Unemployment Benefits and the Timing of Dismissals: Evidence from Bunching at a Notch in France

Laura Khoury*

April, 2017

Abstract

In this paper, I use administrative unemployment data to analyse bunching in the workers' seniority distribution, at a notch created by an unemployment benefit schedule designed for workers laid-off for economic reasons. I exploit the discontinuity in the level of the budget set to estimate an elasticity of labour supply to unemployment benefits. I also investigate the possible channels of strategic behaviours in a context where the dismissal decision is the result of bargaining between employer, employee and representatives within the firm. I find evidence that significant bunching occurs at the relevant seniority threshold as a response to incentives created by the unemployment benefit scheme: employers and employees maximise joint surplus thanks to a third party's - the State - transfer. I find that this bunching is concentrated in the population who has the most to gain and is the most able to implement strategic behaviours and to take advantage of unemployment compensation rules.

Keywords: Unemployment, Behavioural response to taxation, Collective bargaining

JEL Codes: H30, J52, J63, J65, J68

*Paris School of Economics, 48 boulevard Jourdan, 75014 Paris. Email: laura.khoury@psemail.eu

1 Introduction

Unemployment insurance (UI) is an important component of the Welfare State in France. It is classified as a social insurance, as it covers any worker from the risk of job loss as long as he has contributed enough to the scheme before, in a mutual way. The rise of the weight of social spending in recent years in OECD countries, [1] and the increase in the unemployment rate has given UI design center stage in the public debate. Decision-makers are trying to take into consideration recent changes on the labour market – such as the shortening of employment spells – focusing the attention on employment path rather than employment status.

In this spirit, a more specifically targeted benefit package has been introduced in 2005[2] for workers laid-off for economic reasons (WLER), in parallel to the main and broadly designed UI benefits,[3] called the *Convention de reclassement personnalisée* (*CRP*), then renamed the *Contrat de sécurisation professionnelle* (*CSP*). The significant weight of WLER among the registered unemployed population (10.8% in 2011), and the particularity of their profile[4] called for the introduction of a specific scheme, with the objective of securing their professional path by offering a comprehensive and personalised support.

The *CRP-CSP* main feature is to introduce a non-linearity in the compensation amount at a seniority threshold which varied between 1 and 2 years during my period of interest (September 2009 - September 2014). While all the WLER are entitled to the counselling and training components of the *CSP* (respectively the *CRP*), I focus here on the extra benefit offered only to some of them. Workers laid-off for economic reasons having completed one year (resp. 2 years) of tenure are entitled to a specific benefit (*Allocation de sécurisation professionnelle*, ASP) equivalent to 80% of previous gross earnings

[1] From 18% in 2000 to 21% in 2016, OECD Social Expenditure Database (SOCX).

[2] Law №2005-32 of January, 18^{th}, 2005 - art. 74 JORF January, 19^{th} 2005

[3] The UI scheme in France is characterised by a main insurance benefit, the *Allocation de retour à l'emploi* (ARE), designed for all workers having lost their jobs unintentionally, and fulfilling very general and nonrestrictive conditions.

[4] The population of WLER is mainly composed of workers needing to redeploy toward other industries, on average older, more frequently male, less educated but with higher wage and compensation duration than the other compensated workers (Unedic, 2015).

(which virtually translates into 100% of previous net earnings), whereas those under this threshold only receive the standard benefit (57.4% to 75% of previous gross earnings). This jump in the level of UI benefits creates incentives to locate at the right side of the seniority cutoff, and then, to optimise the seniority value.

The behavioural response to this type of non-linearity in the budget set, either through a discontinuity in the slope or in the level of the budget constraint, has been extensively studied in labour and public economics, as taxes and transfers policies often lead to the creation of such kinks and notches.

The standard labour supply model implies that individuals will supply hours of labour until the marginal disutility of work equals marginal utility of disposable income. Under the assumption of convex and smoothly distributed individual preferences, it predicts that the distribution of labour supply should exhibit a bunch where a kink or a notch is present. Yet, important optimisation frictions have been highlighted by several papers (Chetty et al., 2011; Kleven and Waseem, 2013), attenuating the magnitude of the bunching as predicted by the standard model, and explaining the gap between observed and structural compensated elasticity of income with respect to the net-of-tax wage.

The setting under study here is an upward-notch in the level of disposable income created by a jump in the UI benefits generosity at the one-year tenure cutoff, which makes possible to measure the sensitivity of work contract duration, and thus seniority, to the level of unemployment benefits. The effect of different parameters of the unemployment insurance on outcomes such as unemployment duration, reservation wage, quality of subsequent work, has drawn a lot of attention. In particular, the literature on the optimal unemployment insurance aims at finding the parameters that balance the disincentive costs on labour supply and the consumption-smoothing benefits of unemployment compensation. The *sufficient statistics* approach used first by Baily (Baily, 1978) and developed by Chetty (Chetty, 2006) consists in setting a model of optimal unemployment insurance that does not rely on the expression of primitives, but comes down to a small

number of statistics – mainly the elasticity of unemployment duration to the level of benefits, the coefficient of risk aversion, and the drop in consumption undergone when becoming unemployed – that can be empirically estimated. The optimal replacement rate formula, that can be easily connected to the data, equalises the cost of transferring one euro from the employed to the unemployed state, in terms of moral hazard, to the benefits of such a transfer, in terms of consumption smoothing.

This study contributes to the literature on optimal UI and on the effect of taxes and benefits on labour supply by focusing on the impact of the *level* of UI benefits in *France*, while this topic has not been often studied in this country, as the sources of variation – either time-related or territorial – are scarce. One originality of the paper, though, is to mainly analyse behaviours when employed, or, more precisely, at the moment of the dismissal. Indeed, regarding the effect of UI design on labour market outcomes, the emphasize has been put on the impact on unemployment outflows rather then inflows. Studies of the effect of the eligibility criteria to UI benefits have shown that it does play a role on unemployment inflow, as the number of transitions from employment to unemployment sharply increases at the moment workers meet the entrance requirement, or when they reach the maximum potential compensation duration (Christofides and McKenna, 1995; Green and Sargent, 1998; Green and Riddell, 1997; Rebollo-Sanz, 2012)). Green and Riddell exploit a variation in the entrance requirement in Canada in 1990 to look at the effect on employment duration: they find that employment spells are indeed sensitive to the stringency of the eligibility criteria, and that they are extended in response to a tightening of this criteria. Interestingly, they observe that those workers whose employment spell terminates right after they have qualified for UI are disproportionately low skilled, and that the effect mainly goes through layoffs rather than quits. It suggests that employers do play a role in responding to the change in entrance requirement by choosing to extend the employment spell. My results also support this analysis in the sense that my population of interest in only composed of workers laid-off for economic reasons, in order for them to be eligible to the specific UI scheme under study. Then, the extension I observe is to a great extent in the employer's hands, meaning that the

employers choose to adjust to the UI eligibility requirement, through a negotiation process with employees.

Still, the above mentioned studies are not numerous, quite old and mainly focus on Canada. The idea in this paper is to analyse the impact of eligibility not to receiving benefits at all, or to higher compensation duration, but to a *higher level of UI benefits* on employment duration. More precisely, I look at the impact of UI benefit level on the timing of the contract termination, conditional on the dismissal decision having been made. Then, I do not consider the influence of UI on the dismissal decision. My setting relates to the one of the elderly workers, whose exit from employment at the end of the career is likely to be affected by employment protection, UI and pension schemes, and the coordination between these different structures. Elderly workers who experiment an unemployment spell right before they retire can optimise the moment of contract termination in order to be covered successively by UI and pension schemes without any interruption in payment. Baguelin et al. (2016) develop a model clarifying the incentives for employers and employees to end the employment spell before the legal retirement age. This theoretical work is supported by the empirical findings of Baguelin and Remillon (2014) who exploit a 2003 reform in France which decreased the potential benefit duration of UI entrants. They shown that it resulted in an 4-months increase of the mean age at dismissal of workers laid-off close to the retirement age, suggesting that dismissal of elderly workers is scheduled so that they are covered by UI until they are able to retire, and that UI is used both by employers and employees as an early retirement scheme. Public policy implications are large, especially in the French context where the statutory retirement age has been gradually pushed back, and where decision-makers aim at improving senior employment. More specific to my context, UI scheme can be used as a way to soften the conditions of economic dismissals, potentially leading to several types of inefficiencies: (i) the maintenance of a poor match some additional days; (ii) on the contrary, the employer being less reluctant to terminate employment contract if he knows there will be a third-party compensation to the worker, whose cost does not enter his utility function; (iii) the covering by UI of people who should not have been covered,

which increases UI spending mechanically and indirectly through a possible longer unemployment duration. A more detailed discussion of public policy implications will be provided at the end of the paper.

