set at 18 months when our sampled individuals entered unemployment. Because the lock-in effect of reduced activity increases over time, modifying this maximum duration will also modify the overall impact of reduced activity. To quantify the effect of such policy modifications, we run again the simulations described above, but set the tax rate at various levels[24], or put a limit to the duration of part-time jobs.

We run four sets of simulations. In the first, we set the tax rate at 100%, meaning that the UI benefit is reduced on a euro per euro basis. In the second, we allow some degree of disregard on the earnings from RA and set the tax rate to the midpoint of the individual's actual replacement rate and a tax rate of 100%[25]. In the last two simulations, we limit the length of part-time jobs to 6 and 3 months. The results of those simulations are shown in Figures 4 and 5 for the "Intention to treat" and the "Treatment of the treated" parameters, respectively.

As expected, the effect of such policy modifications is to raise the net effect of reduced activity for the treated population. The tax rate modification does so in two ways. First, it shortens the time spent in RA, so that the strongly negative effect that appears after three months is experienced by fewer individuals. Second, higher tax rates lead to a stronger self-selection of individuals that choose to engage in RA, and only those who expect a strong treatment effect from their part-time job will do so. Unsurprisingly, shortening the maximum duration of reduced activity spells leads to an increase in the treatment effects via the limitation of the lock-in effect.

7 Conclusion

Temporary jobs can increase the probability of finding a regular job by improving the unemployed's human capital, signaling a willingness to work, and allowing for a better screening by prospective employers. However, they might also crowd-out job search activity and create a lock-in effect, effectively reducing the hazard rate to regular employment. In a number of countries, the unemployed are encouraged to work part-time, keeping (part of) their wage income in addition to their unemployment insurance benefits. When defining the share of wage income the unemployed are allowed to keep, policymakers must strike a balance between the incentives to find a part-time job, and the incentives to find a *good* part-time job, i.e. a job that will effectively improve the prospects of the unemployed in the labour market.

In this paper, we focus on a French subsidized temporary employment program (*Activité Réduite*) that allows registered job seekers to concurrently receive part of their unemployment benefits and wages from temporary jobs. We assess the magnitude of the lock-in and stepping stone effects as well as their variations with respect to the implicit tax rate on wage income by estimating a multivariate duration model on administrative

[24]To do so, we merely set the replacement rate to the desired value in the equations of time to treatment, in treatment, and in the interacted variables of the treatment effect. The replacement rate for the unemployment spell equation (excluding treatment effect) is not modified, as it is not a tax rate in this case.

[25]When the replacement rate is zero, we also set the tax rate at zero.

data from the Unemployment Records. Since the implicit tax rate varies across individuals, we are able to test for self-selection in "good" part-time jobs according to the size of this key parameter. We find both a significant lock-in effect when individuals are working part-time and a significant stepping stone effect when they return to standard unemployment. When facing a higher implicit tax rate on their wage income, individuals lower their transition rates to part-time jobs, but those who participate experience a weaker lock-in effect, and a stronger stepping stone effect. We interpret this result as evidence for self-selection into part-time jobs of different quality. The overall effect, however, is quite small. Finally, simulations suggest that increasing the tax rate, and/or reducing the authorized duration of involvement in reduced activities can improve the efficiency of such programs.

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Table 4: Control variables, Model (4)

