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Maximum Benefits Duration and Older Workers' Transitions out of Unemployment : a Regression Discontinuity Approach *

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Abstract

This paper investigates the relationship between the length of Unemployment Insurance (UI) entitlement and transitions out of unemployment. Our focus is on older job seekers who usually access to longer benefit periods and may withdraw from the labour force via early retirement. We exploit the 2003 reform of the French UI system that involved substantial cuts in benefits for this specific group. The design of the reform naturally leads us to adopt a Regression Discontinuity framework, comparing the search behaviour of people who became unemployed just before and after the policy change. We account for seasonal factors by taking advantage of pre and post reform cohorts and thus combining the standard RD framework with a Difference-in-Differences strategy. Our empirical analysis reveals that the reform had a structural impact on the distribution of unemployment durations, which shifted downwards in response to benefits cuts. This adjustment mainly operated through the displacement of job seekers from unemployment insurance to unemployment assistance, which largely contributes to explaining the observed spikes in exits from unemployment around the benefit exhaustion date. The effect on transitions to employment was on the contrary quite modest, while the subsequent job stability remained unaffected by the reform.

Keywords: Unemployment Insurance, Older Workers, Regression Discontinuity, Difference-in-Differences.

JEL Classification : C41, J64, J65.

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1 Introduction

Since the Lisbon Strategy was launched, promoting senior employment has become a priority for European governments. A series of reforms has been enacted in order to restore the incentives to work and delay the withdrawals from the labour market. As the sustainability of social security systems has been jeopardized in the context of population ageing, the first policy adjustments naturally concerned pension systems. Important cutbacks were also applied to early retirement schemes. Along with these changes, a deep restructuring of Unemployment Insurance (UI) systems was initiated in several countries. Although the unemployment rate among older workers is lower than the overall rate, the incidence of long term unemployment is typically higher in this group. Such persistance may originate from either poor employment prospects or disincentives to be re-employed. In this latter case, the provision of unemployment benefits is associated with a standard moral hazard issue. From this perspective, the Unemployment Insurance system can be challenged as a policy tool to alter the labour supply of older workers through reductions in benefits generosity.

A considerable theoretical literature has shown that a less generous unemployment insurance system will increase the optimal job search effort of an unemployed worker and hence result in shorter unemployment duration. Theory also establishes that as the date of benefits exhaustion approaches, job seekers increase the intensity of their job search which is expected to create a "spike" in unemployment exit rate at this point. Empirical studies largely confirm the predictions of job search models ¹ concerning the relationship between the generosity of the UI system and the duration of unemployment spells but the effects are quantitatively small, notably when generosity is measured in terms of replacement rates rather than in terms of the maximum duration of benefits. Many studies also report the existence of a spike in the exit rate from unemployment just before benefits expire. However, this fact has recently been questioned by Card, Chetty, and Weber [2007], who show that reemployment only accounts for a small part in the emergence of such spike.

When analyzing the implications of UI reforms for senior workers one needs to take into account the specificity of this population. Indeed, retirement cannot be modelled as a well defined labour market state distinct from other spells out of work. Hairault, Langot, and Sopraseuth [2008] highlight that the distance to retirement is an important determinant of seniors' labour supply. Although the state supported withdrawal can not be initiated before the pension age is actually reached, in most European countries, the unemployment insurance system offers a

^{1.} See Atkinson and Micklewright [1991], Holmlund [1998], Krueger and Meyer [2002] for extensive surveys.

variety of early retirement schemes and extended benefits programs for long term unemployed that allow for older workers to exit the labour market well before the legal retirement age. Studies by Lalive [2008] and Kyyrä and Ollikainen [2008] stress the extreme popularity of this indirect pathway to retirement.

Moreover, in European countries characterized by complex welfare states, unemployment insurance is not an isolated system, but largely interacts and often overlaps with other elements of social security. When unemployment benefits are exhausted, job seekers often shift to either unemployment assistance (UA) or other income support programmes. It is known for a fact that the share of job seekers ending up in these schemes is sensibly higher among seniors compared to younger unemployed. Pellizzari [2006] suggests that the quantitative importance of these transitions might explain the scant success of reform aiming to enhance labour supply via restrictions in the generosity of unemployment compensation.

This paper investigates the relationship between the length of Unemployment Insurance entitlement and older workers' transitions out of unemployment. We exploit the 2003 reform of the French UI system that involved substantial cuts in benefits for this specific group. The reform was processed under high fiscal pressure on the social security system and its main objective was to encourage employment among seniors by mitigating potential disincentive effects of long lasting compensation. Using administrative records of the French National Employment Agency, we consider two sub-populations of job seekers, who have, respectively, experienced a 22 months and a 9 months reduction in maximum benefits duration. Although these two sub-populations are not directly comparable due to the selection process based on past labour market history, their parallel analysis remains qualitatively informative on the heterogeneity characterizing older workers. The design of the reform naturally leads us to adopt a Regression Discontinuity framework, essentially comparing the search behavior of people who became unemployed just before and after the policy change. In order to account for seasonal factors, we combine this approach with a Difference-in-Differences strategy by using using pre and post reform cohorts. The validity of this design is empirically assessed and we provide a wide range of robustness checks.

Our empirical analysis reveals that the reform had a structural impact on the distribution of unemployment duration. The effect on transitions to employment was nevertheless quite limited. The major result of the reform consisted in shifting job seekers from unemployment insurance to unemployment assistance, which largely contributes to explaining the observed spikes in exits from unemployment around the benefits exhaustion date. We also assess the effect on unemployment recurrence which appears to be rather weak. The reminder of this paper is structured as follows. We first make a point on the organization of French Unemployment Insurance system and the 2003 reform in Section 2. We further expose the identification methodology in Section 3. In Sections 4 and 5 we present the data and give some elements of descriptive statistics. The empirical strategy in discussed in Section 6, the results are presented in Section 7 and sensitivity tests provided in Section 8. Section 9 finally concludes.

2 Institutional Settings

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 a sufficient period of employment in the 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 depends on the age and the employment history of unemployed workers. Non compliance with the eligibility rules is subject to benefits sanctions².

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 years preceding 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).

^{2.} 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 Compensation for older workers

Insured unemployed aged above 57 and a half can apply for an exemption from active job seeking ³. If this claim is satisfied, search activities are no longer mandatory and benefits are paid for the remaining entitlement period. Initially, the main objective of this *Dispense de Recherche d'Emploi* (DRE) scheme was to lower measured unemployment by encouraging early labour force withdrawal. Since the 1990's, DRE is more intensively used than state-financed early retirement programmes. By 2002, it involved about 250 000 older workers, which corresponds to 6% of individuals between 55 and 59 years old.

In addition, the French unemployment compensation system offers a particular pathway to early retirement by providing extended benefits for the oldest unemployed. Job seekers who reach the age of 60 before exhausting their UI entitlement and can prove 100 quarters of contributions to the pension system are allowed to collect benefits until the age of 65 when they automatically become eligible for old-age pension.

Lastly, the periods of insured unemployment are accounted for in pension calculations. This is also the case for the periods of uninsured unemployment within the limit of one year for the first uninsured spell or for all subsequent spells as long as those directly follow a period of insured unemployment. The limit can be extended up to five years for the individuals aged at least 55 years old at the of benefits exhaustion and who can prove at least 20 years of contributions to social security system. The uninsured unemployed aged above 55 may thus be interested in claiming the DRE in order to integrate the unemployment periods into pension record.

2.3 The 2003 Unemployment Insurance Reform

The introduction of the reform took place in the context of degrading economic conditions and under high fiscal pressure on Unemployment Insurance System (ref. table 1). The 2001 economic downturn has provoked an important increase in unemployment inflow and resulted in a 10 percentage points growth in coverage rate⁴. Moreover, the preceding period was characterized by a stable economic environment and favorable market conditions, which allowed most workers to build their right for a fresh UI period. By the end of 2002, the Unemployment Insurance recorded the operating deficit of 3,7 billions euros, while the stagnation in the

^{3.} This age limit can be brought to 55 for insured job seekers who have already contributed to the pension system for at least 160 quarters before the claim.

^{4.} In two years, the coverage rate jumped from from 43 to 53% and approached the level observed in 1992 before the instauration of digressive (over time) unemployment benefits, further suppressed in 2001.

labour market stoked the doubts on the financial viability of the system. Facing the urgent need to restore the financial balance, the social partners decided to restructure the compensatory system.

Year	Real GDP	Employment	Unemployment	UI coverage	Budget balance,
	growth, %	growth, %	rate, %	rate, %	bln. EUR
2000	3,9	3,6	8,6	42,2	1,3
2001	1,9	2,6	7,8	45,7	0,2
2002	1,0	0,6	7,9	50,3	-3,7
2003	1,1	-0,4	8,5	53,4	-4,3
2004	2,5	0,0	8,9	53,2	-4,4
2005	1,9	0,6	8,9	50,1	-3,2
2006	2,2	1,2	8,9	47,9	3,4
2007	2,3	1,8	8,0	48,0	3,5

Table 1: Labour market developments

The reform was voted on December 20, 2002 and became immediately effective starting from January 1, 2003. It restricted the access to the Unemployment Insurance system and substantially lowered all potential benefits durations. The new legislation operated on the inflow of benefits recipients with employment contracts ending after the 1st January 2003. Such individuals were entitled to new (shorter) unemployment compensation, while those with contracts ending before this date would still benefit from old (longer) entitlement period.

The changes introduced by the 2003 reform were particularly penalizing for older workers. One of its main objectives was to promote re-employment among seniors by mitigating the disincentive effects associated with a long lasting compensation. The duration of UI benefits was cut consequently by 20 % to 66 %, depending on the job seekers' past employment history. In addition, this policy change had a virtually larger impact on seniors' labor supply since it also affected eligibility to early retirement scheme and pensions calculations.

The unemployed slightly older than 50 could no longer expect a smooth transition between unemployment insurance and early retirement scheme as their benefits entitlement period would have elapsed by the time they reached 55. Moreover, seniors would mechanically qualify for less trimesters of labour market activity in pension calculations. Overall, the incentives to get back to work were even larger than expected for older workers due to the proximity of this specific population to retirement.

In what follows, we focus more precisely on two out of the four categories of older unem-

ployed, namely the *filière* 6 which became the *filière* B with an associated reduction of 22 months of maximum benefits duration and the *filière* 7 which was replaced by *filière* C with a corresponding 9 months decrease. 5

^{5.} For the UI system, those cuts generated the savings of 20500 and 8500 euros per insured unemployed, respectively.

Table 2: The 2003 Unemployment Insurance Reform

(a) UI System before the 2003 Reform

Employment4 in last6 in last8 in last14 in last27 in lastrecord18 months12 months12 months36 months36 monthsAge12 months12 months24 months36 years old55Age50 years old50 years oldbelow50 years old50 years old50 years oldAge50 years old0 above50 years oldor above0 in 0Maximum4 months7 months15 months21 months30 months45 monthsMaximum4 months7 months15 months21 months30 months45 months66	Category	1	5	3	4	Υ. Υ	9		7-8
record18 months12 months 24 months 36 months Age18 months12 months 24 months 36 months 36 months Age 10 move 50 move Age 10 move 50 move 50 move 50 move 100 move 100 move Maximum 4 months 7 months 15 months 21 months 30 months 45 months 45 months 60 months	Employment	4 in last	6 in last	8 in	last	14 in	last	27	in last
Ageimageimageimagefor abovefor above	record	18 months	12 months	12 mc	onths	24 mo	onths	36 r	nonths
Maximum4 months50 years oldor above50 years oldor aboveor aboveor above1010101010101010Maximum4 months7 months15 months21 months30 months45 months66benefits duration4 months15 months21 months30 months45 months66	Age			below	50 years old	below	50 years old	50 years old	55 years old
Maximum 4 months 7 months 15 months 21 months 30 months 45 months 45 months 66				50 years old	or above	50 years old	or above	or above	or above and
Maximum4 months7 months15 months21 months30 months45 months45 months60benefits duration									100 quarters
Maximum4 months7 months15 months21 months30 months45 months45 months60benefits duration									of payments to
Maximum4 months7 months15 months21 months30 months45 months45 months60benefits duration									pension system
_	Maximum benefits duration	4 months	7 months	15 months	21 months	30 months	45 months	45 months	60 months

(b) UI System after the 2003 Reform

Category	Α	B	С	D
Employment record	6 in last 22 months	14 in last 24months	27 in last 36 months	27 in last 36 months
Age			50 years old	57 years old or above and
			or above	100 quarters of payments pension system
Maximum benefits duration	7 months	23 months	36 months	42 months

Our choice is motivated by the fact that eligibility criteria did not change for these two categories whereas they were modified for *filière 4* and *filière 8* as indicated in table 2. We are thus able to disentangle the net effect of a reduction in maximum benefits duration from any other change in UI key parameters resulting from the reform. 6

2.4 Other policies affecting older workers' employment

2.4.1 The 2003 French pension system reform

Along with these policy changes French government also reorganized its pension system. Although the actual modifications were not undertaken before 2004, the reform is known as the 2003 pension reform.