I argue in this paper that the introduction of a discontinuity in the level of UI benefits at a seniority threshold triggers some bunching in the seniority distribution right above this threshold. This bunching phenomenon goes through the retiming of the dismissal thanks to employers and employees bargaining. An exploration of the variation in the magnitude of bunching according to the level of incentives, to individual as well as firm-level characteristics indicates that the rescheduling is part of an individual more than a collective negotiation process, and that the most educated and skilled workers are the ones more able to take advantage of this benefit package.

In this setting, the UI benefits level has no impact on the dismissal decision itself, which is typically affected by employment protection legislation, but on the timing of this decision. On the employer side, expected UI payment can affect whether the employee proceeds with negotiation on the contract termination day, whereas the employer can consider additional UI benefits as a way to offset the psychological and social cost of the dismissal for the worker, and then to avoid having his reputation harmed or paying damages. Hence, this discontinuity in the level of UI benefits can influence the composition of the pool of dismissed workers, and the date of contract termination. In other words, we could observe a selection into dismissal (prioritizing workers meeting the seniority criteria), or, if the employer does not select the dismissed workers according to the UI parameters, he can adopt a strategic waiting behaviour to allow most of them to qualify for the higher benefits. I argue that the main channel of optimisation is the second one, implying some bargaining between employers and employees over the extension of the work contract. The French legislation defines several steps of the economic dismissal procedure, and imposes some minimum time periods between each of these steps. The scenario supported by this paper is that, through these minimum time periods, the employer has some room to strategically extend the length of the procedure, and therefore

the length of the employment spell. One contribution of this paper is to bring some insights on the firm's bargaining black box, by identifying individual and firm-level determinants of bunching, and by trying to decompose the factors explaining bunching into incentives, preferences and ability to negotiate.

Therefore, although a first reduced-form estimate of workers' labour supply response to UI benefits can be computed, it should be noted that this estimate would capture different parameters – the pure behavioural response of workers to financial incentives as well as some ability to negotiate the seniority value and optimisation frictions. In the empirical part, my work builds upon the bunching methodology. I use a difference-in-bunching strategy to isolate the pure effect of the *CSP*, regardless of the role of other labour regulation or social norm [5] that would trigger some bunching unrelated to the behaviour of interest.

The particularity of my setting – a two-sided negotiation whereas the financial incentives lie mainly on the workers' side – calls for the introduction of a theoretical framework clarifying the cost and benefits of extending the employment spell on each side. It motivates the need to take into account the interactions between the different agents, and to cast light on the bargaining process between employers and employees, in a contentious context, source of social tension.[6]

The remainder of this article is organised as follows: Section II gives an overview of the legislative framework on economic dismissals and the corresponding unemployment compensation scheme, Section III presents the data and provides empirical evidence of bunching. Section IV elucidates each party's theoretical costs and incentives, while Section V develops the bunching method and its implementation to derive estimates of the elasticity of contract duration with respect to the level of unemployment benefits, and to analyse the sources of variation of the bunching intensity. Section VI provides some robustness checks and Section VII concludes and presents some public policy implications.

[5] Round-number or psychological anchoring effect for example.

[6] Dismissals for economic reasons often involve collective lay-offs and as a consequence, are highly covered by the media.

2 Legislative Background

The benefit packages studied as part of this paper are the *CRP* (*Convention de reclassement personnalisée*) implemented on April, 5^{th}, 2005 and in effect during our first period of interest (September, 1^{st}, 2009-August, 31^{st}, 2011), and the *CSP* (*Contrat de sécurisation professionnelle*), in effect during our second period of interest (October, 1^{st}, 2011-September, 30^{th}, 2014). Any change taking place after this date are not taken into account, in particular the reform enforced in April, 1^{st}, 2015 which introduced many modifications in the scheme.

The two schemes have been designed in the same spirit, as a way to secure the career path of workers laid-off for economic reasons and to help them reintegrate the labour market as soon as possible, and in good conditions. We focus our study on the *CSP*, and we use the *CRP* only for comparative purposes. In the following pragraph, the legislative rules regarding the *CSP* will be detailled, as the rules that apply to the *CSP* also apply to the *CRP* (the main change being on the seniority criteria to benefit from the higher compensation).

Which firms are concerned?

In firms with less than 1,000 employees or in compulsory liquidation or receivership (whatever the workforce size), employers are bound to offer the *CSP* to any employee they want to lay-off for economic reasons, during the interview prior to dismissal or after the last meeting of employees' representatives. It should be noticed that workers laid-off for economics reasons are necessarily workers in open-ended contracts.

To benefit from the *CSP*, the worker must also meet the following criteria:

- Having been affiliated at least 122 days or 610 hours within the last 28 months
- Not having reached the compulsory retirement age

- To live on the territory where the unemployment insurance is applicable
- Being physically able to work

The seniority condition does not determine the eligibility to the *CSP*, but to the ASP. Under one year of seniority, the worker is only entitled to receive the ARE and to benefit from the counselling and training dimensions of the *CSP*.[7]

Steps of the legal procedure

A quick description of the different steps is provided, as this information will be useful later to understand whether employers and employees have room to set up strategic behaviours.

The procedure for dismissals for economic reasons implies several steps, whose number depends on the workforce size and the number of people dismissed. It involves meeting and discussing with employees' representatives, when they are present in the firm, and respecting minimum periods of time between each step. The whole procedure is monitored by the Health and Safety Inspection.

In the concerned firms, the employer, after having announced the economic dismissal plan and discussed with the employees' representatives, must offer the *CSP*, individually and in a written way, to any eligible worker, either during the interview prior to dismissal, or after the last meeting of the employees' representatives, or after the approval of the redundancy plan, if any. The employee has a 21 days period to take his decision: if he refuses, he gets the standard benefit scheme; if he accepts, the work contract terminates at the end of the 21 days period, without any advance notice.

The *CSP* is organised, over a maximum period of 12 months, as a path back to employment, through intensive counselling and guidance, and possibly through a career change or the creation of an enterprise. During the whole process, the unemployed worker benefits from regular meetings with his dedicated counsellor, including a skills'

[7]If he chooses to accept it. The *CSP* is offered to any eligible worker but he decides ultimately if he accepts it or if he just gets the standard compensation scheme.

assessment, the formulation of a professional project, a social and psychological support, training, advice for job interviews, etc.

If the guidance and counselling dimensions can been seen as attractive – as additional resources to accelerate the return to employment – or troublesome – felt like ways to monitor the worker too closely – the additional benefit offered to workers eligible to the *CSP* and having completed at least one year of seniority is likely to be positively valued by every worker, creating some incentives to go beyond this one-year seniority threshold. However, as the dismissal decision and its timing are in the hand of the employer, it is not up to the employee to decide whether he completes his seniority year. In theory, the dismissal decision, in the setting we are interested in, is only motivated by the economic difficulty of the firm, and should affect workers within the enterprise, if not randomly,[8] at least not according to some sharp eligibility thresholds.

Two important consequences of the acceptance of the *CSP* should be noted: First, as soon as the 21 days period takes an end, the worker starts to be compensated without any waiting period or notice, on the basis of the standard benefit or the ASP, depending on his seniority. Second, for workers accepting the *CSP*, the breach of the work contract is no longer considered a dismissal, but a mutually agreed termination, which may imply less administrative constraints for the employer in the future.

The different possibilities and their consequences are summed up in Tables 1.

Table 1: Entitlements according to worker's decision and seniority

Accepting the *CSP*		**Refusing the *CSP***
Seniority < 365 days	Seniority ≥ 365 days	Whatever the seniority
Counselling + training + ARE + *compensation in lieu of notice* + *no waiting period*	Counselling + training + ASP + *no waiting period*	ARE *compensation in lieu of notice*

A more detailled presentation of the consequences of accepting the CSP and how they are valued can be found in Appendix A:

[8]In setting up a collective dismissal plan for economic reasons, the employer has to follow some criteria to determine which workers will be laid-off in priority. Among them, there are the family load, the seniority, social characteristics making the return to work difficult, the professional skills, etc.

3 Empirical Evidence of Bunching

3.1 Data

I use administrative data (*Fichier national des allocataires*, FNA) collected by the organisation in charge of unemployment insurance in France, the *Union nationale interprofessionnelle pour l'emploi dans l'industrie et le commerce* (Unédic) for the years 2009 to 2014. More precisely, I focus on two sub-periods, for comparative purpose, gathering respectively the contract terminations for economic reasons occurring between September, 1^{st}, 2009 and August, 31^{st}, 2011, and October, 1^{st}, 2011 and September, 30^{th}, 2014. I select only the contract terminations for economic reasons opening entitlements to the *CSP*, that are contract terminations for economic reasons in firms of less than 1,000 employees, or firms in compulsory liquidation or receivership (whatever the workforce size).