Variable	U.→E. Coeff. (Std. Err.)	U.→C. Coeff. (Std. Err.)	To RA Coeff. (Std. Err.)	From RA Coeff. (Std. Err.)	E.→U. Coeff. (Std. Err.)
Baseline d2	0.772** (0.048)	−0.139** (0.035)	−0.296** (0.031)	−0.338** (0.031)	1.075** (0.079)
Baseline d3	0.836** (0.056)	−0.305** (0.042)	−0.557** (0.041)	−0.636** (0.041)	1.123** (0.080)
Baseline d4	0.912** (0.059)	−0.125** (0.041)	−0.681** (0.046)		1.138** (0.078)
Baseline d5	0.683** (0.072)	−0.367** (0.051)	−0.847** (0.061)		0.787** (0.087)
Baseline d6	0.715** (0.075)	−0.437** (0.053)	− 0.95 ** (0.062)		−0.145 (0.096)
Baseline d7	0.805** (0.093)	−0.523** (0.068)	−1.097** (0.090)		−0.351** (0.110)
Baseline d8	0.834** (0.100)	−0.506** (0.075)	−0.972** (0.095)		−0.763** (0.118)
Characteristics					
Woman	− 0.21 ** (0.040)	−0.333** (0.031)	0.011 (0.026)	−0.245** (0.029)	−0.027 (0.040)
Age	−0.006* (0.002)	−0.038** (0.002)	−0.015** (0.002)	−0.014** (0.002)	0.001 (0.003)
French national	0.514** (0.079)	−0.253** (0.048)	0.128** (0.046)	−0.138** (0.052)	−0.138† (0.078)
Couple	0.017 (0.049)	−0.263** (0.038)	0.076* (0.033)	−0.144** (0.038)	−0.135* (0.053)
Has children	0.049 (0.051)	0.180** (0.039)	−0.074* (0.034)	0.014 (0.039)	−0.034 (0.055)
Local unemp. rate	−0.080** (0.009)	−0.021** (0.006)	−0.043** (0.006)	−0.097** (0.005)	0.010 (0.009)
Cum. unemp. in the 5 preceding years	−0.010** (0.001)	0.00 (0.001)	0.006** (0.001)	−0.001 (0.001)	0.012** (0.001)
Education (none, or primary)					
Secondary education	0.317** (0.065)	−0.287** (0.042)	0.163** (0.040)	−0.018 (0.045)	−0.278** (0.065)
Vocational education	0.386** (0.069)	−0.212** (0.046)	0.237** (0.043)	−0.027 (0.048)	−0.276** (0.068)
Tertiary education	0.576** (0.069)	−0.577** (0.049)	0.206** (0.044)	−0.053 (0.050)	−0.681** (0.073)
Social transfers (none)					
UI receipt	−0.293** (0.106)	0.799** (0.064)	0.801** (0.062)	−0.987** (0.080)	
Replacement rate	−1.850** (0.166)	−3.821** (0.103)	−1.148** (0.091)	0.179 (0.119)	
RMI	−0.796** (0.083)	0.068† (0.040)	−0.396** (0.053)	0.068 (0.061)	
Reason for unemployment (first entry)					
Fired	0.250* (0.105)	−0.201** (0.070)	−0.337** (0.075)	0.473** (0.081)	−0.236* (0.115)
Quit	0.218† (0.115)	0.213** (0.073)	0.00 (0.086)	0.327** (0.090)	−0.223† (0.130)
End of fixed-term contract	0.681** (0.095)	0.046 (0.058)	0.192** (0.066)	0.478** (0.072)	0.134 (0.100)
Other	−0.266** (0.098)	−0.039 (0.058)	−0.180** (0.067)	0.316** (0.073)	−0.016 (0.107)
Length of unemp. spell					−0.019** (0.005)
In RA		−1.321** (0.074)			
In RA * RR		2.041** (0.146)			
Post RA		0.744** (0.041)			
Post RA * RR		0.390** (0.075)			
Intercept	−4.102** (0.182)	−0.118 (0.114)	−2.062** (0.110)	1.015** (0.118)	−3.382** (0.183)
N	10020 individuals, 18258 spells				
Log-likelihood	-101937.415				
$\chi^2_{(131)}$	14496.761				