One of the main features of this reform was the extension of the minimum contribution period required to qualify for a full pension. As a first step, the differences between public and private sectors pension systems were reduced : between January 1, 2004 and January 1, 2009 the minimum duration of contributions in the public sector (37,5 years before the reform) was progressively brought to the level effective in the private sector (40 years). Then, between January 1, 2009 and January 1, 2013, the contribution length was expected to progressively increase from 40 to 41 years in both sectors.

As another feature, the reform introduced more flexibility in labour supply decisions of older workers. On the one hand, it softened the penalty born by those who retire before reaching the minimum contribution period. The rate by which benefits are cut was lowered from 10% for each missing year to 5% (in 2013). On the other hand, the reform encouraged longer careers by setting up benefit accruals for workers who continue working beyond the contribution period required to obtain a full pension (3% for each additional year).

The 2003 reform also enabled people who began working at young age and who had worked for 40 years to retire at age 56 (instead of the statutory age of 60).

We argue that the existence of this pension reform does not compromise the validity of our conclusions. Since the individuals we consider are slightly above 50 years old, they are too distant from legal retirement and still have to work for about 10 to 15 years to qualify for full pension. Besides, the pension reform has been implemented gradually by generations and our

^{6.} Atkinson and Micklewright [1991] highlight the fact that UI system reforms often involve simultaneous variations in several key parameters, which compromises the readability of policy changes and substantially complicates the analysis of causal effects.

population of interest is only expected to be concerned by new measures in 2008 - 2013, which is well beyond the time scope of our analysis.⁷

2.4.2 Employment protection

Specific employment protection for older workers may also influence their labour market experiences. Recently, Ljungqvist and Sargent [2008] have shown that strong employment protection may increase structural (*ie* long term) unemployment in turbulent times, especially among older workers. Over the period we consider, French firms dismissing workers older than 50 years of age had to pay a tax to the UI system. In fact, this tax - the so called *contribution Delalande*⁸ - is the sole policy measure that takes advantage of dismissals to finance the unemployment insurance system (Blanchard and Tirole [2008]). Behaghel, Crépon, and Sédillot [2008] show that this tax had a negative effect on the hiring probability of unemployed workers in the protected age group, while the effect on layoffs was harder to detect. However, a reform in 1992 exempted firms from the tax for workers hired after the age of 50 if they were laid off later on. In 2003, this age threshold was moved down towards 45. Consequently, the population of older workers we consider (aged above 50) should not be concerned by the effects of this policy measure as they neither suffer from the discriminatory effect on hiring nor benefit from the specific protection against layoff.

3 Identification

A large literature has examined the effects of maximum benefits duration on transitions out of unemployment and subsequent job stability. Most commonly, the effects of Unemployment Insurance are identified through individual variation in benefits entitlement length. However, in most OECD countries, this parameter is partly determined by past work history. Consequently, individuals with better track records in the labour market will be entitled to longer UI benefits periods. This suggests an endogeneity problem at the individual level if past work history is correlated with unobserved characteristics that also affect job finding prospects.

^{7.} Had our population been concerned by the pension reform, we would expect two opposite effects : on the one hand, extending the contribution period required to qualify for a full pension would enhance transitions to employment; on the other hand, weaker penalty for those who retire before reaching the minimum contribution threshold would have a disincentive effect on labor supply. It is thus difficult to anticipate the net effect of the pension reform and its potential interaction with the UI reform considered herein.

^{8.} The contribution Delalande was suppressed starting from the 1er January 2008.

Other sources of variation which are commonly used for identification are geographic and/or longitudinal ones. Studies are indeed often based on differences in maximum benefits duration that occur across geographic areas or over time in a given country. However, most of the times, the existence of such variations is directly determined by labour market conditions. As a matter of fact, policymakers may decide to extend UI benefits entitlement during recessions in response to low job finding rates. Endogenous policy formation would therefore lead to an overstatement of the effect of benefits duration and would require to control for the forces that initiated the corresponding change (Card and Levine [2000], Besley and Case [2000], Lalive and Zweimuller [2004]).

In order to measure a causal impact of the UI one then needs an exogenous variation in the parameter of interest. An ideal context would be to implement a randomized experiment where the maximum duration varies randomly between unemployed. This is nevertheless hardly conceivable in the Unemployment Insurance context. Recently, a number of studies attempted to get closer to the randomized experiment framework by taking advantage of quasi-experiments. Representative studies in this fields include Card and Levine [2000], Carling, Holmlund, and Vejsiu [2001], Roed and Zhang [2005], van Ours and Vodopivec [2006, 2008], Lalive [2008].

3.0.3 Regression Discontinuity Framework

Our empirical strategy exploits the quasi-experiment created by the reform of the French Unemployment Insurance system to identify the impact of maximum benefits duration (MBD) on transitions out of unemployment. The design of the reform naturally leads us to adopt a Regression Discontinuity framework, essentially comparing the search behavior of people who became unemployed just before and after January 1, 2003⁹. Cohort based identification is also used by Lalive and Zweimüller [2009] and McCrary and Royer [2010].

Let *Y* be the duration of unemployment in days. We denote by *D* the entitlement status of a job seeker, where D = 1 if UI benefits have been reduced by the reform and D = 0 otherwise. Following the notations of the potential outcome approach to causal inference, (Y(0), Y(1)) represents unemployment durations one would experience under each of these two alternatives. Moreover, the entitlement status depends in a deterministic way on the date of contract ending *T*:

$$D_i = 1 \left[T_i \succeq c \right] \tag{1}$$

^{9.} As discussed earlier, the reduction in maximum benefits duration concerned all groups of workers. It therefore compromises a classic differences-in-differences approach frequently used in studies with similar purpose (see Card and Levine [2000], van Ours and Vodopivec [2006] or Kyyrä and Ollikainen [2008] for examples).

where *c* corresponds to the date of reform implementation, *i.e.* January 1, 2003. Since the design we consider is "sharp", the average causal effect of a reduction in MBD can be identified at the assignment threshold by the discontinuity in the conditional expectation of the outcome.

$$\tau_{RD} = E[Y_i(1) - Y_i(0)|T_i = c] = \lim_{t \downarrow c} E[Y_i|T_i = t] - \lim_{t \uparrow c} E[Y_i|T_i = t]$$
(2)

The key identifying assumption is that individuals have imprecise control over the running variable T (Lee and Lemieux [2010]). In other words, workers and firms should not be able to manipulate the date of contract ending. This seems plausible in our case considering that the timing of the reform was so tight (voted December 20, 2002 and introduced January 1, 2003) that it left virtually no room for anticipation. In addition, any strategic adjustment by workers can be ruled out by the fact that UI benefits are denied or at the very least substantially delayed in case of voluntary quits.

Lee [2008] shows that under this assumption, the RD design can identify impact estimates that share the same internal validity as those available from a controlled experiment. The variation in UI entitlement status can thus be regarded as randomized in a neighborhood of the January 1, 2003 threshold. That is, all observed and unobserved predetermined characteristics will have identical distribution on either side of the cutoff, so that we can suppose that the groups of individuals that became unemployed just before and after January 1, 2003 would have had similar average unemployment duration had they benefited from the same entitlement status ¹⁰. An important implication of local randomization is that it makes it possible to empirically assess the validity of the RD design (see section 5.2).

Since the running variable we consider is a date we have to impose an additional assumption to properly measure the main effect of interest. More specifically, identification requires labor market conditions to be the same for every worker at the assignment threshold in order to disentangle the impact of the reform from business cycle effects. We therefore need to restrict the comparison to individuals sufficiently close to the cut-off date to suppose they face equivalent reemployment opportunities. By doing so, we also address the endogeneity of policy change which was triggered by economic downturn and could induce quantitatively significant bias in the impact estimates.

Although this strategy allows mitigating the endogeneity policy bias, it is not suited to properly account for seasonal factors. Abbring, van den Berg, and van Ours [2002] show that the quarter

^{10.} This corresponds to the assumption that E[Y(0)|T = t] and E[Y(1)|T = t] are smooth (continuous) functions in *t* (Imbens and Lemieux [2008]).

of inflow into unemployment influences exit rates *ceteris paribus*. In order to improve identification, we combine the Regression Discontinuity framework with a Difference-in Difference approach (RD-DID) by including pre and post reforms cohorts to better pin down seasonal factors in the spirit of Petrongolo [2009] and Johansson and Palme [2005]. Formally, we can write :

$$\tau_{RD-DID} = (\lim_{t \to s} E[Y_i | T_i = t, G = 1] - \lim_{t \to s} E[Y_i | T_i = t, G = 0])$$
(3)
- $(\lim_{t \to s} E[Y_i | T_i = t, G = 1]) - \lim_{t \to s} E[Y_i | T_i = t, G = 0])$

where *s* now corresponds to the common assignment date (January 1) and *G* stands for the reference group, *i.e.* G = 1 for the reform cohort (10/02-03/03) and G = 0 for the control cohort presumably unaffected by the 2003 reform. This extended RD-DID strategy requires a third identifying assumption that seasonal factors are time invariant and common to all cohorts.

It is important to note that the effect we measure is not exactly the Average Treatment Effect for the entire population. Meanwhile, Hahn, Todd, and Van der Klaauw [2001] point out that this local effect might be highly relevant to policy makers who are contemplating either expanding or limiting entitlement to UI benefits for a given group of workers.

3.0.4 Measurement error

So far, we have supposed that the triplet (Y, D, S) was perfectly observable. Our data nevertheless suffer from measurement error as we do not have precise information on the forcing variable - the date of contract ending - but instead possess a slightly noisy measure of it - the registration date. Blasco [2009] shows that this latter variable can be seen as a good proxy since 80% of the claims are initiated within the month following the job loss. In what follows, it is important to keep in mind that the entitlement status D is correctly notified and allows deducting the year of contract ending. It is therefore not affected by the measurement error.

Formally, we can write $S = S^* + \varepsilon$ where S and S^{*} denote respectively the registration and contract ending dates. To ensure the consistency of estimates, we need to assume that the measurement error is not correlated with individual characteristics and that registrations occur in the same order than job losses, *i.e* that $S_{t'}^* > S_t^*$ implies $S_{t'} > S_t$. These assumptions cannot be formally tested but appear relatively weak and empirically plausible. The duration of entitlement to UI benefits being exclusively determined by the date of contract ending, no gains can be expected from the manipulation of registration dates.

4 Data

The empirical analysis is based on the records of French National Employment Agency. The *Fichier Historique Statistique* is an administrative dataset covering all registered unemployed since 1993¹¹. It contains exhaustive information on individuals' dates of inflow into and outflow out of the register, socio-demographic characteristics and, most importantly, UI benefits entitlement status. However, we do not have information on employment histories (employment duration, dates and type of contracts) nor insured job seekers' financial situation (previous wage, replacement ratio).

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.

We consider the inflow of workers aged between 50 and 54 years old, who became unemployed between October 2002 and March 2003 and are entitled to fresh UI rights. We further distinguish two sub-populations, based on individuals working history and UI entitlement.

On the one hand, we look at the unemployed who have previously worked for at least 14 months in the two years preceding their registration with the unemployment agency. For this group, the 2003 reform drastically reduced the entitlement period by 22 months depending on the date of contract ending. Workers who lost their job before January 1, 2003 maintained a 45 months UI benefits entitlement period (Filière 6) while those who became unemployed after this date were only granted with 23 months (Filière B).