The *CSP* is offered to any eligibile WLER: if he chooses to accept it, he will benefit from the package for a maximum of 12 months. If he has not found a job by the end of the 12 months, he can switch to the standard compensation scheme (ARE) if the initial compensation duration he was entitled to was greater than 12 months (meaning that he has been affiliated more than 12 months before the contract termination). Then, the compensation duration is computed by substracting the duration of the *CSP* to the initial compensation duration.

In my analysis, I consider the whole compensated period by reconstructing the unemployment spell: it corresponds either to the potential *CSP* duration to which we add the potential ARE compensation period that immediately follows, or directly the ARE compensation period if the worker has rejected the *CSP*. In somes cases, the unemployed person has experienced several episodes during the same unemployment spell, either because he found a temporary job and resumed UI compensation after, either because he interrupted compensation for sickness or other motives. As the information on the reason why the unemployed person left the UI register is not entirely reliable, I chose to gather

within the same spell the episodes separated by a period shorter than the minimum affiliation requirement to open a new entitlement to UI benefits (that is 4 months). However, I do not add these periods to my computation when counting the total duration of the compensated spell.[9]

Another limit of the data is that I do not observe directly the return to work: the only variable I am able to measure is the duration of compensated unemployment, which is an imperfect proxy for the return to work, as leaving unemployment does not necessarily mean that the worker has found a new job (Card et al., 2007). However, as the return to work is not my main outcome of interest, I can still use the duration of compensated unemployment to have some insights on the effect of the *CSP* on labour supply.

My main variable of interest is the seniority variable: I need a precise and reliable measure of the density of the length of service on a daily basis to understand what happens at the one-year threshold. The information on seniority comes form the certificate delivered by the employer either to the employee for him to receive unemployment benefits, or directly to the employment agency (*Pôle Emploi*). As this certificate is mandatory for the employee to be compensated and that the information on seniority determines the way the worker will be compensated, this information is closely monitored by the employment agency and can be deemed reliable. The contract termination occurs at the end of the reflection period granted to the employee eligible to the *CSP*, no matter his answer. Yet, we find in the data some inconsistency between the end of the contract date and the beginning of the advance notice period: indeed, in case the worker refuses the *CSP*, he will receive the standard benefit, and will potentially execute a notice period, that is a period when he knows he is laid-off, but he continues to work and to be paid. This period is a way to give the worker some time to find a new job while continuing to receive a wage. In some cases, the notice is not executed but the worker still gets the corresponding earnings. Adjusting for this discrepancy by subtracting the notice duration

[9] Although this choice can be discussed, we can argue that these breaks generally correspond to small employment periods – and then should not be counted in the unemployment spell duration – or to periods where the unemployed person was not able to look for a job – for sickness or maternity for example.

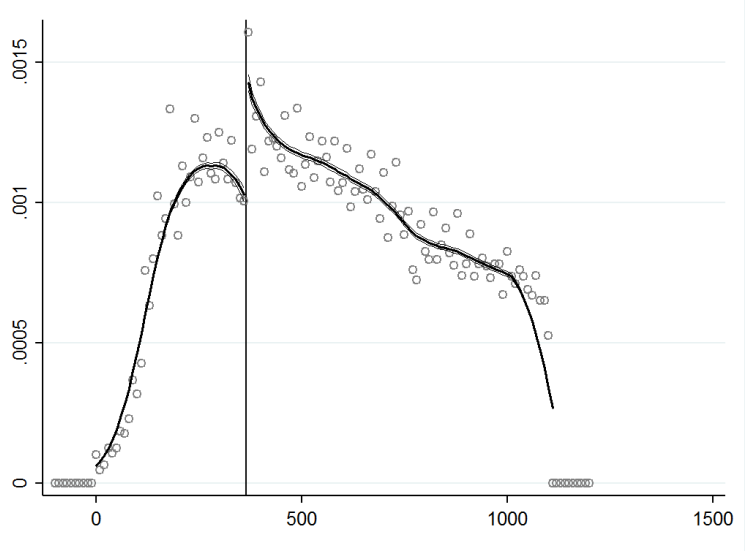
to the seniority value does not affect the results. I then choose to keep the raw seniority variable for everyone.

3.2 Documentation of the Bunching

A first evidence that some manipulation occurs at the one-year seniority threshold is provided by the Mc Crary test (McCrary, 2008) which analyses the difference in log density between both sides of a specific threshold. This test is traditionally used to make sure that the assumptions to use a regression discontinuity design hold, in particular the one ensuring that no manipulation of the running variable occurs. The Mc Crary test on the seniority density highlights the discontinuity at the strategic one-year threshold.

Figure 1 provides a striking graphical evidence of bunching just above the 365 days threshold for our period of interest:

Figure 1: Mc Crary test on the seniority variable at the 365 cutoff (October, 2011 - September 2014)



Source: FNA.
SAMPLE: The whole population of workers eligible to the *CSP* entering unemployment between October, 2011 and September, 2014. Binsize: 10, bandwidth: 100.

Figure 1 shows a significant 36% increase in the density at the cutoff, with a hole at the left side and a mass at the right side, two distinctive features of bunching.

Although this graph provides evidence of some concentration of workers at one year, I cannot yet rule out the possibility that this pattern is not related at all with the existence of the *CSP*. I start by eliminating two possible explanations that may come to one's mind by making two precisions: first, all the contract terminations for economic reasons examined in my sample are open-ended contracts, meaning that this pattern cannot be due to some regularity in the duration of fixed-term contracts. Second, the observed spike cannot be explained neither by the existence of renewable trial periods, as the maximum duration that can be reached corresponds to eight months (for executive workers).

These clarifications having been made, we can still distinguish several explanations to the spike in the density that we observe at the cutoff, either through psychological mechanisms (anchoring phenomenon on a reference point) or legislative feature (the 365 days cutoff can serve as a threshold for other administrative schemes). All the challenge here is to prove that this concentration is indeed due to strategic behaviours in response to the incentives introduced by the *CSP*, and that it is not just an administrative or psychological reference point. This sub-section provides informative elements all converging towards the strategic behaviours explanation.

3.2.1 Location of the Discontinuity at Different Cutoffs for Different Periods of Time

To argue that the concentration of workers laid-off for economic reasons just above the 365 days cutoff is a response to incentives created by the *CSP*, we exploit the fact that a similar package existed before the introduction of the *CSP* in September, 2011, the *CRP*. As explained above, it also consisted in an intensified guidance, support and counselling, and an easier access to training, as well as a much higher benefit for those having more than 2 years of seniority. In other words, the main difference with the *CSP* is that, to qualify for the higher benefit, the requirement is *to have at least two years of tenure* instead of one.

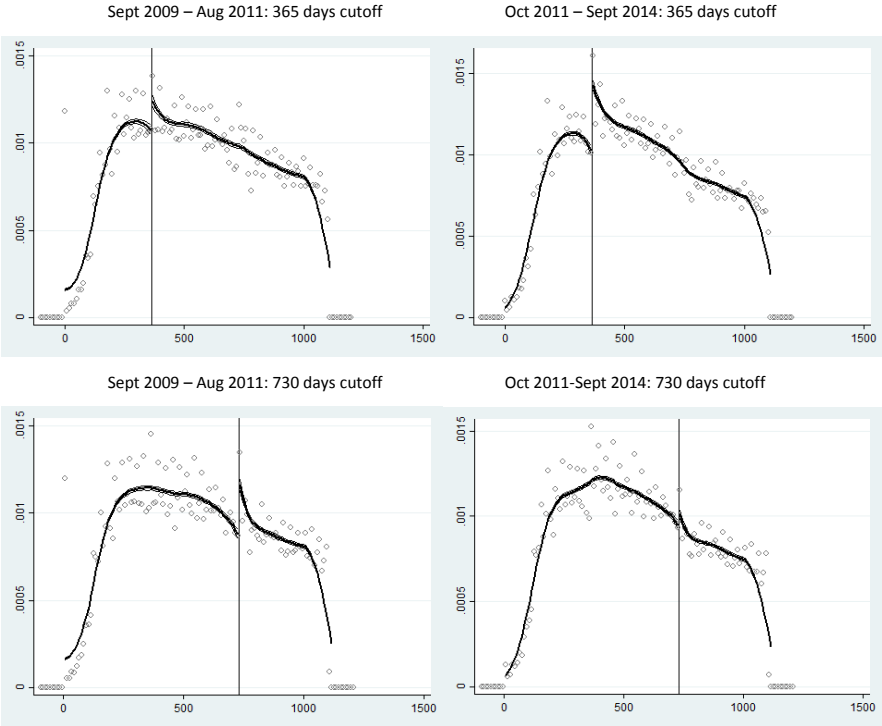
I then perform a placebo test on the period *preceding the introduction of the CSP* by plotting the distribution of the seniority density at the same threshold, when the *CRP* was in effect. Reassuringly, we observe a discontinuity in the tenure density at two years in the period September, 2009 - August, 2011, which disappears completely after the *CRP* has been replaced by the *CSP*. The density jumps by 32% at the cutoff, and the discontinuity is significantly different from zero. However, no or a much smaller discontinuity is observed respectively at the one-year and two-years seniority cutoffs for the 2009-2011 and 2011-2014 periods. It means that when no incentives created by the UI benefits schedule exist at some points of the seniority distribution, no bunching is observed. This finding needs to be qualified by the fact that I find some evidence of a small discontinuity at the one-year seniority threshold for the 2009-2011 period that is necessarily explained by some factors unrelated to the *CRP*/*CSP*: although much smaller in magnitude (a 16% jump instead of a 36% jump after the introduction of the *CSP*), it should not be neglected, and it calls for the use of a difference-in-bunching methodology, as I will further explain in sub-section 6.2.