Significance levels : †: 10%; $*$: 5%; $**$: 1%

Table 5: Factor loadings

Parameter	Model (1) Coeff. (Std. Err.)	Model (2) Coeff. (Std. Err.)	Model (3) Coeff. (Std. Err.)	Model (4) Coeff. (Std. Err.)
a_u	-0.925^{**} (0.053)	-1.111^{**} (0.050)	-1.063^{**} (0.049)	-1.08^{**} (0.052)
b_u	-1.397^{**} (0.097)	-1.194^{**} (0.063)	-1.278^{**} (0.064)	-1.295^{**} (0.071)
a_r		0.786^{**} (0.048)	-0.833^{**} (0.058)	-0.832^{**} (0.059)
b_r		0	0	0
$a_{\bar{r}}$			0.104^{**} (0.039)	0.106^{**} (0.039)
$b_{\bar{r}}$			-0.483^{**} (0.030)	-0.484^{**} (0.031)
a_c	1.064^{**} (0.062)	-0.319^{**} (0.065)	0.869^{**} (0.051)	0.871^{**} (0.051)
b_c	0	-0.732^{**} (0.058)	$-0.121^{\dagger}$ (0.066)	$-0.118^{\dagger}$ (0.066)
a_e				0.162^{**} (0.058)
b_e				-0.038 (0.070)
$\Pr(U_1 = 1)$	0.608^{**} (0.035)	0.576^{**} (0.019)	0.545^{**} (0.019)	0.541^{**} (0.019)
$\Pr(U_2 = 1)$	0.513^{**} (0.036)	0.475^{**} (0.026)	0.516^{**} (0.026)	0.513^{**} (0.026)

Significance levels : †: 10%; ∗: 5%; ∗∗: 1%

Table 6: Covariance matrix of the (log) heterogeneity distribution, Model (4)

	U	R	$\bar{R}$	E	C
Unemployment (U)	2.833^{**} (0.175)				
To RA (R)	0.892^{**} (0.146)	0.687^{**} (0.098)			
In RA ($\bar{R}$)	0.512^{**} (0.138)	-0.087^{**} (0.033)	0.254^{**} (0.027)		
Employment (E)	-0.124 (0.107)	-0.133^{**} (0.047)	-0.035 (0.036)	0.027 (0.019)	
Attrition (C)	-0.781^{**} (0.186)	-0.719^{**} (0.132)	0.148^{**} (0.034)	0.144^{**} (0.052)	0.767^{**} (0.074)