On the other hand, we examine the individuals who have previously worked for at least 27 months in the 36 months preceding unemployment. For those individuals the 2003 reform was associated with a reduction of the UI entitlement period of 9 months. Thus benefits are still paid for 45 months for those with contracts ending before January 1, 2003 (Filière 7), but are only granted for 36 months for those who lost their jobs after this date (Filière C).

Such policy change provides a quasi-experimental setting for studying the causal relationship between potential benefits duration and transitions out of unemployment, identification being achieved within each group by comparing the search behaviour of individuals registered before and after January 1st 2003.

^{11.} According to Chardon and Goux [2003] estimation based on labor force surveys, 90% of ILO-unemployed would also register at the employment offices.

Although the individuals belonging to the two distinct sub-populations described above share the same UI entitlement duration before the 2003 reform, they are not directly comparable. In fact, they are selected on different labour market histories (longer record for Filières 7/C, compared to Filières 6/B), possibly related to unobserved characteristics, which might also affect the job finding rates. Inference will therefore be conducted separately on each of sub samples.

Job seekers are observed until December 31, 2007. In order to focus on a homogeneous sample, we make a number of additional sample restrictions. First, we remove from the database the few observations with incomplete information. We also drop disabled job seekers as well as people classified as "non immediately available for work". Lastly, we eliminate benefits recipients who are covered by a different set of unemployment compensation regulations (such as the intermittent du spectacle in the entertainment industry).

To account for seasonal factors, we replicate the sample selection scheme and consider two cohorts comparable to the population of interest but belonging to the time periods one year before and one year after the reform. The pre-reform cohort consists of the individuals entering the unemployment between October 2001 and March 2002 and entitled to 45 months of unemployment benefits (for both Filière 6 and Filière 7). By contrast, the post reform cohort covers the individuals, entering the unemployment between October 2003 and March 2004, with the access to unemployment benefits for 23 months (for Filière B) or 36 months (for Filière C). It is important to note that for those two extra cohorts the date of the 1 January 2002 or 2004, respectively, is not associated with any change in benefits entitlement duration.

We end up with 6 sub-samples (3 cohorts for each UI category). The distribution of the final sample over those sub populations is displayed in Table 3.

	Pre-r	eform	F	Reform	Post-	reform
	Cohort 20	001/2002 :	Cohort	2002/2003 :	Cohort 2	003/2004 :
	Before	After	Before	After	Before	After
Filières 6/B	1197	1051	1285	1140 (894)	1072	1087
Filières 7/C	6140	6500	6931	6712 (3178)	7279	7205

Table 3: Constitution of cohorts

Note: "Before" and "After" columns respectively refer to the periods preceding and following January 1st. For the reform cohort, we indicate in parentheses the number of individuals registering after this date and subject to the reduction in maximum benefits duration.

Remarkably, the number of UI recipients entitled to Filière 7/C is 5 to 7 times bigger than those entitled to Filière 6/B. For each category and cohort, it also appears that inflows are equally balanced on both sides of the January 1 threshold. However, considering total inflows can be misleading. If focusing on the reform cohort, one can notice that reductions in maximum benefits duration only concerned a fraction of the unemployed registered after January 1 (numbers in parenthesis indicate that this share varies between 80 % for Filière 6/B and 50 % for Filière 7/C). This gap originates from delays in registrations : some individuals who filed for benefits after January 1, 2003 had lost their jobs before this date and were therefore entitled to longer benefits as in previous system 12 .

For those observations, using the registration date as a proxy for the date of contract ending is not entirely accurate. We hence choose to discard them from our analysis, but we believe that identification does not suffer from such removal, since their characteristics are very similar to the ones of the individuals registered before January 1, 2003 (see tables 9 and 10). Besides, let us remind that the duration of benefits entitlement is exclusively determined by the date of contract ending, so that no gains can be expected from the manipulation of registration dates.

5 Descriptive statistics

5.1 Sample description

Tables 7 and 8 in the Appendix report key background statistics on the job seekers entering unemployment before and after January 1, by cohorts and UI entitlement. The distribution of individual characteristics appears quite stable between cohorts within each of the two UI categories (Filières 6/B and Filières 7/C), but given that the entitlement status is determined by previous work histories, the two UI groups naturally differ in this respect.

While the UI recipients entitled to Filières 6/B mostly enter unemployment after the end of a temporary contract (over 50%), a layoff is the quasi exclusive reason of a job loss for the individuals of Filères 7/C (almost 80% of entrees). By definition, all individuals entitled to Filières 6/B have already been unemployed for at least 10 months in the 36 months preceding the registration with the Unemployment Agency. Over 80% of them have experienced a spell

^{12.} Although we do not directly observe the date of contract ending, we can infer it since we perfectly observe the individuals' entitlement status. Such procedure is not replicable with pre and post reform cohorts, the unemployed sharing the same rights whenever their contract ends. Had this been possible, we would probably observe comparable gaps due to registration delays for these cohorts

of unemployment within the two years preceding registration, while this share barely exceeds 2% in the Filières 7/C. The individuals entitled to Filières 7/C are also more educated and qualified.

The differences between two UI categories persists when considering the ways the job-seekers leave unemployment. Table 4 displays the distribution of outflow directions for different co-horts separated by the individuals' registration date.

		F	'ilières 6/B			
	Cohort 20	001/2002	Cohort 20	02/2003	Cohort 20	003/2004
	Before	After	Before	After	Before	After
Employment	38,1	36,9	35,3	33,7	36,5	36,4
Training	7,5	8,8	4,9	7,9	5,6	6,4
Sickness	9,5	8,6	8,9	8,3	7,4	7,4
DRE	12,0	10,1	14,6	6,4	9,7	4,4
Retirement	0,3	0,2	0,3	0,0	0,1	0,0
Attrition	28,5	30,3	30,6	33,1	31,3	32,9
Assistance	3,9	5,0	5,1	10,0	7,9	9,9
Censoring	0,3	0,3	0,4	0,7	1,5	2,6

Table 4: Exits from unemployment, by destination state

		F	'ilières 7/C			
	Cohort 20	001/2002	Cohort 20	02/2003	Cohort 20	003/2004
	Before	After	Before	After	Before	After
Employment	28,2	29,4	29,4	33,4	33,2	34,0
Training	9,2	11,0	8,9	9,1	9,0	9,3
Sickness	10,0	10,3	9,7	10,3	8,8	9,9
DRE	19,9	14,8	20,0	8,4	14,7	7,8
Retirement	0,4	0,5	0,5	0,4	0,4	0,5
Attrition	23,5	23,5	23,6	26,6	21,7	24,4
Assistance	8,7	10,3	7,7	11,6	10,1	9,6
Censoring	0,2	0,3	0,2	0,3	2,0	4,6

The share of exits to employment is relatively stable across different cohorts of the Filières 6/B and varies around 36%. In the Filières 7/C this share is initially smaller (28%), but one can easily observe a catch up after January 1, 2003 (new UI benefits regulation) when the proportion of exits to jobs increases to almost 33%.

The exits due to sickness make between 8 and 10 % of all exits for both UI categories and this

number remains stable over time.

The exits to training are more stable and more frequently observed in the Filières 7/C (9 % versus 7% for Filières 6/B), which is consistent with higher qualification of these individuals.

The direct transitions to retirement are virtually inexistant (below 1% of exits), which is not surprising taking into account that we consider seniors slightly above 50, who are far below the legal retirement age and still have time and incentives to search for a new job. However, a significant part of those unemployed have access to *Dispenses de Recherche d'Emploi* (DRE), that can be viewed as an early retirement scheme. A striking feature of exits to DRE is their strong seasonal pattern : for all cohorts and all UI categories the appeal to DRE is much more frequent among the unemployed registered at the end of the year (before January 1).

The major drawback of our data is the importance of attrition which concerns almost one third of the exits. Debauche and Jugnot [2006] show that at least half of such exits are due to an undeclared take up of a new job, which might explain the larger attrition in Filières 6/B, since outflows to jobs are also more frequent in this category.

Lastly, an important number of exits in both UI categories occur through the Unemployment Assistance (UA) system. While on average the beneficiaries of the Filières 7/C use this type of exit more frequently than their peers from the Filières 6/B, both UI categories have experienced an important jump in exits to UA after the introduction of a new legislation. This shift in exits was is in part mechanically dragged by the reduction in benefits duration. Indeed, individuals concerned by the reform and who have not found jobs before the end of their UI entitlement period were redirected to the UA system, provided that eligibility to this means tested income support are fulfilled.

5.2 Validity of the design

In this section we report descriptive evidence on the effect of the reform on unemployment duration. We begin with graphical overview and then empirically assess the validity of our identifying assumptions.

Figures 1 and 2 plot the average unemployment duration as a function of the registration day over the period October 2002-March 2003. The dashed vertical line represents the January 1, 2003 cutoff date associated with the policy change. To the left of this assignment threshold insured job seekers were entitled to 45 months of UI benefits (for Filières 6 and 7 indistinctively); to the right, they only were granted with 23 months (Filière B) or 36 months (Filière

C). The same figures are plotted for pre and post reform cohorts as graphical falsification test. For simplicity, we ignore censoring (only 5% of the observations). Besides, we superimpose a linear regression model fit separately to points on each side of the assignment threshold.

The figure shows a clearly discernible jump of about 150 days for the Filières 6/B and of 30 days for Filières 7/C in the average unemployment duration at the date of reform implementation. We do not find similar jumps in the cohorts which are not concerned by the reform. Apart from seasonal variations, the shape of the graphs seems rather smooth away from the threshold. Moreover, the average unemployment durations on the left the January 1, 2003 threshold are comparable to those observed for the pre reform cohort, while the durations on the right of the threshold are of the same order then the ones reported for the post-reform cohort, which suggests a structural change in unemployment duration distributions.

Although the continuity assumption cannot be fully tested, its validity can still be empirically assessed. We follow Lee and Lemieux [2010] and inspect successively the density of the forcing variable and the distribution of observed baseline covariates.

We first investigate the existence of a discontinuity in inflows into unemployment at the January 1, 2003 threshold. Such discontinuity would compromise identification, since it would suggest that individuals might control their entitlement status by manipulating the date of their job loss. Recall that in our case, the timing of the reform was very tight (voted December 20, 2002 ; introduced January 1, 2003), leaving virtually no room for anticipation. Figures 3 and 4 shows a fairly smooth pattern of unemployment inflow and displays no sign of behavioral response around the time of reform implementation.

Moreover, we have previously shown that for each cohort the sub-populations of unemployed registered just before and after the January 1, 2003 threshold are similar in terms of observed baseline covariates. These results suggest that eligibility status might therefore be considered as locally randomized.

5.3 Exploratory analysis

We continue the descriptive analysis by presenting the empirical hazards and survivor functions, accounting for censoring. The functions are depicted for the different cohorts over the common time span of 48 months. However, as they become very noisy at long long durations due to the reduction in the number of available observations, they should be interpreted with caution after 36 months, especially for the reform and post-reform cohorts of the Filières 6/B.



Figure 1: Mean unemployment duration by inflow date, Filière 6/B

Figure 2: Mean unemployment duration by inflow date, Filière 7/C



Note to figures 1 and 2 : Mean daily unemployment durations hat been smoothed using a moving average filter.



Figure 3: Inflows into registered unemployment, Filière 6/B

Figure 4: Inflows into registered unemployment, Filière 7/C



Figures 5 and 6 in the Appendix display the unemployment hazards and survivor functions for different cohorts (pre-reform 2001-2002, reform 2002-2003, post-reform 2003-2004) and UI categories (Filières 6/B and Filières 7/C).

The shape of the hazard functions suggests that for the specific population of older workers, the probability of leaving the unemployment stands constant (about 4 %) over the whole entitlement period, but shows an important upturn (to 25 %) around the date of benefits exhaustion (45 months for Filière 6, 45 months for Filière 7, 36 months for Filière C and 23 months for Filière B). After this upwards shift the unemployment hazard does not return to its initial level, but remains well above (between 8 and 12 %).