This spike at the 2 years cutoff can be interpreted as a sign that the bunching is a response to the *CSP* and *CRP* packages, as, if it would have been linked to any other feature of the legislation related to the one year seniority cutoff, it would not have been observed at the two year cutoff in the 2009-2011 period. Similarly, after the introduction of the *CSP*, the discontinuity at the two year cutoff disappears while the discontinuity at the one year threshold starts appearing (Figure 2). All in all, having discontinuities in the seniority density at the threshold corresponding respectively to the *CSP* and *CRP* legislation for the relevant period, and, conversely, not observing these discontinuities for the period the *CSP* or the *CRP* are not applicable are all elements converging toward the strategic behaviours scenario.

3.2.2 Speed of the Discontinuity Shifting

In addition to observe a shift in the discontinuity location at the relevant thresholds respectively for the *CRP* and the *CSP*, we notice that this shift occurs rapidly. In the

Figure 2: Mc Crary test on the seniority variable at the 365 and 730 days cutoffs for the two periods of interest



Source: FNA.
SAMPLE: The whole population of workers eligible to the *CSP* entering unemployment between September, 2009 and September, 2014 (1,118,847 observations). Binsize: 10, bandwidth: 100.

first quarter after the introduction of the *CSP* (September 2011 - November 2011), we already observe a sharp decrease in the two-year discontinuity and an important increase in the one-year one. In the following quarters, the discontinuity at one year goes on increasing and then stabilises, while the one at 730 days almost disappears (at the 4^{th} quarter). We see this gradual evolution in Table 2.

The immediate translation of the legal scheme into a change in the seniority distribution corroborates the hypothesis that the behavioural response is driven by the *CRP-CSP* incentives.

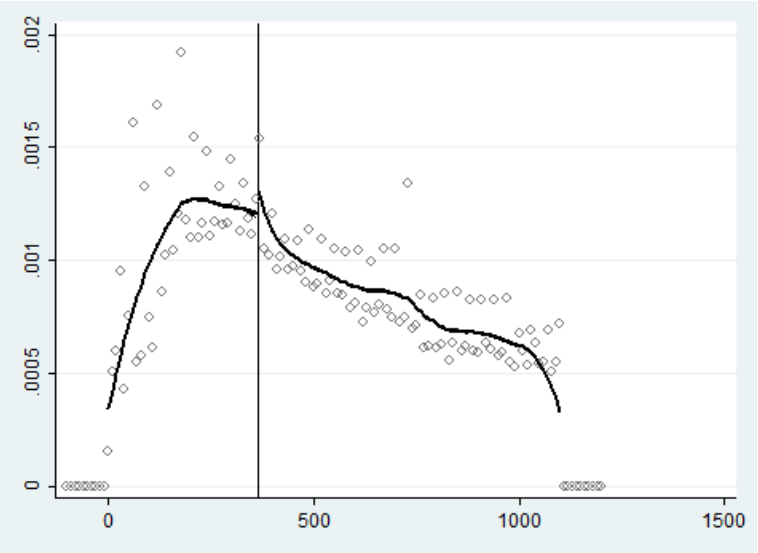
Table 2: Log discontinuity estimates

Time period	Threshold	Log difference
September 2009 - September 2011	365 days	.157***
		(.021)
	730 days	.319***
		(.022)
July 2011 - September 2011	365 days	.067
		(.072)
	730 days	.154*
		(.081)
September 2011 - November 2011	365 days	.315***
		(.060)
	730 days	.174***
		(.067)
December 2011 - February 2012	365 days	.284***
		(.059)
	730 days	.146**
		(.068)
March 2012 - May 2012	365 days	.350***
		(.060)
	730 days	.174**
		(.069)
June 2012 - August 2012	365 days	.332***
		(.063)
	730 days	.040
		(.069)

3.2.3 Continuous Distribution of the Seniority Among All Open-Ended Contracts

To be more convinced that the bunching we observe is not an administrative bunching, just linked to another feature of the legislation or to a round-number effect (employers when reporting the date of contract termination choose it so that they have a round-number seniority), I plot the seniority density of all the persons registered as unemployed after the termination of an open-ended contract, excluding economic dismissals. Figure 3 does not exhibit any significant discontinuity at the relevant threshold, confirming our hypothesis.

Figure 3: Mc Crary test on the seniority variable at the 365 days cutoff on all open-ended contracts (excluding workers eligible for the *CSP*) (France, 2011-2014)



Source: FNA.
ECHANTILLON: The whole population of unemployed person after an open-ended contracts over the period between October 2011 and September 2014 (excluding workers eligible for the *CSP*). Binsize: 10, bandwidth: 100.

3.3 Underlying Mechanisms: Exploration of the Bargaining Process

If the bunching at the one-year threshold seems to be a response to some incentives created by the *CSP*, we need to dig further to understand why do we observe this concentration.

My preferred scenario to justify the excess mass in dismissals after one year of tenure is that, conditional on the dismissal having been decided, employers and employees bargain over the date of contract termination as they have both incentives and room to do so. On the worker's side, differences in preferences interact with differences in ability to negotiate and in incentives, whereas on the employer's side, the cost of extending the work contract and then of paying employees additional weeks or months while knowing that they would be fired eventually is also likely to change among employers.

Profile of the typical buncher

To investigate in further details the type of employees and employers concerned by this bunching phenomenon, I produce two types of graph, that can be found in Appendix B. The first ones are testing whether there is a discontinuity at the cutoff in the distribution of some observable characteristics, and the second ones are specifying for which values of these observable characteristics the discontinuity in the seniority density is the highest. In other words, the first graphs indicate in which dimensions the populations on each side of the cutoff differ on average. The second graphs reproduce the Mc Crary test (McCrary, 2008) on the seniority density by filtering on some value of observable characteristics. It provides a way to compare the size of the discontinuity in different sub-populations and helps to understand what is the typical profile of the buncher and its firm.

The main insights from these visual elements are that bunchers are typically working more frequently full-time, with a high level of education, more skilled, with a higher wage as compared to those below the threshold, and more frequently a woman.

The set of Figures from 10 to 14 indicates a discontinuity in the distribution of the mentioned variables, which is a sign that populations on each side of the cutoff differ in terms of these characteristics.

Table 3 provides numerical evidence – from the Mc Crary tests – of the stronger magnitude of the discontinuity for some sub-populations, to refine the profile of the typical buncher.

All the characteristics of the typical buncher are associated with a higher bargaining power, which is compatible with my preferred scenario.

Dismissals order

If the bargaining scenario was true, we might observe that people laid-off as part of the same collective dismissal plan would have different end of the contract dates. In particular, we might have people right above the cutoff laid-off later than those far from the threshold (either above or below) and for which it is useless or too costly to manipulate the seniority.