Significance levels : †: 10%; ∗: 5%; ∗∗: 1%

Standard errors in parentheses

Figure 2: Model fit

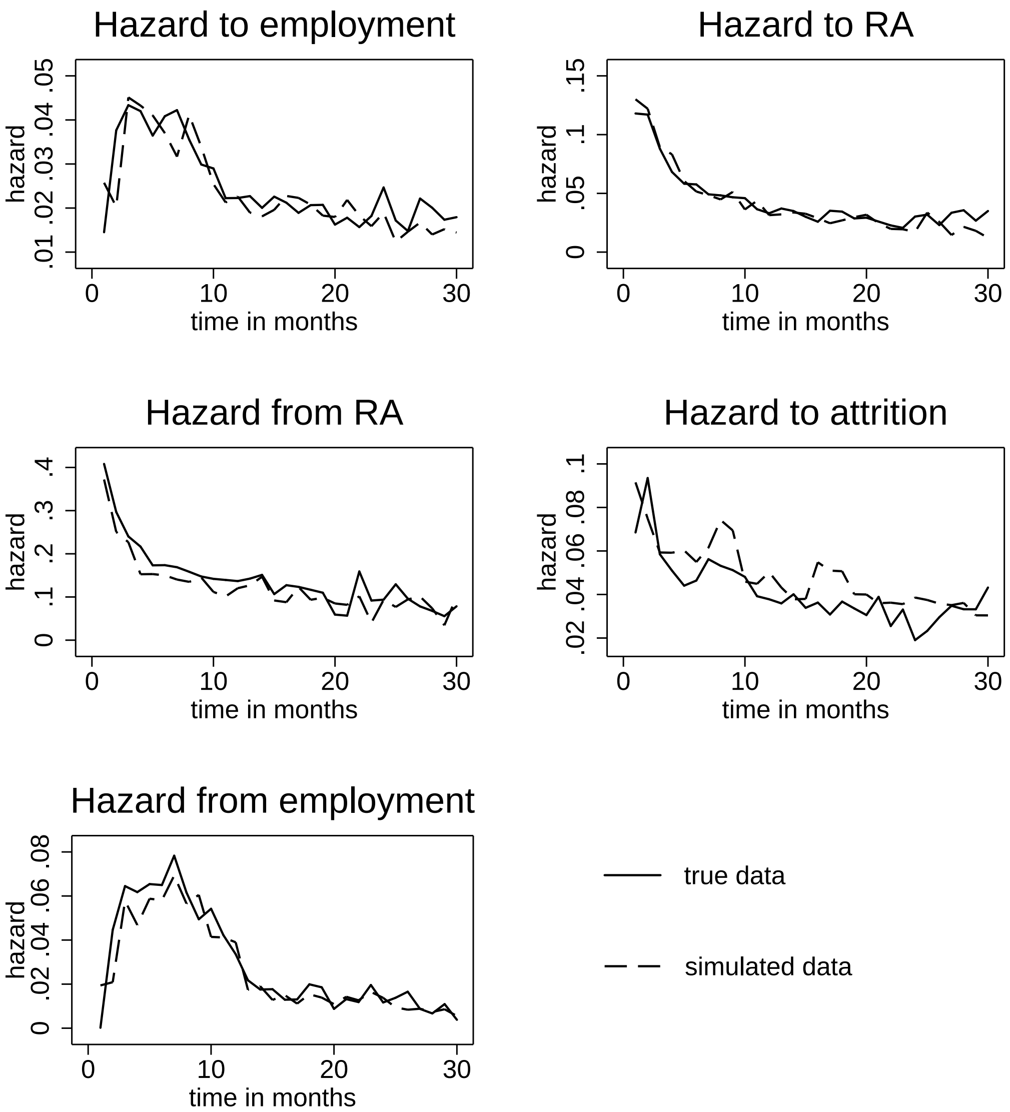


Figure 3: Effect of reduced activity

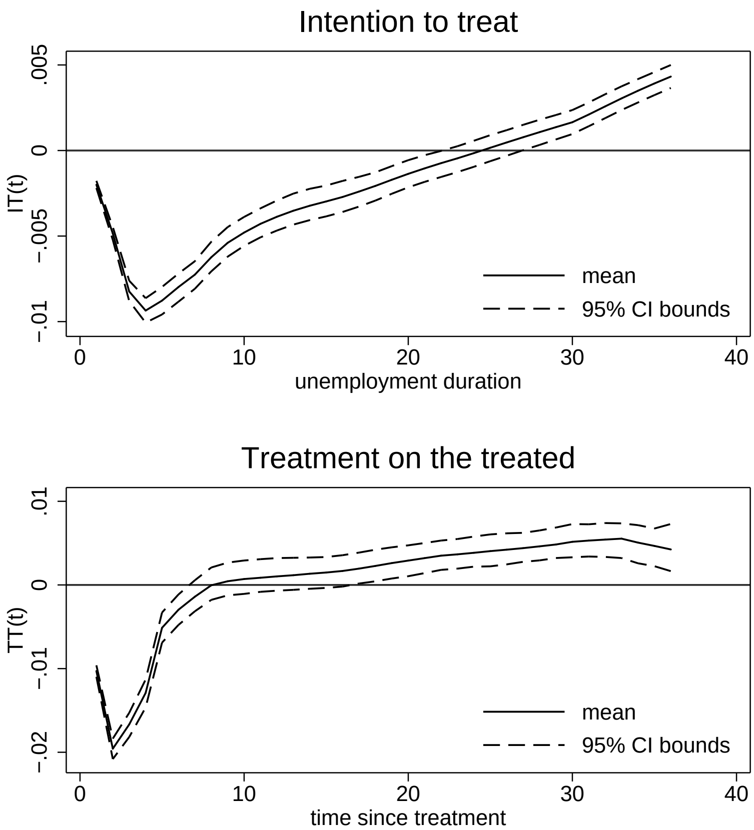
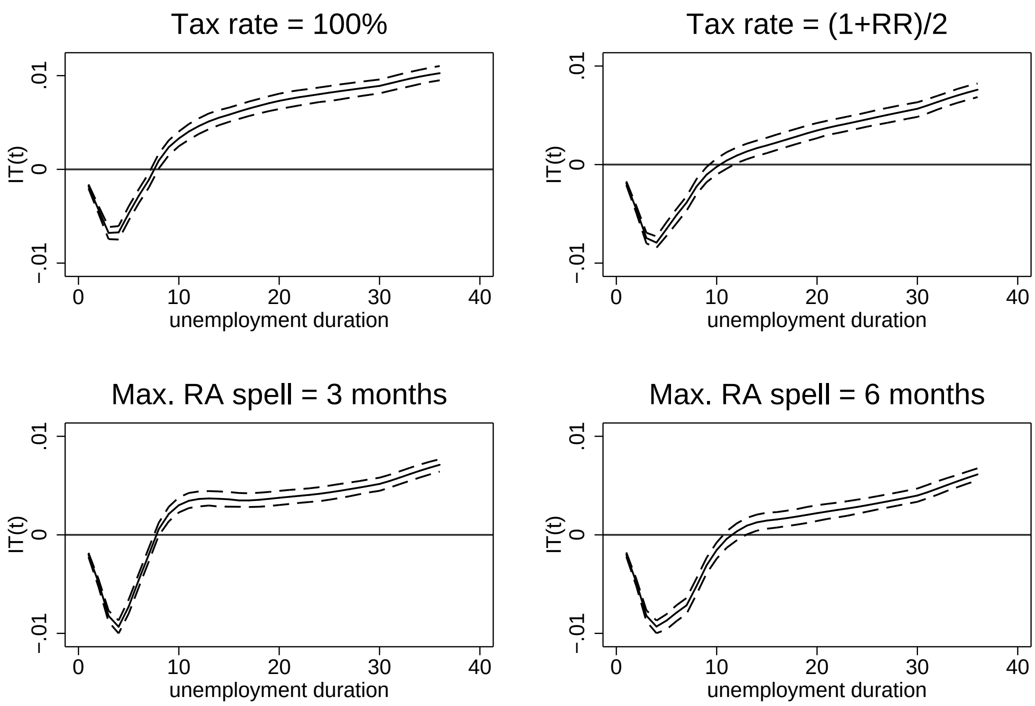