As long as the cohort is not concerned by the reform (2001-2002 and 2003-2004), we do not observe any remarkable differences in the speed or timing of exits from unemployment when comparing individuals registered before and after January 1. When reform operates (cohort 2002-2003)), we observe quite the opposite : for the unemployed registered after January 1, 2003 and thus being subject to the reduction of benefits duration (treated), there is a distinct peak in exits from unemployment around the new upper bound of benefits duration (23rd month for Filières 6/B and 36th month for Filières 7/C), while no such peak is noted for the UI recipients registered before January 1, 2003, who are not concerned by the reform and receive longer benefits (untreated). The visual analysis of the survivor functions also confirms this finding: a year after benefits exhaustion for the treated population - only 5%-10% of treated individuals are still unemployed, while this share reaches 25-30% in the untreated population.

The existence of the peaks in exits from unemployment around the date of benefits exhaustion is well documented in the literature. While some associate these peaks with the outflows to jobs (Boone and van Ours [2009]), others suggest that the peaks are rather created by the (sometimes mechanical) transitions to other states (social assistance, inactivity) and argue that the contribution of exits to employment in creating these spikes is only marginal (Card, Chetty, and Weber [2007]). In order to better understand the nature of the upturns observed in our data, we decompose the unemployment hazard into hazards to main outflow destinations, i.e. employment, attrition, *Dispenses de Recherche d'Emploi* (DRE) and unemployment assistance (UA) (Figures 7 and 8 in Appendix).

We start with the hazards to employment : constant or slightly decreasing during the entitlement period, the exit rate to jobs doubles around the date of benefits exhaustion (from 2 to 4 %). Similarly shaped for treated (registration before January 1) and untreated (registration after January 1) populations within the pre and post reform cohorts, the hazards to employment

feature important differences between the two groups when analyzing the cohort touched by the reform. A strong (from 2 to 5%) upward shift in probability of exit to employment is only observable for the individuals with reduced benefits.

As to the transitions to attrition, the hazard rate is constant around 1,5% while benefits are paid and then jumps to 8% -10% as soon as the benefits are exhausted and remain at this level in the following months. Again, the peak in exits observed at the new maximum benefits duration is only visible for treated individuals, while hazard remains flat for their untreated peers. It is interesting to remark that the profiles of hazard to attrition and hazard to employment are very similar.

Regarding the transitions to social assistance, during the entitlement period the hazard is null by definition : a UI recipient can access UA only when benefits payments are exhausted. The sharp increase observed at this date (of order of 10%) is however followed by an important drop (almost to initial level).

Another interesting outflow is Early Retirement scheme (*Dispense de Recherche d'Emploi*). The hazard to DRE is increasing with the time spent in unemployment, which is not surprising since individuals come closer to fulfill the DRE eligibility criteria (being aged 55) over time. We once again observe an important spike in hazard to DRE around the time when UI payments are suspended. The existence of this peak is related to the fact that the periods of non insured unemployment contribute to the calculation of individuals' pensions. Therefore even when benefits are exhausted, older individuals are interested in claiming the DRE in order to maintain the unemployment status while taking the indirect path to early retirement. The magnitude of the observed spike is slightly higher for the pre-reform cohort simply because it comprises more individuals reaching the age of 55 while receiving the UI benefits. Similarly, the difference observed in hazard functions of treated and untreated individuals can be explained by a slight age difference between those registrer before and after January 1.

Finally, we analyze the duration of subsequent employment for those who had previously found a job. Figures 9 and 10 display the corresponding hazard and survival functions.

For the individuals formerly entitled to Filière 6/B, the probability to exit the employment state progressively decreases from about 6% in the first 6 months of tenure to 1 % after 2-3 years of employment. An interesting observation concerns the periodicity of exit spikes observed every 6 months, which perfectly coincides with the usual periodicity of temporal employment contracts in France. On average, two out of three individuals who transited from unemployment to jobs face a new unemployment episode in the 4 years following this transition. The differ-

ence between treated and untreated groups is weak and can probably be explained by seasonal factors as suggested by the lagged pattern observed for certain peaks.

As for those previously registered with the Filière 7/C, the hazard out of subsequent employment is also decreasing, but the instantaneous probability to exit the state in the beginning of the employment spell is weaker comparing to the Filière 6/B (4% versus 6%). The peaks in exits are observable every 3 months in the years following the take up of a job. The rest of the peaks by contrast are rather clipped, meaning that after a year on the job, the chances to return to unemployment decrease smoothly. On average, 50 to 60 % of individuals transiting from unemployment to jobs are still working 4 years after the exit, which attests higher stability of jobs found by the individuals belonging to of Filière 7/C. When examining the difference in exits from employment of treated and untreated groups, the gap appears rather weak. It should be noted that pre and post reform cohorts display the same pattern for employment hazards, suggesting that the 2003 reform of the UI system had virtually no impact of subsequent job stability.

6 Estimation

6.0.1 Local randomization and dynamic selection bias

Social experiments in which the outcome of interest is a duration variable are more difficult to analyze than those with time-independent outcomes (see Abbring and van den Berg [2005] for an extensive exposition). First, the outcome may be censored. Second, despite randomization at the beginning of the experiment (t = 0), there might be a dynamic selection bias resulting from differential sorting between those concerned by a reform and those who are not (Ham and LaLonde [1996]). Indeed, starting from the beginning of the unemployment spell, individuals adapt their search behavior according to the maximum benefits duration they have been entitled to (less generous for people entering unemployment after January, 1 2003). The composition of survivors in unemployment starts to differ between the two groups, so that independendence between the entitlement status and the unobserved characteristics does no longer hold. It is consequently not possible anymore at t > 0 to infer the effect of interest by simply comparing the hazard rates of both sub-populations.

Our identification strategy should account for these specific features. This can be done in the duration model framework where the hazards rates - the selection process out of the state of

interest - are explicitly modelled. Hence, we formulate treatment effects as :

$$\Delta = \frac{\theta_T(t \mid S = 1)}{\theta_T(t \mid S = 0)}$$

which is the relative effect of entitlement status S on the hazard rate at time t. Abbring and van den Berg [2005] show that nonparametric inference fails in disentangling the treatment effect from the dynamic selection effect.¹³ They nevertheless demonstrate that point identification can still be achieved semi-parametrically by imposing the assumption of a mixed proportional hazard (MPH) model :

$$\theta_{T(s)}(t \mid X, V) = \gamma^{s} . \lambda(t) . f(X) . V$$

where $\gamma > 0$ denotes some scalar treatment effect parameter, the functions $\lambda(.)$ and f(.) represent respectively the baseline hazard and the effect of observed characteristics on the conditional hazard and V > 0 designates unobserved individual heterogeneity.¹⁴

Under this assumption, the individual characteristics (X, V) are supposed to affect the counterfactual hazard rates in the same proportional way. In other words, the entitlement status has no influence on the impact of the observed explanatory variables on the hazard rates. It implies that the individual treatment effect is homogenous across individuals but not necessarily over time.

Identification based on single spells also requires observed and unobserved explanatory variables to be independent which is highly unlikely in most of empirical studies. Here this assumption nevertheless follows from the randomization of the entitlement status.

$$\theta_T(t \mid x, d, v) = \lambda_0(t) \cdot \exp[x + d\delta_{\theta}(t)] \cdot v$$

where

$$\delta_{\theta}(t) \equiv \ln \lambda_1(t) - \ln \lambda_0(t)$$

^{13.} Abbring and van den Berg [2005] argue that the only relevant causal impact that can be nonparametrically estimated in this context is the additive effect on the survival probability : $\Delta = P(T > t | S = 1) - P(T > t | S = 0)$. They nevertheless stress, in line with Meyer [1996], that by imposing a proportional hazard structure and an additional assumption of monotonicity, *i.e.* the treatment effect is positive (negative) at all durations, it turns possible to determine a lower (upper) bound on the true treatment effect from the ratio of empirical hazard rates.

^{14.} Rosholm [2008] suggests a similar expression based on differences in baseline hazards :

6.0.2 Specifications

To quantify the causal impact of the UI reform on older workers' transitions out of unemployment, we estimate a continuous time competing risks model where we distinguish between independent exits to employment, attrition, unemployment assistance (UA) and early retirement (Dispense de Recherche d'Emploi or DRE). We also assess the impact on unemployment recurrence by analyzing transitions from employment to unemployment.¹⁵

In order to account for seasonal factors, we combine the Regression Discontinuity and Differencein-Differences approaches by using pre-reform (2001/2002) and post-reform (2003/2004) cohorts. Although one extra cohort would be sufficient for identification, we choose to use the two of them in order to better pin down seasonal factors while increasing the number of observations used for estimations (which improves the computation of standard errors). For all cohorts, we censor the ongoing spells at 48 months to ensure their comparability over the same time span.

We model state-specific hazard rates using the following Cox proportional hazards specification:

$$\theta_{k}^{RDD-DID}(t \mid x, s, d) = \lambda_{k}(t) \exp \begin{pmatrix} x\beta_{k} + h_{k}(d) \\ +\delta_{k}^{january} 1(d \ge January, 1) \\ +\delta_{k}^{reform}(01/10/2002 \le d \le 31/03/2003) \\ +\delta_{k}^{post}(01/10/2003 \le d \le 31/03/2004) \\ +\tau_{k}(01/01/2003 \le d \le 31/03/2003) \\ +\delta_{k}^{january,post}(01/01/2004 \le d \le 31/03/2004) \end{pmatrix}$$

where $1(d \ge January, 1)$ is a dummy indicating for a given cohort whether unemployed registered after January 1, $1(01/10/2002 \le d \le 31/03/2003)$ is a dummy for unemployed registered between 10/2002 and 03/2003 (reform cohort), $1(01/10/2003 \le d \le 31/03/2004)$ is a dummy for unemployed registered between 10/2003 and 03/2004 (post-reform cohort) and reference group $1(01/10/2001 \le d \le 31/03/2002)$ consists of unemployed registered between 10/2001 and 03/2002 (pre-reform cohort).

In this specification, the causal impact of a reduction in maximum benefits duration on tran-

^{15.} Recall that we do not observe the true employment durations. Instead we observe a slightly noisy measure of it, namely the time elapsed between successive registrations into unemployment. However, that is unsure that the job has been held over this whole period. Thus we measure the recurrence of unemployment rather than job stability, but concurrently use both terms in what follows.

sitions from registered unemployment to state *k* or from employment to unemployment is captured by the parameter τ_k associated with the interaction term between $1(d \ge January, 1)$ and $1(01/10/2002 \le d \le 31/03/2003)$ dummies. It is important to note that fixed effects $1(01/10/2002 \le d \le 31/03/2003)$ and $1(01/10/2003 \le d \le 31/03/2004)$ do not only reflect cohort effects but also include business cycles and UI generosity effects ¹⁶. They are hardly interpretable *per se* but are essential for the identification of the causal effect.

The function h(.) is used to control for the specific effect of the registration date d and the fact that it is correlated with individuals' entitlement status in the reform cohort. As pointed out by Card and Shore-Sheppard [2004], the addition of this flexible function shifts the source of identification from a global difference in differences to a local one, concentrated around the eligibility threshold. We specify $h_k(d)$ as polynomial functions of the registration date : $h_k(d) = \sum_{j=1}^{P} \alpha_{kj}(d-c)^j + \gamma_{kj} \cdot s \cdot (d-c)^j$. Since inference is conducted at the cutoff point, the forcing variable is normalized by substracting the cutoff value. We also add an interaction term between the entitlement status and the forcing variable to allow the regression function to differ on both sides of the cutoff point. This functional form has been widely used in empirical studies involving discontinuity designs, such as Lalive [2008]. As the results might be sensitive to the order *P* of the polynomial, we test for quadratic, cubic and quartic specifications.

One important aspect of Regression Discontinuity Designs is that they provide causal estimates for the subpopulation around the threshold (Imbens and Lemieux [2008]). Here, we choose to consider a 6 months window around the discontinuity point (3 months before and 3 months after January, 1) in order to deal with the endogeneity of the policy change, which was triggered by economic downturn, while saving enough data to be able to detect the impact of a reduction in maximum benefits duration.¹⁷

$$\widehat{h}_{opt} = C_K \cdot \left(\frac{2.\widehat{\sigma}^2(c)/\widehat{f}(c)}{\left(\widehat{m}_+^{(2)}(c) - \widehat{m}_-^{(2)}(c)\right)^2 + (\widehat{r}_+ + \widehat{r}_-)} \right)^{1/5} \cdot N^{-1/5}$$

^{16.} Since those are by definition associated with different UI set of rules.