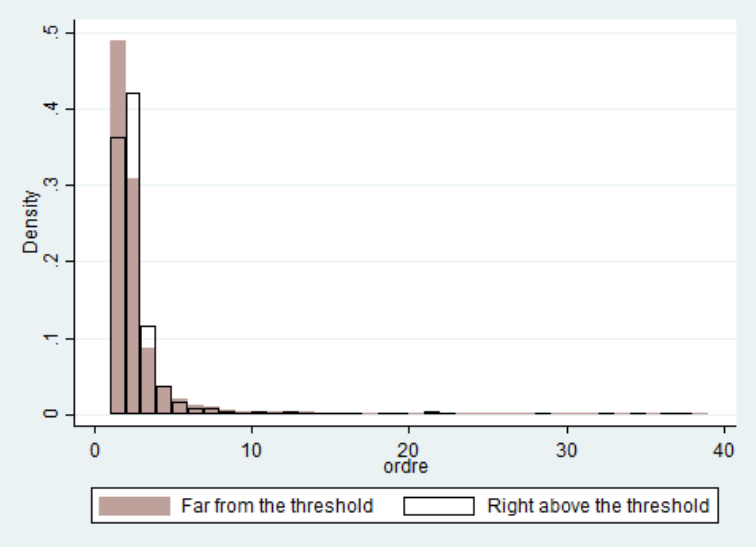
Table 3: Magnitude of the discontinuity at 365 days for different values of the observables

Variable	Value of the variable we are filtering on	Log discontinuity estimates
Sex	Male	0.314***
		(0.022)
	Female	0.45***
		(0.032)
Diploma	Primary school	0.054
		(0.085)
	CAP or BEP	0.317***
		(0.030)
	Bac+5 or more	0.62***
		(0.071)
Level of qualification	Executive	0.614***
		(0.069)
	Skilled employee	0.42***
		(0.028)
	Unskilled employee	0.148**
		(0.062)
Working time	Full time	0.382***
		(0.020)
	Part time	0.25***
		(0.044)

SAMPLE: The whole population of workers eligible to the CSP entering unemployment between October, 2011 and September 2014

If I spot employers for which I observe several dismissals for the period October 2011-September 2014, I can count the number of people laid-off and look at the dismissal order. I gather the dismissals observed for the same employer over a period of 30 days (the legal criteria to consider a dismissal as collective is to have several dismissals on a 30 days period) into the same dismissal episode, and I compute the order, by date of contract termination, of each dismissal in the same episode. Indeed, I find that having a seniority lying between 365 and 380 days (corresponding to the area right above the cutoff) is associated to a lower probability of being laid-off the first as part of a collective dismissal plan (- 12.8ppts). However, it is also associated with a higher probability of being laid-off the second (+10.4ppts). The rest of the distribution is rather similar (as observed on Figure 4). As the median of the variable giving the position is 2, being in the second position means, in 50% of the cases, being the last laid-off in the dismissal plan. Thus, it appears that workers close to the cutoff are indeed more frequently laid-off later in the dismissal plan.

Figure 4: Dismissal order within the same dismissal plan with respect to the distance from the cutoff (France, October 2011-September 2014)



Source: FNA.
NOTE: The dismissal plan gathers all dismissals from the same employer on a 30 days period. Being right above the cutoff means having a seniority lying between 365 and 380 days (included).

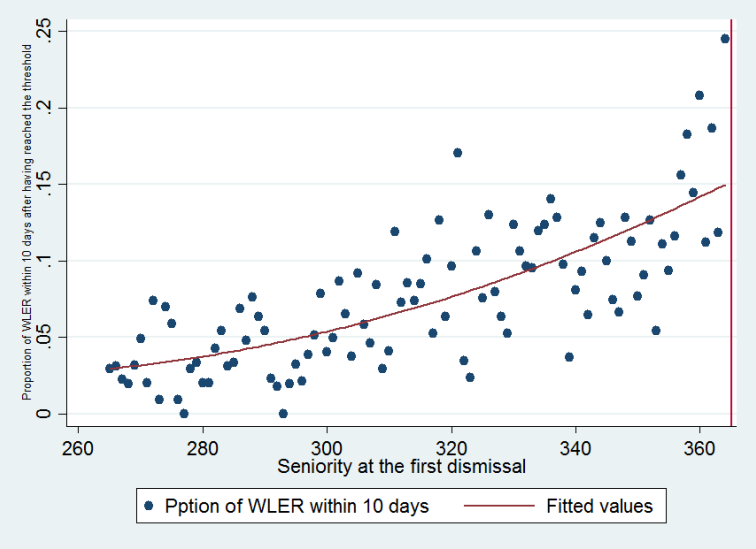
The results are robust even if we make the window above the cutoff vary, as illustrated in Table 17 of Appendix C .

I also look at the relationship between the proportion of persons whose dismissal seems strategically delayed and the value of seniority at the beginning of the dismissal spell.

To construct Figure 5, I identify individuals: (i) dismissed as part of a collective dismissal plan; (ii) not dismissed first (which suggest a waiting time); (iii) dismissed just (i.e. within 10 days) after reaching the one year condition (which suggests the waiting time was related to the ASP). The proportion of people fulfilling these conditions indeed increases as the gap between the seniority value at the moment of the first dismissal and the cutoff closes. This result suggests that the cost of waiting strategically increases with the initial distance to the cutoff.

This finding also confirms that the excess mass right above the one-year threshold comes from the area right below the threshold – which is consistent with hole visible

Figure 5: Proportion of WLER laid-off after a first dismissal right after one year of service (France, October 2011-September 2014)



Source: FNA.
NOTE: The dismissal plan gathers all dismissals from the same employer on a one year period.

at the left hand side of the cutoff (Figure 1) – in line with the hypothesis of strategic bargaining for people just below one year of seniority.[10]

Cost of extending the contract

In the bargaining scenario, we must consider the trade-off between the benefit for the employee to move up the 365 days cutoff and the cost for the employer to extend the contract. A likely hypothesis is that this cost varies among employers, and might be higher for firms that have economic difficulties but continue their activity than for firms definitively shutting down, as for these firms, paying some workers additional weeks or months will not change the final outcome, whereas it can put in jeopardy firms trying to overcome their difficulties. To have an idea of which firm is shutting down, I compute the difference between the number of people laid-off during the same dismissal episode and

[10]Another scenario could be that employers falsify the contract termination date to make workers better-off. But this is not consistent with our finding as, in that case, they would not necessarily choose workers with true seniority just below the cutoff.

total workforce size. As we can see on Figure (Figure 15) of Appendix C, having a seniority lying between 365 and 380 days is associated with smaller values of the difference between the number of people laid-off during the same dismissal episode and total workforce size .

If I consider "having a difference between the total workforce size and the number of people laid-off during the same dismissal episode lower than 5" as a proxy for the firm shutting down, we see that having a seniority lying between 365 and 380 days is associated with a 12.5ppts higher probability of shutting down. If I make the definition of "being right above the cutoff" and of the proxy for shutting down vary, the results go all in the same direction, as made clear in Table 4.

These results indeed show that employers seem more willing to grant contract extension when the firm is shutting down, and therefore when it represents a negligible cost for them.

4 Theoretical Framework of Negotiated Layoff

The specificity of the setting under study is that, contrary to the traditional bunching scenario – a change in marginal tax rate in most cases – the optimisation is not at the worker's level: it is the joint optimisation of the couple employer-employee that determines the optimal number of extension day from the moment the layoff is announced. Employer and employee maximise the sum of their utilities to decide whether they extend or not the contract to reach the threshold. The employee – the principal – can offer a transfer to the employer – the agent – to compensate for the maintenance of the match.

Table 4: Proportion of firms shutting down

Proportion of firms whose workforce = Nb of people laid-off		**Proportion of firms whose workforce = Nb of people laid-off ± 5**		**Proportion of firms whose workforce = Nb of people laid-off ± 10**	
$Seniority < 365$ or $Seniority > 380$	$365 \geq Seniority \leq 380$	$Seniority < 365$ or $Seniority > 380$	$365 \geq Seniority \leq 380$	$Seniority < 365$ or $Seniority > 380$	$365 \geq Seniority \leq 380$
6.9%	10.9%	35.3%	47.8%	48.6%	62.8%
$Seniority < 365$ or $Seniority > 390$	$365 \geq Seniority \leq 390$	$Seniority < 365$ or $Seniority > 390$	$365 \geq Seniority \leq 390$	$Seniority < 365$ or $Seniority > 390$	$365 \geq Seniority \leq 390$
6.9%	10.4%	35.3%	47.1%	48.5%	62.2%

From the agent's point of view, once the firm is hit by a productivity shock, the profit becomes negative:

$$\pi_q = (P - w) \cdot q$$

where P is the worker's productivity, w the wage, supposed determined when the contract is set up, and fixed afterward, and q the number of days of extension. Each additional day of employment means a loss for the employer, equivalent to the difference between the productivity and the wage.

The principal, at the moment of the dismissal, has some incentives to maintain the match, as the unemployment benefits he would get are a function of seniority at contract termination, discontinuous at one year. His utility takes the following form:

$$U_q = (w - \alpha) \cdot q + \Delta_C + V_u$$

where α is the disutility from work, V_u is the utility from unemployment, and Δ_C is the difference in total expected benefits he would get if he reaches the one-year threshold.

If no extension at all occurs, the principal's utility is equal to:

$$U_0 = DB_1 \cdot q + V_u$$

where DB_1 is the standard benefit the unemployed person gets if his seniority is below one year. Instead of extending the contract by q days, and then earn a wage q additional days, the worker will be laid-off right away, and will get the standard benefit the number of days the contract would have been extended in case it was profitable.