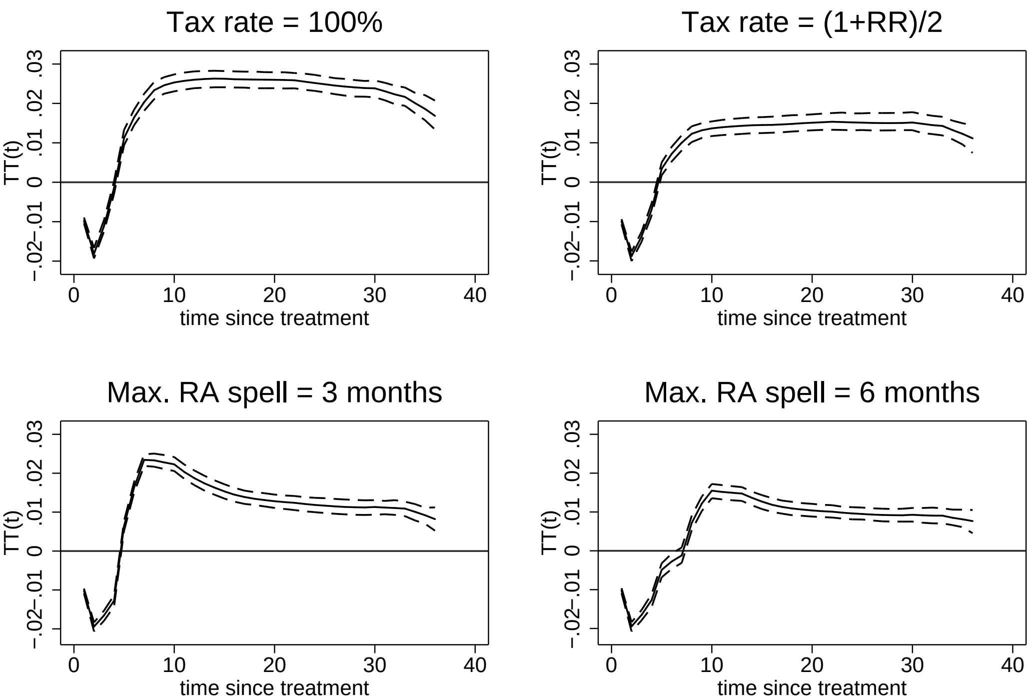


Figure 4: Intention to treat



(Solid line: mean effect. Dashed lines: 95% CI bounds)

Figure 5: Treatment on the treated



(Solid line: mean effect. Dashed lines: 95% CI bounds)