^{17.} From a statistical point of view, this strategy amounts to implementing local regression based on a 6 months wide rectangular kernel. As pointed out by Lee and Lemieux [2010], the convenience of working with a rectangular kernel compensates for efficiency gains that could be achieved using more sophisticated kernels. However, choosing a bandwidth is less straightforward as it involves a tradeoff between precision and bias potentially affecting the results. We consequently applied Imbens and Kalyanaraman [2009] plug in method to obtain the optimal bandwidth for the regression discontinuity estimator :

where $\widehat{m}^{(2)}_{+}(c)$ and $\widehat{m}^{(2)}_{-}(c)$ are the right-side and left-side second derivatives (curvature) of an estimated regression of the outcome variable Y on the forcing variable X evaluated at the threshold, N is the number of observations, $\widehat{\sigma}^{2}(c)$ the estimated standard error, $\widehat{f}(c)$ the density of the forcing variable, $\widehat{r}_{+} + \widehat{r}_{-}$ a regularization term (the approximate variance of the estimated curvature) and C_{K} a constant specific to the kernel K.

We preserve the RD intuition by introducing weights that decrease with the distance from the threshold (Gorodnichenko, Martinez-Vazquez, and Peter [2009]). Each observation is now weighted by ω_{ik} defined as :

$$\omega_{ik} = K\left(\frac{t_R - t_C}{h/2}\right) / \sum_{i=1}^N K\left(\frac{t_R - t_C}{h/2}\right)$$

where t_R is the date of registration with the unemployment agency, t_C is the January, 1 cutoff date and *h* is our *a priori* 6 months wide bandwidth. We use a triangular kernel $K(u) = (1 - |u|) \cdot \mathbf{1}_{|u| \le 1}$ to put more weight on observations closer to the cutoff point.¹⁸

Another point worth mentioning is the unobserved heterogeneity issue. Typically, the Cox model does not allow for unobserved heterogeneity and from this perspective our estimation results may be subject to some bias.¹⁹ However, unobserved heterogeneity is less likely to be a problem when flexible hazards are used (Meyer [1990], Han and Hausman [1990]). Besides, our estimations include variables describing past work histories, which to some extent capture the specific labour market behaviour of unemployed and should thus reduce the magnitude of the unobserved heterogeneity bias. We can also argue that the selection operated via compensation rules is very specific and tends to homogenize the population within each UI category thus limiting the source and the magnitude of unobserved differences between individuals.

7 Results

This section presents the main estimation results, while a set of sensitivity tests will be proposed in section 8. We first discuss the estimated causal effects of a reduction in UI entitlement on unemployment duration and on transitions to different exit states. We further analyze the effects on unemployment recurrence. The estimation results are presented in table 5.

As abovementioned, two sub-populations of UI recipients, those entitled with Filières 6/B and Filières 7/C, are not directly comparable and will be therefore analyzed parallelly.

Following Imbens and Kalyanaraman [2009] algorithm, we found the optimal bandwidth to be approximatively one month wide (14 days before and 14 days after January, 1 2003). We nevertheless did not retain this optimal bandwidth since the insufficient number of observations left for estimation resulted in large standards errors and compromised the detection of any causal effect.

^{18.} Fan and Gijbels [1996] have shown that a triangular kernel was optimal for estimating local linear regressions at the boundary.

^{19.} We also have estimated piecewise constant hazard models with a gamma distribution for unobserved heterogeneity. The results (available on request) are very similar to the ones obtained with a Cox model as none unobserved heterogeneity in hazard rates was detected.

	Filière 6/B	Filière 7/C
Exits out unemployment	0.505***	0.344***
	[0.092]	[0.043]
Exits to employment	0.305**	0.234***
	[0.149]	[0.075]
Exits to attrition	0.361**	0.335***
	[0.173]	[0.089]
Exits to early retirement (DRE)	0.854**	0.330**
	[0.341]	[0.129]
Exits to Unemployment Assistance	1.612***	1.956***
	[0.432]	[0.157]
Observations	6586	37233
Recurrence	0.100	-0.082
	[0.182]	[0.108]
Observations	2339	11375

Table 5: Estimated treatment effects

Note : Standard errors in square brackets.

Significance levels *** : 1%, ** : 5%, * : 10%.

7.0.3 Unemployment duration and outflows from unemployment

Results indicate that the reduction in maximum benefits duration has increased the transition rates out of unemployment by 66% (exp(0.505)-1) for Filières 6/B and by 41% (exp(0.344)-1) for Filières 7/C).

When decomposing these outflows by exit destinations, we remark that the effect of the reform on exits to employment is positive for both categories of UI recipients. The 9 months cuts in benefits duration produced a 26 % raise in transitions to jobs for the Filières 7/C. Similarly, the 22 months reduction in entitlement length for Filières 6/B has impulsed a 36 % increase in outflows to employment.

As to the exit rate to attrition, the effect of the reform is positive and significant for both subpopulations. It is also of higher magnitude, compared to the the effect on employment, i.e. 43 % for Filières 6/B and 40 % for Filières 7/C. The interpretation of this last result should however be carried with precaution, since half of attrition accounts for undeclared exits to employment. The estimated effects are therefore an upper bound for the effect of maximum benefits reduction on transitions to attrition and a lower bound for the effects on outflows to employment. Keeping this in mind, we have tested two alternative specifications one of which discards the exits to attrition from the sample of interest while the other considers those exits as outflows to jobs (which gives an upper bound for the estimate for the effect on exits to employment). These manipulations do not affect the validity of our conclusions since the obtained results do change neither qualitatively nor quantitatively.

Even if outflows to early retirement have been held back by the UI reform (see table 4 in section 5.1) one can notice that the policy change has also increased the corresponding hazard rates (135% for Filières 7/C and 39% for Filières 6/B). This implies that unemployed exiting to DRE transited to this state earlier than their counterfactuals. This result is hardly surprising insofar as that the majority of those individuals wait for benefit exhaustion before claiming DRE, which directly contributes to the calculation of pensions.

Lastly, we can see that the cuts in maximum benefits duration had a massive positive effect on transitions to unemployment assistance : the transition rates increasing by 400-600% suggests that the major impact of the reform consisted in shifting the job seekers from unemployment insurance to unemployment assistance. This result is in line with Pellizzari [2006] conclusions and echoes the Card, Chetty, and Weber [2007] argument on the true mechanisms underlining the emergence of spikes in outflows from unemployment around the date of benefits exhaustion.

7.0.4 Unemployment recurrence

The last column of table 5 shows the estimated effects of the reform on unemployment recurrence, *i.e.* on the transition rates from employment back to unemployment for those who had exited to jobs in the first place. Although reductions in maximum benefits durations had a positive significant effect on transitions to employment, the estimations conducted for unemployment recurrence show that faster exits to jobs were not associated with a deterioration in job stability. This result is in line with van Ours and Vodopivec [2008] and Fitzenberger and Wilke [2010].

7.0.5 The effect of observable characteristics

Our estimations control for a broad range of observable characteristics. Tables 11 and 12 report the corresponding coefficients for both categories of UI recipients (Filières 6/B and Filières 7/C). Since the RDD-DID approach uses the pre and post reform cohorts (2001-2002

and 2003-2004) and the effect associated with the explanatory variable may change over time, the estimated coefficients should be interpreted as the mean effect for all three cohorts.

The results indicate that the registration date rarely influences transitions. Individuals from the post-reform cohort exit faster than other unemployed, which might be explained by shorter UI entitlements and/or more favorable economic conditions. For Filières 7/C, the coefficients associated with the January 1 dummy are statistically significant in most cases, thus witnessing the importance of seasonal variations in outflows and the pertinence of the combined RDD-DID approach.

Older, women, and non-French have lower transition rates to employment. The same is observed for transitions to attrition except for the non-French, who exhibit higher exit rates to this state. Although the level of educational attaintment positively affects transitions to employment for Filières 7/C, this feature does not hold for the Filières 6/B. As to the effect of qualification, high skilled blue collars and managers are more likely to exit to employment. However the former ones tend to return rapidly into the unemployment (positive effect on unemployment recurrence), while the latter ones seem to keep their jobs once the exit is made (negative effect on unemployment recurrence).

Another fact worth mentioning is that, those who enter unemployment due to the end of a fixed term contract, have a higher probability to return to work, but the incidence of repeat unemployment is also systematically higher in this group. Moreover, in the Filières 6/B, the number of previous unemployment spells also has a positive significant effect on both exits to employment and unemployment recurrence. This observation is in line with the profile of the Filières 6/B recipients, most of which are recurrent unemployed who are used to transit frequently between the unemployment and employment states.

Concerning the exits to unemployment assistance or to early retirement, those are affected by a small set of very specific characteristics, which are, not surprisingly, closely related to the eligibility criteria for these schemes. Older individuals have higher chances of transition to early retirement as they stand closer to the eligibility threshold of 55 years. Similarly, the transitions to unemployment assistance are more likely to occur for non-married individuals with low educational level (this latter being correlated with the earnings), since eligibility is means tested against households income in this case.

8 Sensitivity Analysis

8.1 Sub-sample analysis

We replicate our main analysis by considering women and men separately. In order to assess the validity of Regression Discontinuity approach on these sub-samples, we compare for each of them the distributions of characteristics for unemployed registered before and after the January 1 cutoff date. Results in tables 13 to 16 in the Appendix show no sign of asymmetry across the threshold.

The estimated causal effects of the UI reform are displayed in table 6 here below. It appears that the two gender groups responded differently to cuts in maximum benefits duration. A positive effect on hazard to employment is detected for men in Filières 7/C and is probably related to their higher educational and qualification level. Surprisingly, in Filières 6/B higher transitions to jobs were observed for women. For both UI categories, women's transitions out of unemployment were nevertheless mainly driven by an increase in exit rates to attrition. We can reasonably think that a significant part of those women chose to withdraw from labor market. This result is line with Lalive [2008] who found that the effect of extended benefits on women's unemployment durations is much larger than the effect observed for men. Besides, the impact of the reform on transitions to early retirement is highly significant and stronger than the one estimated on the whole sample for men, while it is inexistant for women. This may be related to the fact that men are more likely to work as blue collars and thus have a higher propensity to claim for DRE because of the potential deterioration in state of health related to the occupation.

8.2 Time varying causal effects

In order to investigate to what extent a reduction in maximum benefits duration influences the time profile of exit rates to employment, we now allow the causal effect to vary with the duration of unemployment (see Uusitalo and Verho [2010] for similar applications). To do so, we interact the entitlement status dummy with unemployment duration grouped in 3 months time intervals.

The results of these estimations are reported in table 17 in the Appendix. They show that the effect is globally significant and positive during the first 9 months of unemployment for Filières 6/B and for the first 22 months for Filières 7/C. Over this period, the exit rates of individuals

	Filièı	re 6/B	Filièr	re 7/C
	Women	Men	Women	Men
Exits out unemployment	0.634***	0.389***	0.347***	0.339***
	[0.129]	[0.134]	[0.063]	[0.058]
Exits to employment	0.392*	0.247	0.178	0.260***
	[0.210]	[0.217]	[0.122]	[0.095]
Exits to attrition	0.688***	0.105	0.448***	0.257**
	[0.259]	[0.237]	[0.137]	[0.118]
Exits to early retirement (DRE)	0.619	1.170*	0.267	0.442**
	[0.434]	[0.654]	[0.167]	[0.209]
Exits to Unemployment Assistance	1.520**	1.977***	1.961***	1.990***
	[0.600]	[0.653]	[0.232]	[0.215]
Observations	3661	2925	17732	19501
Recurrence	0.025	0.241	-0.064	-0.092
	[0.254]	[0.267]	[0.168]	[0.143]
Observations	1272	1067	4530	6845

Table 6: Estimated treatment effects for men and women

entitled to shorter benefits are about 40 % higher than those of their counterfactuals not affected by the reform.