Then, the decision to extend depends on the comparison of both surplus. The contract will be maintained if and only if :

$$U_q + \pi_q - U_0 - \pi_0 \geq 0$$

$$\Leftrightarrow (P - DB_1 - \alpha)q + \Delta_C \geq 0 \tag{1}$$

As $q = L_{365} - L_{initial}$, with L_{365} being the threshold at 365 days, and $L_{initial}$ the seniority value at the moment the dismissal is announced, before any extension, we can define a $L_{initial}$ from which any individual will decide to extend the contract to reach the cutoff, as they would all meet condition (1). L_0 is the lowest value of $L_{initial}$ which verifies (1), or, in other words, the initial value of seniority of the marginal buncher.

However, as underlined earlier, the decision of extension is part of a bargaining process: the principal offers a transfer to the agent to compensate for the loss from the extension. Indeed, if the employee is eager to work some additional days to get the higher benefits, as long as q meets condition (1), the employer needs to receive a payment in order to accept to maintain the match while the profit has become negative. To better represent the bargaining power of employees, I impose an additional constraint on this transfer: it is capped by a certain amount t_{max} which represents the extent to which the employee is a threat for the employer. It refers, for example, to the amount of damages the employee is likely to get if he appeals Labour Court, or to the social capital he is able to mobilise, to the extent to which he can harm the employer's reputation, etc.

Adding this constraint does not change the validity of condition (1), as, no matter the value of the transfer and the division rule of the surplus between employer and employee, at the joint level, the transfer cancels out and condition (1) is left unchanged. However, the optimisation is then subject to:

$$(P - w) \cdot q + t_{max} \geq 0$$

We define L_1 as the lowest value of the initial seniority which verifies (1) under the constraint that $L_{365} - L_1 \leq \frac{t_{max}}{w-P}$. It follows that all the employees for whom it is profitable to extend the contract (all employees with initial seniority between L_0 and L_{365}) will not necessarily do so, as the decision to extend will also depend on the amount of transfer they are able to offer the employer to compensate for the loss he undergoes

$(P - w)$. We observe empirically that those bunching are the ones with initial seniority above $L_{min} = max(L_0, L_1)$.

The optimal q, q^*, is such that:

$$P - DB_1 - \alpha = \frac{\Delta_C}{q^*}$$
$$and\ q^* \leq \frac{t_{max}}{w - P}$$

It means that, at the equilibrium, the marginal benefit of extending the contract – that is the product from work, minus the opportunity cost of unemployment benefits, and minus the disutility from work – equals the marginal cost represented by the foregone UI payments. The marginal benefit from extension is proportional to the elasticity of contract duration with respect to the level of total expected unemployment benefits, defined as $e = \frac{q/L_{365}}{\Delta_C/C_{min}}$, where C_{min} is the capital of total benefits the worker is entitled to at a seniority value equal to L_{min} (where he lies when there is no extension). Then:

$$P - DB_1 - \alpha = \frac{1}{e} \cdot \frac{C_{min}}{L_{365}}$$

The magnitude of the bunching will then depend on several parameters:

- It is positively correlated to P, as the higher is the productivity, the lower the cost of extending the contract
- It is negatively correlated to α, the disutility from work, as the employee is more reluctant to extend the contract if each additional day of work brings a lot of disutility
- The standard benefit DB_1 granted to workers with less than one year of seniority has a negative impact on bunching, as the outside option "leaving immediately and start receiving unemployment benefits" is more attractive as DB_1 increases
- The differential in benefit capital Δ_C when crossing the cutoff is positively correlated

with the magnitude of bunching, as it increases the value of having more than one year of seniority

- It is positively correlated to t_{max}, as it means that the employee is able to compensate more the employer for the extension of the contract, so the constraint on q is less stringent

- Because of the existence of the constraint on the transfer, the wage has a negative impact on bunching, as it increases the cost that has to be compensated for the employer. From a joint surplus point of view, however, the wage does not intervene as it cancels out when we add both parties utilities.

One of the challenge of the empirical analysis will be to disentangle the effect of these different parameters. In particular, I focus my analysis on the differences in bunching between several sub-populations, defined by the magnitude of the potential gain from the standard benefit to the *CSP* benefit. By looking at different individual and firms' characteristics, I investigate which parameters make the intensity of bunching vary empirically, and I try to distinguish the several channels of transmission.

5 Heterogeneity in Bunching

A first evidence of differences in bunching between potential gain categories is provided by the Mc Crary test: we observe that the magnitude of the bunching is positively correlated to the magnitude of the difference in replacement rates, and then to the wage (Table 5).

Yet, it is difficult to disentangle the different channels at play: the population having a higher potential gain, and then higher earnings, is also significantly more educated, more skilled, working more frequently full-time, than the rest of the population. It means that, for the moment, we cannot decompose the effect of having higher incentives and of having characteristics associated with more bargaining power.

What is at stake here is to know whether the higher propensity to bunch as the potential gain increases is due: (i) to higher financial incentives, keeping preferences and the

Table 5: Log discontinuity estimates according to potential gain

Potential gain from ARE to *CSP*	Log discontinuity estimates
$Gain < 10ppts$	.1074
	(.1031)
$10ppts \leq Gain < 15ppts$	.2673***
	(.0513)
$15ppts \leq Gain < 20ppts$	.3012***
	(.03023)
$Gain \geq 20ppts$	.4640***
	(.0265)

ability to bargain constant; (ii) to different preferences coupled with higher incentives, keeping the ability to bargain constant; (iii) to a higher ability to bargain coupled with higher incentives, keeping preferences constant.

Therefore, we need a metric that neutralises the effect of having higher incentives, to see to which extent it varies with different characteristics. In other words, if we observe differences in L_{min}, we do not know yet if it comes from a higher Δ_C – higher incentives – a higher t_{max} – higher ability to bargain – or differences in preferences – α – or productivity – P. This metric can be provided by the reduced-form elasticity of contract duration with respect to the level of benefits, measured through bunching.

5.1 Empirical Bunching Estimation

Drawing on the bunching literature (Saez, 2010; Chetty et al., 2011; Kleven and Waseem, 2013; Brown, 2013), I exploit the observed hole and spike in the seniority distribution to have an estimate of the elasticity of labour supply, using the relationship between observed bunching and elasticity brought to light by Saez (2010). An additional difficulty here is that we are in the case of an upward notch, as disposable income increases sharply at the one-year threshold, thanks to a jump in the level of the budget set. Then, we cannot identify an area of strictly dominated choice and use it to estimate the optimisation frictions pointed out byChetty et al. (2011) and Kleven and Waseem

(2013), though these frictions are likely to be important in our case, as the extension of the contracts can only occur at some bargaining cost.

The usual methodology rests upon the standard labour supply model where the individual trades-off the value of consumption (measured by the disposable income when employed or unemployed) with the cost of work effort (captured by the before-tax-and-benefits income). However, in my particular setting, the optimisation is at the level of the joint surplus, which complicates the derivation of a structural elasticity parameter, as I am left with two unobservable parameters, the productivity and the disutility from work. For this reason, and because I am primarily interested in having some insights on the differences of behaviours between subgroups rather than having a precise estimate of the structural elasticity of labour supply, I implement a reduced-form strategy to uncover the elasticity parameter thanks to an estimation of the bunching. This estimate will be informative on the response in presence of important negotiation frictions, and then, will not give a precise measure of the true workers' optimisation behaviour. Nonetheless, it will be used as a metric to compare subgroups behaviours, neutralising the impact of the differences in incentives.

The empirical methodology consists in estimating the excess mass of individuals laid-off at a seniority value within the defined bunching area by computing a counterfactual seniority density, and compare it with observed one.

I start by fitting a polynomial to the empirical distribution, excluding an area around the notch point, that I will refer from now on as the *excluded area*. The counterfactual distribution is then estimated using the same coefficients, from a regression of the following form:

$$Den_s = \sum_{j=0}^{J} \beta_j \cdot (L_s)^j + \sum_{i=L_l}^{L_u} \lambda_i \cdot \mathbb{1}_{L_s=i} + \nu_i \tag{2}$$

where Den_s is the seniority density in bin s, L_s the seniority value in bin s, J is the order

of the polynomial, $[L_l; L_u]$ the excluded area around the notch point. The counterfactual distribution is then computed as the predicted value from equation 2, omitting the contribution of the dummies around the notch point. It follows that the counterfactual density is given by:

$$\hat{Den}_s^c = \sum_{j=0}^{J} \hat{\beta}_j \cdot (L_s)^j$$

Excess bunching at the notch can be expressed as:

$$B = H_0(L^*) - H_0(L^* - \Delta L^*) = \int_{L^*-\Delta L^*}^{L} h_0(L)\,\mathrm{d}L \approx h_0(L^*)\Delta L^*$$

where $H_0(L)$ and $h_0(L)$ are respectively the seniority cumulative distribution function and the seniority density function in the absence of a notch, L^* corresponds to L_{365} and ΔL^* to the difference between L_{365} and L_{min}. The approximation holds if we assume that the density $h_0(L)$ is roughly constant over the interval $(L^* - \Delta L^*; L^*)$

Empirically, it is obtained by taking the excess number of individuals locating at the notch of the observed distribution as compared to the counterfactual one.

$$\hat{B} = \sum_{L^*}^{L_u} \hat{Den}_s - \hat{Den}_s^c$$

The excluded area upper bound can be determined visually without ambiguity, as the spike is typically sharp. Regarding the lower bound, the missing mass is harder to delimit as it is more diffuse: the standard methodology is to set the upper bound, and to determine the lower bound through an iterative process, by making it vary and reestimating the counterfactual density until the bunching mass ($\hat{B}$) and the missing mass ($\hat{M} = \sum_{L_l}^{L^*} \hat{Den}_s^c - \hat{Den}_s$) equalize.[11]

Following Chetty et al. (2011), we define b as the excess mass around the notch as a

[11]Missing mass must be equal to bunching mass as all the bunchers come from the left side of the cutoff, creating a hole.

proportion of the average density of the counterfactual distribution in the area around the notch:

$$\hat{b} = \frac{\sum_{L^*}^{L_u} \hat{Den}_s^c - \hat{Den}_s}{\sum_{L^*}^{L_u} \hat{Den}_s^c / (L_u - L^* + 1)}$$

It follows that the reduced-form elasticity corresponds to:

$$e_{RF} = \frac{\hat{b}}{L^* \cdot \Delta_C / C_{min}}$$

where C_{min} is the UI benefits capital that a worker is entitled to at the seniority value equal to L_{min}.

The identification of the elasticity from bunching measurement rests upon two assumptions: (i) the counterfactual distribution is smooth in the bunching area, so that B captures a behavioural response; (ii) Bunchers come from a continuous set $M = B$ below the notch point so that we can identify a marginal buncher.

In the same spirit of Goupille-Lebret and Infante (2016), I decompose the contribution to the observed distribution of the points within the excluded area into the part due to points above and the part due to points below the notch. The part below correponds to the hole created by the postponement of contract termination whereas the mass above captures the concentration of dismissals once the cutoff is passed. By measuring the two components separately, I relate the dismissals locating right after the cutoff to the missing ones that have been strategically retimed. Then, I redefine the regression model as :

$$Den_s = \sum_{j=0}^{J} \beta_j \cdot (L_s)^j + \gamma_1 \cdot \mathbb{1}_{L_l \leq L_s < L^*} + \gamma_2 \cdot \mathbb{1}_{L^* \leq L_s \leq L_u} + \nu_i$$

Table 6 shows the corresponding regression results: the seniority bin counts are regressed on a 4^{th} order polynomial of the seniority value, with a specific set of dummies for being located in the bunching area above the notch point and another set of dummies

for being located in the bunching area below the notch point. This table indicates that for my period of interest, being located in the upper (respectively lower) bunching area is always associated with a significant increase (resp. decrease) in the number of WLER at this seniority value. It means that we indeed observe a significant hole and spike in the distribution of the seniority around the notch point in the period were the *CSP* was in force, whereas no such pattern is observed for the pre-*CSP* period.

Table 6: Seniority count regression

	Count	Count	Count	Count	Count	Count
Seniority	2.081***	2.105***	.598	.558	2.243***	1.308***
	(.227)	(.233)	(.342)	(.350)	(.114)	(.160)
$Seniority^2$	-.004**	-.004**	.002	.002	-.005***	-.003***
	(.001)	(.001)	(.002)	(.002)	(.0004)	(.001)
$Seniority^3$	1.68e-06	1.78e-06	-7.47e-06	-8.25e-06*	4.07e-06***	2.01e-06*
	(2.66e-06)	(2.79e-06)	(3.99e-06)	(4.20e-06)	(5.69e-07)	(7.97e-07)
$Seniority^4$	5.32e-10	5.15e-10	5.85e-09*	6.39e-09*	-1.20e-09***	-5.36e-10
	(1.81e-09)	(1.90e-09)	(2.72e-09)	(2.86e-09)	(2.56e-10)	(3.59e-10)
Bunching area below	-55.060***	-38.832**	-24.386	-18.560	-35.893***	-2.424
	(16.304)	(11.862)	(24.521)	(17.842)	(9.909)	(13.880)
Bunching area above	76.005***	43.048***	33.0277	5.216	44.572***	20.397
	(19.158)	(12.423)	(28.814)	(18.686)	(10.876)	(15.234)
Constant	-38.640**	-39.689***	32.551	33.477	-43.985***	7.974
	(11.828)	(11.905)	(17.789)	(17.907)	(8.976)	(12.572)
$L_u - L^*$	12	33	12	33	33	33
$L^* - L_l$	17	37	17	37	41	41
Period	Oct, 11 - Oct, 14	Oct, 11 - Oct, 14	Sep, 09 - Sep, 11	Sep, 09 - Sep, 11	Oct, 11 - Oct, 14	Sep, 09 - Sep, 11
Window	< 730	< 730	< 730	< 730	< 1100	< 1100

** p<0.05, ** p<0.01, *** p<0.001*

Focusing on the case of a notch, Kleven and Waseem (2013) develop another reduced-form approach, that does not rely on the estimation of the excess mass, but simply on the observed response in terms of extension days, that is $\Delta L^* = L_{365} - L_{min}$.

As we are in the case of the notch, we need to translate the increase in the level of benefits into an implicit increase in the marginal replacement rate in the bunching area, or an implicit decrease in the marginal tax rate, as it is the relevant parameter for the estimation of the structural elasticity. Following Kleven and Waseem (2013), I relate the response in terms of contract extension to the change in marginal replacement rate between L^* and $L^* - \Delta L^*$ created by the notch, as illustrated in Figure 16 of Appendix

D. The implicit replacement rate is given by the following expression:

$$r^* \equiv \frac{R(L^* - \Delta L^*) - R(L^*)}{\Delta L^*} = r + \frac{\Delta r \cdot (L^* - \Delta L^*)}{\Delta L^*} \approx r + \frac{\Delta r \cdot L^*}{\Delta L^*}$$

The elasticity parameter becomes:

$$e = \frac{\Delta L^*/L^*}{\Delta r * /(1 - r*)} \approx \frac{(\Delta L^*/L^*)^2}{\Delta r/(1-r)}$$

Following the methodology explained above, I derive elasticity estimates from the observed bunching using both reduced-form approaches, and making the estimation window and the excluded area vary. In accordance to the theoretical framework, I use the variation in total benefits capital, that is the difference in the average daily benefit received times the average compensation duration the workers is entitled to on each side of the cutoff.[12]

Table 7 and 8 show consistent reduced-form estimates, even when the estimation window and the excluded area boundaries vary. The sensitivity parameter appears quite low, but we have to keep in mind that it measures the behavioural response attenuated by important optimisation frictions. Using the below estimate computed with the method from Chetty et al. (2011) on the six months bandwidth, it means that a 10% increase in UI benefits capital leads, on average, to 1.83 days of extension, measured at one year.

5.2 Interaction Between Ability and Incentives

The reduced-form elasticity as computed above is a way to measure to what extent the couple employer-employee responds to an increase in the level of unemployment compensation at the moment of the dismissal, by retiming the termination of the contract, and then maximise joint surplus. It scales the observed response in extension days by

[12]Indeed, it makes sense to think that the worker considers the total capital he would receive when optimising his behaviour. As the potential compensation duration depends on employment history, extending the contract would lead to a discontinuous increase in the level of benefits, as well as a marginal increase in the number of days compensated, in some cases.

Table 7: Reduced form elasticity estimates

L_u	398	398	397	397
L_l	309***	312***	328***	324***
	(4.238)	(5.8218)	(4.6477)	(5.5697)
Seniority window	[120;540]	[180;540]	[0;730[	[0;1100[
Average max compensation duration below	462 days	462 days	468 days	466 days
Average max compensation duration above	420 days	420 days	420 days	420 days
Average standard daily benefit below	37.6	37.5	37.9	37.8
Average CSP daily benefit above	53	53.1	53.1	53.1
ϵ_{above}	0.0287***	0.0294***	0.0296***	0.0286***
	(0.0011)	(.0011)	(0.0014)	(0.0012)
ϵ_{below}	0.0841***	0.0774***	0.04***	0.0483***
	(0.0116)	(0.0153)	(0.0097)	(0.0127)

** p<0.05, ** p<0.01, *** p<0.001*

NOTE: The elasticity is computed using the same formula as in Kleven and Waseem (2013) : $\frac{(dL^*/L^*)^2}{\Delta_C/C_{min}}$. Standard errors of L_l are calculated using a bootstrap procedure generating seniority distributions and associated estimates by random resampling. 200 replications.