However, in accordance with graphical evidence (figures 7 and 8) most of the dynamic causal effect operates close to the expected benefits exhaustion date : the difference in exit rates between those registered before and after January 1, 2003 is then 2 (Filières 7/C) to 2,5 (Filières 6/B) times larger than in the beginning of the unemployment spell.

This result can receive two concurrent readings. On the one hand, according to the standard moral hazard explanation, it is possible that individuals know about their future jobs in advance but make sure with future employer to start working only once benefits have lapsed (Boone and van Ours [2009]). Under this assumption, the impact of the reduction in maximum benefits duration on subsequent job quality should be modest. On the other hand, one can also argue that the spike in job finding at benefits exhaustion may be explained by a declining reservation wage and liquidity constraints which push unemployed to accept the first upcoming job (Chetty [2008]). In this case, we should observe people exiting near the spike to find less stable jobs. At this stage, it is however difficult to assess the validity of these competing explanations.

8.3 Unemployment recurrence: a bivariate duration model

As pointed out before, a reduction in maximum benefits duration may impact labor market transitions in two different ways. On the one hand, the unemployed are expected to lower their reservation wage and increase their search effort which should alleviate the moral hazard problem. On the other hand, the tightening of financial constraints prevents them from waiting for offers better suited to them which may be detrimental to subsequent job stability. In the main analysis, we studied both types of transitions separately. However, one can argue that among the population of unemployed who found a job the distribution of unobserved heterogeneity is likely to differ between individuals entitled to longer and shorter benefits duration (see Ham and LaLonde [1996] or Abbring and van den Berg [2005] for a similar argument). As a result, despite randomization at t = 0, dynamic selection in the sample of the re-employed invalidates the comparison of post-unemployment outcomes.

In order to test the robustness of our results *vis-à-vis* dynamic selection, we estimate a bivariate mixed proportional hazard model with potentially correlated unobservables influencing both unemployment and subsequent employment durations. Since Cox models do not allow for unobserved heterogeneity, we estimate constant piecewise proportional hazard models instead. The joint distribution of the unobserved characteristics is modelled non parametrically using a finite number of points of support (Heckman and Singer [1984]).

We could not detect any dependence between the inobservables in the two processes. The parameter estimates of probabilities associated to the points of support revealed to be on the boundary of the parameter space, which implies that the unobserved heterogeneity components are independent. A description of similar computational issues can be found in Lalive, van Ours, and Zweimüller [2005] and van den Berg, van der Klaauw, and van Ours [2004]. This result reasserts the validity of the conclusions obtained in section 7 based on the separate analysis of unemployment and employment hazards.

9 Conclusions

In recent demographic context marked by ageing and shrinking labour force, promoting senior employment became one of top priorities on European policy agenda. A series of reforms have been enacted in order to restaure the incentives to work and delay the withdrawals from the labour market. Many of these reforms challenged the Unemployment Insurance (UI) system to alter the labour supply of older workers through reductions in benefit generosity.

This paper exploits the 2003 reform of the French Unemployment Insurance system to evaluate the causal impact of a reduction in maximum benefits duration on older workers' transitions out of unemployment. We focus on two sub-populations of job seekers who have, respectively, experienced 22 months and 9 months cuts in benefits entitlement length. Because the new set of rules extensively applied to all benefits recipients entering unemployment after January 1, 2003, such design naturally appeals for a cohort-based analysis. We adopt a Regression Discontinuity approach, essentially comparing the search behavior of people who became unemployed just before and after this date. Local identification allows to address the endogenous nature of the policy change triggered by the economic downturn. In addition, we account for seasonal factors by taking advantage of pre and post reform cohorts and thus combining the standard RD framework with a Difference-in-Differences strategy.

Our results are in line with job search theory and indicate that the reform had a structural impact on the distribution of unemployment durations, which shifted downwards in response to benefits cuts. When decomposing the outflow with respect to exit destinations, it appears that the adjustment mainly operated through the massive displacement of job seekers from unemployment insurance to unemployment assistance. The effect on transitions to employment was on the contrary quite modest, while the subsequent job stability remained unaffected by the policy change.

From a policy perspective, our conclusions highlight the need to take into account the overlappings between unemployment insurance and unemployment assistance when designing welfare reforms (Pellizzari [2006]). The effectiveness of a reduction in UI generosity might indeed be compromised if individuals can easily shift into other programmes. Concerning the moral hazard issue, it could be alleviated by tightening job search requirements while intensifying monitoring and sanctions. An intermediate solution might be to tie benefit payments to the participation in active labour market programmes as it is already the case in Nordic countries. Such combination could improve the qualifications of individuals with poor employment prospects and reintroduce them to the labour market. In the same time, the compulsory aspect would provide an increased incentive for unemployed workers to return to jobs via the "threat effects" (Geerdsen [2006], Black, Smith, Berger, and Noel [2003]). This policy mix would therefore induce a natural sorting among benefits recipients and provide insurance while mitigating the disincentives effects on job search.

10 Appendix : Tables and Figures

	Cohor	t 01/02 (control)	Cohor	rt 02/03 (reform)	Cohor	t 03/04 (control)
	Before	After	p-value	Before	After	p-value	Before	After	p-value
Age	51,9	52,3	<.0001	52,0	51,9	0,51	51,8	51,8	0,93
Gender									
(ref: Man)									
Woman	48,1	47,5	0,76	57,1	59,1	0,37	61,8	60,9	0,68
Children									
(ref : no child)									
Less than 3 children	37,7	41,3	0,08	39,9	44,7	0,02	44,4	40,5	0,07
Three children or more	15,9	15,4	0,77	13,3	14,4	0,45	15,6	15,1	0,75
Nationality									
(ref : French)									
Other	16,4	15,3	0,49	14,0	13,3	0,64	15,6	14,5	0,50
Marital situation									
(ref : single, divorced or widow)									
Married	67,3	65,1	0,28	65,2	67,8	0,21	65,8	65,3	0,83
Education									
(ref : lower secondary)									
BEP-CAP	32,7	35,6	0,15	33,2	34,1	0,67	33,0	34,5	0,47
Secondary general or professional	11,8	10,4	0,29	11,0	10,7	0,86	13,3	12,1	0,44
Upper secondary	6,7	8,1	0,20	5,9	6,4	0,66	6,7	7,5	0,51
Higher	6,1	6,0	0,92	5,0	6,4	0,16	6,0	7,4	0,20
Qualification									
(ref : low skilled blue collar)									
High skilled blue collar	23,4	22,8	0,76	17,7	15,2	0,13	14,7	13,6	0,45
Low skilled white collar	11,5	10,3	0,37	12,5	12,8	0,88	14,7	14,9	0,87
High skilled white collar	38,3	37,9	0,85	43,7	46,2	0,26	46,1	43,2	0,18
Technicians and assoc. professionals	7,0	7,5	0,65	6,2	6,4	0,89	5,1	6,7	0,12
Management	10,4	11,4	0,46	10,0	9,8	0,88	10,2	10,7	0,70
Entry into unemployment									
(ref : Lay-offs)									
End of fixed term contract	51,6	46,4	0,02	49,0	50,6	0,48	47,5	46,8	0,76
Other	11,8	12,3	0,72	16,0	18,3	0,14	19,3	19,3	0,99
Unemployment spells									
Within the two years									
preceding registration	0,84	0,86	0,57	0,82	0,82	0,75	0,88	0,87	0,97
Cumulated unemployment (in days)									
Within the two years									
preceding registration	165,2	160,1	0,22	154,8	156,0	0,79	160,6	160,0	0,88

Table 7: Baseline characteristics, Filière 6/B

	Cohort	t 01/02 (control)	Cohor	t 02/03 (reform)	Cohort	t 03/04 (control)
	Before	After	p-value	Before	After	p-value	Before	After	p-value
Age	52,2	52,4	<.0001	52,2	52,4	<.0001	52,3	52,4	<.0001
Gender									
(ref: Man)									
Woman	48,9	48,4	0,60	46,0	45,4	0,54	48,0	48,0	0,93
Children									
(ref : no child)									
Less than 3 children	31,9	32,3	0,63	31,6	33,3	0,08	33,4	34,2	0,31
Three children or more	6,2	6,2	0,95	7,1	7,7	0,25	7,4	7,6	0,65
Nationality									
(ref : French)									
Other	6,7	6,5	0,68	7,7	8,1	0,58	7,3	7,1	0,73
Marital situation									
(ref : single, divorced or widow)									
Married	71,8	72,1	0,78	70,0	70,1	0,92	70,9	70,1	0,26
Education									
(ref : lower secondary)									
BEP-CAP	33,1	32,6	0,53	32,3	33,1	0,41	35,6	35,5	0,88
Secondary general or professional	13,1	13,1	0,98	12,7	12,3	0,51	12,9	13,2	0,63
Upper secondary	7,8	7,7	0,87	7,5	7,8	0,49	7,4	7,4	0,94
Higher	9,0	9,1	0,79	9,3	9,1	0,82	8,5	9,1	0,22
Qualification									
(ref : low skilled blue collar)									
High skilled blue collar	15,0	15,2	0,79	16,5	16,5	0,99	16,1	15,3	0,18
Low skilled white collar	9,8	10,1	0,65	11,7	11,4	0,62	11,3	11,2	0,82
High skilled white collar	37,0	36,1	0,28	36,2	36,9	0,48	36,6	37,4	0,32
Technicians and assoc. professionals	11,2	11,3	0,92	10,4	10,1	0,61	10,9	10,7	0,73
Management	20,9	21,3	0,50	19,1	18,9	0,83	18,8	19,0	0,80
Entry into unemployment									
(ref : Lay-offs)									
End of fixed term contract	8,4	7,7	0,14	12,6	10,4	<.0001	8,2	8,0	0,69
Other	13,5	12,0	0,02	21,5	23,2	0,05	29,1	29,9	0,28
Unemployment spells									
Within the two years									
preceding registration	0,02	0,02	0,20	0,03	0,02	0,52	0,02	0,02	0,97
Cumulated unemployment (in days)									
Within the two years						_			
preceding registration	56,3	49,8	0,29	41,7	45,1	0,57	57,9	61,6	0,59

Table 8: Baseline characteristics, Filière 7/C

	F	'ilières 6/	/B	F	ilières 7/	/C
	Before	After	p-value	Before	After	p-value
Age	52,0	52,4	<.0001	52,2	52,5	<.0001
Gender						
(ref: Man)						
Woman	57,1	55,7	0,68	46,0	46,7	0,50
Children						
(ref : no child)						
Less than 3 children	39,9	35,8	0,22	31,6	32,1	0,60
Three children or more	13,3	14,2	0,70	7,1	6,2	0,08
Nationality						
(ref : French)						
Other	14,0	14,2	0,93	7,7	7,6	0,74
Marital situation						
(ref : single, divorced or widow)						
Married	65,2	60,6	0,16	70,0	70,5	0,64
Education						
(ref : lower secondary)						
BEP-CAP	33,2	34,6	0,69	32,3	33,7	0,16
Secondary general or professional	11,0	12,2	0,58	12,7	13,0	0,70
Upper secondary	5,9	4,1	0,25	7,5	6,4	0,05
Higher	5,0	6,5	0,33	9,3	9,4	0,87
Qualification						
(ref : low skilled blue collar)						
High skilled blue collar	17,7	19,1	0,59	16,5	17,5	0,23
Low skilled white collar	12,5	14,2	0,47	11,7	11,1	0,33
High skilled white collar	43,7	43,9	0,96	36,2	35,7	0,60
Technicians and assoc. professionals	6,2	6,9	0,69	10,4	9,5	0,16
Management	10,0	7,3	0,18	19,1	19,3	0,83
Entry into unemployment						
(ref : Lay-offs)						
End of fixed term contract	49,0	54,9	0,09	12,6	8,6	<.0001
Other	16,0	14,6	0,60	21,5	27,4	<.0001
Unemployment spells						
Within the two years						
preceding registration	0,82	0,84	0,77	0,03	0,02	0,13
Cumulated unemployment (in days)						
Within the two years						
preceding registration	154,8	151,1	0,59	41,7	50,0	0,16

Table 9: Baseline characteristics, Discarded

	Filière	es 6/B	Filière	s 7/C
	Before	After	Before	After
Employment	35,3	28,1	29,4	29,9
Training	4,9	8,5	8,9	10,8
Sickness	8,9	13,8	9,7	10,6
Early retirement (DRE)	14,6	10,6	20,0	14,9
Retirement	0,3	0,0	0,5	0,6
Attrition	30,6	33,7	23,6	24,9
Assistance	5,1	5,3	7,7	8,1
Censoring	0,4	0,0	0,2	0,2

Table 10: Exits from unemployment, by destination state (Discarded)

	Unempl.	Empl.	Attrition	DRE	UA	Recurrence
$1(d \ge January, 1)$	-0.030	-0.017	0.243	-1.631***	0.570	-0.154
	[0.081]	[0.127]	[0.155]	[0.295]	[0.404]	[0.154]
$1(01/10/2002 \le d \le 31/03/2003)$	-0.027	-0.115	0.183	-0.086	0.591*	0.058
	[0.062]	[0.099]	[0.121]	[0.189]	[0.338]	[0.120]
$1(01/10/2003 \le d \le 31/03/2004)$	0.307***	0.078	0.496***	1.202***	2.186***	-0.037
	[0.066]	[0.104]	[0.126]	[0.216]	[0.331]	[0.129]
$1(01/01/2004 \le d \le 31/03/2004)$	0.095	0.177	-0.082	-0.289	-0.212	0.075
	[0.088]	[0.140]	[0.165]	[0.338]	[0.403]	[0.179]
(d-c)	-0.094	-0.030	-0.200	0.161	-0.551	-0.236
	[0.112]	[0.180]	[0.210]	[0.336]	[0.476]	[0.221]
$(d-c)*1(d \ge January, 1)$	-0.082	-0.320	-0.038	1.254**	0.437	0.402
	[0.154]	[0.251]	[0.287]	[0.560]	[0.611]	[0.312]
Age	-0.009	-0.061***	-0.107***	1.007***	0.001	0.019
~ .	[0.014]	[0.022]	[0.025]	[0.068]	[0.053]	[0.028]
Gender						
(ref: Man)	0.105***	0 201 ***	0.2(2***	0.050	0 220**	0.051
woman	-0.185***	-0.201***	-0.262***	-0.059	-0.339**	0.051
	[0.044]	[0.071]	[0.081]	[0.162]	[0.170]	[0.096]
Marital situation						
Married	0.122***	0.040	0 310***	0.140	0 806***	0.215***
Married	-0.125****	0.040	-0.310***	0.140	-0.808***	-0.213
Childron	[0.041]	[0.000]	[0.070]	[0.146]	[0.132]	[0.062]
(ref : no child)						
Less than 3 children	-0.066	-0 103	0.096	-0.066	-0 300*	-0.071
Less than 5 children	10.0411	10.0651	[0.070]	-0.000 [0.138]	[0 160]	-0.071
Three children or more	0.028	-0.160	0 381***	-0.214	_0.230	0.040
Three cliniciten of more	[0.059]	10 1011	[0 102]	[0 237]	[0 239]	10 1271
Nationality	[0:0055]	[0.101]	[0.102]	[01207]	[01207]	[01127]
(ref : French)						
Other	-0.084	-0.346***	0.292***	-0.023	-0.027	0.146
	[0.057]	[0.101]	[0.093]	[0.207]	[0.215]	[0.126]
Education						
(ref : lower secondary)						
BEP CAP	-0.008	-0.006	-0.098	0.094	-0.505***	-0.032
	[0.044]	[0.072]	[0.083]	[0.155]	[0.177]	[0.090]
Secondary general or professional	-0.042	0.001	-0.176	-0.080	-0.498*	-0.065
	[0.065]	[0.103]	[0.125]	[0.236]	[0.260]	[0.134]
Upper secondary	-0.083	-0.092	-0.184	0.270	-1.098***	-0.053
	[0.083]	[0.136]	[0.160]	[0.278]	[0.380]	[0.179]
Higher	-0.247**	-0.070	-0.280	-0.902*	-1.228***	-0.011
	[0.099]	[0.153]	[0.188]	[0.465]	[0.396]	[0.202]
Qualification						
(ref : low skilled blue collar)						
High skilled blue collar	0.226***	0.250**	0.268**	0.512*	0.232	0.040
	[0.073]	[0.119]	[0.128]	[0.276]	[0.290]	[0.145]
Low skilled white collar	-0.113	-0.268**	-0.066	0.337	-0.053	-0.238
····	[0.078]	[0.136]	[0.140]	[0.264]	[0.285]	[0.168]
High skilled white collar	0.012	0.094	0.041	0.047	-0.04 /	-0.180
	[0.067]	[0.110]	[0.120]	[0.245]	[0.250]	[0.134]
reconnicians and assoc. professionals	0.005	0.080	0.071	-0.417	-0.103	-0.120
Management		$\begin{bmatrix} 0.133 \end{bmatrix}$ 0.142	[0.177]	[0.393]	[0.410]	0.195]
Wanagement	10.029	10 1581	-0.110	-0.220	[0.370]	-0.440
Entry into unemployment	[0.090]	[0.150]	[0.190]	[0.575]	[0.570]	[0.200]
(ref : Lay-offs)						
End of fixed term contract	0.249***	0.433***	0.186**	0.322**	-0.105	0.193**
	[0.043]	[0.069]	[0.078]	[0.152]	[0.172]	[0.087]
Other	0.171***	0.088	-0.005	0.242	-0.015	0.051
	[0.056]	[0.097]	[0.106]	[0.204]	[0.210]	[0.126]
Unemployment spells						
Within the two years	0.200***	0.222***	0.293***	-0.039	0.086	0.255***
preceding registration	[0.048]	[0.076]	[0.084]	[0.193]	[0.214]	[0.093]
Cumulated unemployment (in days)		.40				
Within the two years	-0.020	0.000	-0.028	-0.025	-0.030	-0.027
preceding registration	[0.013]	[0.021]	[0.024]	[0.049]	[0.053]	[0.026]
Observations	6586	6586	6586	6586	6586	2339

Table 11: Effects of observable characteristics - RDD-DID, Filières 6/B

	Unempl.	Empl.	Attrition	DRE	UA	Recurrence
1(1 > 1 (mass 1)	0.110***	0.120**	0.011	1 25(***	0.005	0 171**
$1(a \geq January, 1)$	-0.110***	0.130**	-0.011	-1.330****	0.005	-0.1/1**
1(01/10/2002 < d < 21/02/2002)	[0.034]	[0.060]	[0.073]	[0.091]	[0.133]	[0.085]
$1(01/10/2002 \le u \le 51/05/2005)$	10.099	10.073	0.079	[0.060]	0.104	0.002
$1(01/10/2003 \le d \le 31/03/2004)$	0.303***	0 300***	0 171***	0.450***	1 912***	-0.169**
$1(01/10/2003 \le u \le 51/05/2004)$	10.0261	10 0471	[0.057]	[0.063]	[0 100]	10.0681
$1(01/01/2004 \le d \le 31/03/2004)$	0.058	-0.022	0 154**	0.163	-0.123	0 144
	[0.035]	[0.062]	[0.076]	[0 100]	[0.129]	[0.091]
(d-c)	-0.012	-0.053	-0.037	0.361***	-0.701***	0.072
([0.046]	[0.081]	[0.099]	[0.107]	[0.170]	[0.118]
(d-c)*1(d > January, 1)	0.009	-0.068	0.032	0.133	0.943***	0.018
	[0.065]	[0.114]	[0.138]	[0.184]	[0.231]	[0.168]
Age	0.053***	-0.155***	-0.073***	1.209***	0.247***	0.040**
	[0.007]	[0.011]	[0.014]	[0.027]	[0.024]	[0.017]
Gender						
(ref: Man)						
Woman	-0.185***	-0.431***	-0.232***	0.220***	-0.482***	0.138***
	[0.018]	[0.031]	[0.037]	[0.048]	[0.063]	[0.047]
Marital situation						
(ret : single, divorced or widow)	0.101	0.0565	0.00	0.000	0.7/2444	0.075
Married	-0.104***	0.056*	-0.326***	0.202***	-0.762***	-0.062
Children	[0.017]	[0.031]	[0.036]	[0.050]	[0.057]	[0.046]
(ref : no shild)						
(ref : no child) Less than 3 children	0.112***	0 1/1***	0 130***	0.000*	0.022	0.043
	[0.018]	0.141****	[0.038]	0.099** [0.051]	10.022	-0.043
Three children or more	0.103***	-0.021	0.202***	_0.255**	0.3/0***	0.160**
Three cliniciten of more	[0.032]	[0.055]	[0.062]	[0.121]	[0 109]	[0 079]
Nationality	[0:002]	[0:0000]	[0:002]	[01121]	[01107]	[0:077]
(ref : French)						
Other	-0.018	-0.166***	0.435***	-0.682***	0.359***	-0.066
	[0.031]	[0.058]	[0.055]	[0.101]	[0.095]	[0.084]
Education						
(ref : lower secondary)						
BEP CAP	0.052***	0.166***	-0.024	-0.115**	-0.221***	0.043
	[0.019]	[0.034]	[0.040]	[0.048]	[0.065]	[0.049]
Secondary general or professional	0.023	0.155***	-0.033	-0.534***	-0.400***	0.012
	[0.027]	[0.047]	[0.057]	[0.079]	[0.097]	[0.069]
Upper secondary	0.033	0.205***	-0.033	-0.722***	-0.532***	0.026
III.ahaa	[0.034]	[0.058]	[0.073]	[0.106]	[0.127]	[0.089]
Higner	0.019	0.231***	-0.006	-0.625***	-0.623***	-0.059
Qualification	[0.034]	[0.037]	[0.072]	[0.108]	[0.132]	[0.094]
(ref : low skilled blue collar)						
High skilled blue collar	0.210***	0 535***	0 234***	0.006	-0.116	-0.145
Then skined blue contai	[0.036]	[0.069]	[0 074]	[0.087]	[0 114]	[0.095]
Low skilled white collar	-0.053	0.060	0.020	-0.372***	-0.317***	-0.116
	[0.039]	[0.078]	[0.080]	[0.091]	[0.118]	[0.106]
High skilled white collar	0.061*	0.303***	0.120*	-0.389***	-0.105	-0.255***
	[0.034]	[0.068]	[0.071]	[0.081]	[0.104]	[0.092]
Technicians and assoc. professionals	0.050	0.318***	0.001	-0.181*	-0.048	-0.248**
	[0.040]	[0.076]	[0.086]	[0.098]	[0.129]	[0.105]
Management	-0.099**	0.215***	-0.040	-0.526***	-0.512***	-0.562***
	[0.040]	[0.075]	[0.084]	[0.100]	[0.128]	[0.109]
Entry into unemployment						
(ref : Lay-offs)	0.010***	0.601.****	0.460***	0.0064444	0.172*	0.007***
End of fixed term contract	0.313***	0.631***	0.462***	-0.336***	0.173*	0.28/***
Other	[0.027]	[0.042]	[0.052]	[0.090]	[0.103]	[0.057]
Ouler	0.198***	0.13/***	0.080**	0.062	-0.04 /	-0.044
Unomployment spells	[0.019]	[0.055]	[0.041]	[0.033]	[0.070]	[0.052]
Within the two years	-0.106	0.123	0.027	-0.608	-0.816	0 359
nreceding registration	[0 1341	[0 204]	[0.250]	[0 4841	[0 543]	[0 284]
Cumulated unemployment (in days)	[0.1.54]	[0.204]	[0.230]	[0.404]	[0.545]	[0.204]
Within the two years	0.050	0.020	0.064	0.129	0.142	-0.073
preceding registration	[0.0391	[0.061]	[0.074]	[0.141]	[0.159]	[0.085]
Observations	37233	37233	37233	37233	37233	11375
	1 1 1 1 1 1					

Table 12: Effects of observable characteristics - RDD-DID, Filières 7/C

	Cohort 01/02 (control)			Cohort 02/03 (reform)			Cohort 03/04 (control)		
	Before	After	p-value	Before	After	p-value	Before	After	p-value
Age	51,9	52,3	<.0001	52,0	51,8	0,01	51,9	51,7	0,22
Children									
(ref : no child)									
Less than 3 children	33,5	36,6	0,27	35,0	41,5	0,05	38,1	37,9	0,96
Three children or more	19,5	20,1	0,79	16,3	16,4	0,98	18,3	17,9	0,88
Nationality									
(ref : French)									
Other	22,5	20,8	0,48	20,0	16,7	0,21	18,1	15,5	0,33
Marital situation									
(ref : single, divorced or widow)									
Married	64,9	66,3	0,61	66,2	65,9	0,90	66,3	62,8	0,29
Education									
(ref : lower secondary)									
BEP-CAP	37,2	36,6	0,83	34,7	34,7	0,99	33,4	35,8	0,48
Secondary general or professional	12,4	10,9	0,42	11,1	7,7	0,09	14,2	13,4	0,76
Upper secondary	6,1	9,1	0,06	6,4	7,7	0,45	8,8	8,2	0,78
Higher	7,3	7,8	0,72	7,4	9,3	0,32	9,8	11,3	0,47
Qualification									
(ref : low skilled blue collar)	20.2	20.0	0.00		20.2	0.10		a a a	0.05
High skilled blue collar	39,3	39,0	0,90	35,2	30,3	0,12	31,2	28,2	0,35
Low skilled white collar	4,2	4,4	0,89	4,2	5,7	0,28	5,1	4,9	0,91
High skilled white collar	20,8	17,8	0,19	20,5	23,8	0,24	23,9	21,9	0,49
Technicians and assoc. professionals	11,0	10,0	0,58	8,9	10,9	0,31	8,5	9,9	0,50
Management	14,3	17,9	0,09	17,4	17,5	0,98	20,2	21,9	0,56
Entry into unemployment									
(ref: Lay-offs)	47.0	12 (0.07	46.1	20.0	0.02	10.4	267	0.00
End of fixed term contract	4/,8	42,0	0,07	40,1	38,8	0,05	42,4	30,7 19.4	0,09
	9,7	9,1	0,72	12,2	18,0	0,01	10,1	18,4	0,39
Within the two years									
within the two years	0.05	0.02	0.41	0.00	0.01	0.55	0.07	0 00	0.05
Cumulated unemployment (in days)	0,95	0,92	0,41	0,09	0,91	0,55	0,97	0,09	0,05
Within the two years									
preceding registration	163.2	162.0	0.81	154.0	148 0	0.41	161.8	1624	0.93
preceding registration	105,2	102,0	0,01	154,0	140,9	0,41	101,0	102,4	0,95

Table 13: Baseline characteristics, Filière 6/B - Men

	Cohort 01/02 (control)			Cohort 02/03 (reform)			Cohort 03/04 (control)		
	Before	After	p-value	Before	After	p-value	Before	After	p-value
Age	52,0	52,3	<.0001	51,9	52,0	0,17	51,8	51,9	0,28
Children									
(ref : no child)									
Less than 3 children	42,2	46,5	0,16	43,6	47,0	0,24	48,3	42,2	0,02
Three children or more	12,0	10,2	0,36	11,0	13,1	0,27	13,9	13,3	0,75
Nationality									
(ref : French)									
Other	9,7	9,2	0,78	9,5	11,0	0,40	14,1	13,9	0,94
Marital situation									
(ref : single, divorced or widow)									
Married	69,8	63,7	0,04	64,4	69,1	0,08	65,4	66,9	0,56
Education									
(ref : lower secondary)									
BEP-CAP	27,8	34,5	0,02	32,2	33,7	0,56	32,8	33,7	0,73
Secondary general or professional	11,1	9,8	0,49	10,9	12,9	0,28	12,7	11,3	0,45
Upper secondary	7,3	7,0	0,86	5,6	5,5	0,94	5,4	7,0	0,25
Higher	4,9	4,0	0,50	3,1	4,4	0,25	3,6	4,8	0,28
Qualification									
(ref : low skilled blue collar)									
High skilled blue collar	6,3	5,0	0,38	4,5	4,7	0,84	4,5	4,2	0,79
Low skilled white collar	19,3	16,8	0,30	18,8	17,6	0,59	20,5	21,3	0,74
High skilled white collar	57,1	60,1	0,32	61,2	61,7	0,84	59,8	57,0	0,29
Technicians and assoc. professionals	2,8	4,8	0,08	4,2	3,2	0,36	3,0	4,7	0,12
Management	6,3	4,2	0,14	4,5	4,6	0,97	3,9	3,5	0,66
Entry into unemployment									
(ref : Lay-offs)									
End of fixed term contract	55,6	50,7	0,11	51,2	58,7	0,01	50,6	53,3	0,32
Other	14,1	15,8	0,42	18,8	18,6	0,91	21,3	19,9	0,54
Unemployment spells									
Within the two years	0.70	0.70	0.15	0.50	0.75	0.45	0.00	0.07	0.17
preceding registration	0,73	0,79	0,15	0,78	0,75	0,45	0,82	0,86	0,17
Cumulated unemployment (in days)									
Within the two years	167.0	1577	0.10	155.5	161.0	0.20	150.7	150.2	0.00
preceding registration	167,9	157,7	0,12	155,5	161,8	0,30	159,7	158,3	0,80

Table 14: Baseline characteristics, Filière 6/B - Women

	Cohort 01/02 (control)		Cohort 02/03 (reform)			Cohort 03/04 (control)			
	Before	After	p-value	Before	After	p-value	Before	After	p-value
Age	52,2	52,4	<.0001	52,1	52,3	<.0001	52,3	52,4	<.0001
Children									
(ref : no child)									
Less than 3 children	35,4	35,4	0,96	34,0	35,1	0,39	36,9	36,6	0,83
Three children or more	9,4	9,7	0,68	10,3	11,5	0,18	10,6	11,0	0,61
Nationality									
(ref : French)									
Other	8,8	8,3	0,47	10,0	9,6	0,69	9,1	9,2	0,84
Marital situation									
(ref : single, divorced or widow)									
Married	74,7	74,6	0,92	71,9	72,4	0,72	73,9	71,4	0,01
Education									
(ref : lower secondary)									
BEP-CAP	35,3	33,4	0,10	34,4	34,1	0,81	38,2	37,5	0,50
Secondary general or professional	13,0	12,7	0,67	11,9	10,9	0,29	11,7	13,2	0,05
Upper secondary	8,1	8,5	0,52	8,7	9,1	0,59	8,1	7,6	0,46
Higher	12,1	12,1	1,00	12,5	11,8	0,45	11,6	12,4	0,32
Qualification									
(ref : low skilled blue collar)									
High skilled blue collar	23,8	24,2	0,76	25,9	26,2	0,79	25,9	24,4	0,13
Low skilled white collar	5,0	5,0	0,98	6,2	5,5	0,31	6,1	6,0	0,81
High skilled white collar	19,2	19,4	0,83	20,7	20,6	0,95	19,9	20,7	0,38
Technicians and assoc. professionals	14,5	13,9	0,49	13,2	12,2	0,29	13,8	12,9	0,26
Management	30,6	30,6	0,99	28,0	28,7	0,58	27,4	27,8	0,64
Entry into unemployment									
(ref : Lay-offs)									
End of fixed term contract	8,0	7,0	0,12	12,9	8,8	<.0001	7,0	5,9	0,05
Other	11,3	10,3	0,20	20,2	22,8	0,03	29,6	29,8	0,90
Unemployment spells									
Within the two years									
preceding registration	0,02	0,02	0,11	0,03	0,03	0,32	0,02	0,02	0,38
Cumulated unemployment (in days)									
Within the two years									
preceding registration	50,2	43,4	0,38	43,6	37,5	0,42	49,0	45,2	0,63

Table 15: Baseline characteristics, Filière 7/C - Men

	Cohort 01/02 (control)			Cohort 02/03 (reform)			Cohort 03/04 (control)		
	Before	After	p-value	Before	After	p-value	Before	After	p-value
Age	52,2	52,4	<.0001	52,2	52,4	<.0001	52,3	52,4	0,001
Children									
(ref : no child)									
Less than 3 children	28,2	29,0	0,48	28,9	31,2	0,11	29,7	31,6	0,08
Three children or more	2,9	2,5	0,43	3,4	3,3	0,83	3,8	3,9	0,97
Nationality									
(ref : French)									
Other	4,5	4,6	0,83	5,1	6,2	0,14	5,3	4,9	0,39
Marital situation									
(ref : single, divorced or widow)									
Married	68,9	69,4	0,66	67,8	67,4	0,79	67,7	68,7	0,40
Education									
(ref : lower secondary)									
BEP-CAP	30,8	31,7	0,44	29,8	32,0	0,14	32,7	33,3	0,62
Secondary general or professional	13,2	13,6	0,64	13,7	13,9	0,88	14,1	13,1	0,22
Upper secondary	7,4	6,8	0,34	6,0	6,3	0,70	6,7	7,1	0,48
Higher	5,7	5,9	0,72	5,4	5,9	0,52	5,1	5,5	0,48
Qualification									
(ref : low skilled blue collar)									
High skilled blue collar	5,8	5,7	0,77	5,6	4,9	0,33	5,4	5,4	0,88
Low skilled white collar	14,9	15,5	0,53	18,1	18,4	0,83	16,9	16,8	0,92
High skilled white collar	55,6	53,8	0,16	54,4	56,6	0,17	54,7	55,6	0,48
Technicians and assoc. professionals	7,7	8,4	0,32	7,2	7,6	0,62	7,7	8,3	0,37
Management	10,7	11,5	0,31	8,6	7,1	0,07	9,6	9,4	0,77
Entry into unemployment									
(ref : Lay-offs)									
End of fixed term contract	8,9	8,5	0,60	12,2	12,3	0,96	9,5	10,4	0,24
Other	15,8	13,9	0,04	22,9	23,7	0,55	28,5	30,1	0,15
Unemployment spells									
Within the two years									
preceding registration	0,02	0,02	0,78	0,02	0,02	0,85	0,03	0,03	0,40
Cumulated unemployment (in days)									
Within the two years									
preceding registration	62,3	54,3	0,39	38,4	56,5	0,04	65,6	73,5	0,45

Table 16: Baseline characteristics, Filière 7/C - Women

	Filières 6/B	Filières 7/C
0-3 months	0.367**	0.360***
	[0.177]	[0.083]
4-6 months	-0.643***	0.073
	[0.224]	[0.090]
7-9 months	0.387*	0.368***
	[0.201]	[0.102]
10-12 months	0.005	0.066
	[0.289]	[0.132]
13-15 months	-0.160	0.293**
	[0.257]	[0.130]
16-18 months	-0.098	0.147
	[0.271]	[0.163]
19-21-months	0.678**	0.384**
	[0.294]	[0.161]
22-24 months	0.762**	0.181
	[0.338]	[0.180]
25-27 months	0.842***	0.012
	[0.293]	[0.201]
28-30 months	1.002**	-0.239
	[0.453]	[0.254]
> 30 months	1.038***	
	[0.237]	
31-33 months		-0.193
		[0.233]
34-36 months		0.419**
		[0.199]
37-40 months		0.419**
		[0.197]
> 40 months		0.696***
		[0.153]
Observations	6586	37233

Table 17: Estimation results by unemployment duration

Figure 5: Empirical hazard and survivor functions, unemployment, Filière 6/B Reform cohort 2002-2003



Pre-reform cohort 2001-2002



Post-reform cohort 2003-2004



Figure 6: Empirical hazard and survivor functions, unemployment, Filière 7/C Reform cohort 2002-2003



Pre-reform cohort 2001-2002



Post-reform cohort 2003-2004



Figure 7: Empirical hazard functions, exits from unemployment, Filière 6/B Reform cohort 2002-2003



Pre-reform cohort 2001-2002







Figure 8: Empirical hazard functions, exits from unemployment, Filière 7/C

Reform cohort 2002-2003



Pre-reform cohort 2001-2002







Figure 9: Empirical hazard and survivor functions, employment, Filière 6/B



Reform cohort 2002-2003

Pre-reform cohort 2001-2002



Post-reform cohort 2003-2004



Figure 10: Empirical hazard and survivor functions, employment, Filière 7/C



Reform cohort 2002-2003

Pre-reform cohort 2001-2002



Post-reform cohort 2003-2004



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