Table 8: Reduced-form elasticity estimates

L_u	398	398	397	397
L_l	308	315	327	324
Seniority window	[120;540]	[180;540]	[0;730[	[0;1100[
b	5.49***	5.02***	4.71***	4.89***
	(0.4715)	(0.5)	(0.4158)	(0.3716)
m	5.78***	5.08***	4.67***	4.94***
	(0.6047)	(0.5582)	(0.3703)	(0.37)
Average max compensation duration below	461*** days	463** days	468*** days	466*** days
	(1.53)	(1.6064)	(1.8634)	(1.7368)
Average max compensation duration above	420*** days	420*** days	420*** days	420*** days
	(1.4)	(1.493)	(1.4687)	(1.4647)
Average standard daily benefit below	37.6***	37.7***	37.9***	37.8***
	(0.1322)	(0.1436)	(0.1832)	(0.1643)
Average CSP daily benefit above	53.1***	53.1***	53.1***	53.1***
	(0.2919)	(0.271)	(0.2845)	(0.2836)
ϵ_{above}	0.05282***	0.0495***	.0497***	0.0499***
	(0.005)	(0.0054)	(0.005)	(0.0043)
ϵ_{below}	0.0556***	0.05***	0.0493***	0.0504***
	(0.0062)	(0.0057)	(0.0046)	(0.0042)

** p<0.05, ** p<0.01, *** p<0.001*

NOTE: The elasticity is computed using the same formula as in Chetty et al. (2011) : $\frac{b/L^*}{\Delta_C/C_{min}}$
Standard errors are calculated using a bootstrap procedure generating seniority distributions and associated estimates by random resampling. 600 replications.

the magnitude of the financial gain, and provides a metric that should be valid for any value of the gain in unemployment benefits.

As such, it can be used to compare the behaviours of different categories of the population, precisely delimited by their potential gain when crossing the one-year cutoff.

Table 9: Elasticity estimates by gain categories (same excluded area)

Gain category	Average gain in total capital (in %)	ϵ_{above}	ϵ_{below}
$Gain < 10 ppts$	7.648	0.0981	-0.0538
		(1.1315)	(1.3773)
$10 ppts \leq Gain < 15 ppts$	20.048	0.054***	0.0421**
		(0.0157)	(0.0166)
$15 ppts \leq Gain < 20 ppts$	17.668	0.0482***	0.0708***
		(0.0109)	(0.0098)
$Gain \geq 20 ppts$	26.335	0.0717***	0.0748***
		(0.009)	(0.008)

** p<0.05, ** p<0.01, *** p<0.001*
NOTE: The bunching boundaries are located at 328 days and 398 days for all categories. The area used to estimate the counterfactual is included between 0 and 730 days. The polynomial fitting the seniority bin count is of order 4. Standard errors are calculated using a bootstrap procedure generating seniority distributions and associated estimates by random resampling. 200 replications.

Table 10: Elasticity estimates by gain categories (varying excluded area)

Gain category	Average gain in total capital (in %)	L_u	L_l	b	m	ϵ_{above}	ϵ_{below}
$Gain < 10 ppts$	3.58	369	335	3.46***	3.12	0.2014	0.1562
				(0.9273)	(2.0129)	(1.4301)	(1.1406)
$10 ppts \leq Gain < 15 ppts$	20.67	397	324	3.99***	3.94***	0.0527***	0.0518***
				(1.0514)	(1.1898)	(0.0148)	(0.0163)
$15 ppts \leq Gain < 20 ppts$	16.94	398	343	3.28***	3.67***	0.0543***	0.0606***
				(0.6501)	(0.3971)	(0.0122)	(0.0084)
$Gain \geq 20 ppts$	27.03	398	326	5.88***	6.05***	0.0699***	0.0718***
				(0.5713)	(0.5619)	(0.0085)	(0.0079)

** p<0.05, ** p<0.01, *** p<0.001*
NOTE: The bunching boundaries change with gain category. The area used for estimating the counterfactual is included between 0 and 730 days. The polynomial fitting the seniority bin count is of order 4. Standard errors are calculated using a bootstrap procedure generating seniority distributions and associated estimates by random resampling. 200 replications.

In Tables 9 and 10, the elasticity parameter computed using the excess and missing masses shows that – keeping incentives fixed – the last category seems to be much more responsive to a change in UI benefits than the first ones. The elasticity increases with

the category, and is not even significant for the first one. More meaningfully, taking the estimates computed with the same excluded area boundaries, for a 10% increase in total benefit capital, workers in the highest gain category would increase the length of their contract by 2.7 days on average, whereas worker in the second gain category would increase it by 1.5 days. This positive relationship indicates that people with higher incentives to extend the work contract do negotiate more on contract termination to reach the cutoff, but not only because their gain from unemployment compensation is higher, but also because they have different preferences, and/or different abilities to bargain. I am not able to totally disentangle the different parameters, but an exploration of the observables characteristics of the different groups can bring some information.

Individual characteristics – Belonging to a higher gain category is associated, on average, to a higher level of education, to a higher probability of being executive, to longer working hours, and, mechanically,[13] to higher earnings. These characteristics are likely to be positively correlated to bargaining power, through the fact that more educated and skilled people are more able to voice their claims or to use the representation resources available, and that the transfer they are able to offer to the employer is higher. Indeed, if we think of t_{max} as the maximum potential amount of damages the employer may have to pay if they appeal Labour Court, it increases with earnings, which are positively correlated to potential gain.

Table 11 decomposes different individual characteristics by gain category. We observe that the proportion of men, of executive and of highly educated workers increases with the gain category, and the difference is greater for the last category.

In Table 20 of Appendix E, I investigate whether the differences between categories are significant or not. The first gain category is taken as the reference: again, the age, the level of education and the level of qualification are increasing functions of the gain category, and the difference is more significant and of higher magnitude in the highest

[13]The standard benefit replacement rate increases as earnings decrease, reducing the gap between the two types of benefits replacement rates.

Table 11: Descriptive statistics by gain category

		$Gain < 10ppts$	$10ppts \leq Gain < 15ppts$	$15ppts \leq Gain < 20ppts$	$Gain \geq 20ppts$	Total
Sex	Male	40.3	46.1	54.7	65.4	59.9
	Female	59.7	53.9	45.3	34.6	40.1
Education level	Not any education	7.7	7.6	5.4	3.6	4.6
	Primary school	4.6	3.8	3.1	2.0	2.6
	Primary school to 8^{th}	4.7	4.6	3.4	2.1	2.8
	9^{th} grade	8.6	8.0	6.3	4.1	5.2
	10^{th}-11^{th} grade	2.2	2.1	1.4	0.9	1.2
	Vocationnal diploma (CAP/BEP)	39.2	40.9	45.1	35.8	39.3
	BAC	18.8	19.9	20.3	18.1	19.0
	BAC+2	8.1	8.1	9.9	16.6	13.6
	BAC+3 and +4	2.2	1.6	1.5	8.8	5.7
	BAC+5 or more	3.9	3.4	3.4	7.9	6.0
Qualification	Executives	0.6	0.4	1.0	17.9	10.7
	Intermediate professions	0.4	0.6	1.2	5.4	3.5
	Unskilled employees	22.0	16.7	10.2	3.7	7.2
	Skilled employees	52.3	54.5	54.7	48.5	51.1
	Unskilled workers	10.3	10.0	8.8	4.5	6.4
	Skilled workers	14.5	17.8	24.0	20.1	21.1

** p<0.05, ** p<0.01, *** p<0.001*

part of the gain distribution.

These results can be interpreted in two ways: either these characteristics are associated with differences in preferences, for example, an older executive with high earnings may be more willing to extend his employment spell even if he knows he is dismissed, whereas the psychological cost to keep on working in the firm can be greater for other types of workers; either these characteristics put the worker in a better position to negotiate with the employer, and to offer him a high transfer.

Firms' characteristics – Looking at the individual characteristics decomposed by

gain categories is informative on the profile on the typical buncher. Though, it does not help to entirely disentangle the different sources of variation of the magnitude of bunching. Looking at firms' characteristics, and, in particular, to the forms of employees' representation, can give some insights on this point.

I use the aggregate statistics provided by the Statistics department of the Ministry of Labour, Employment, Professional training, and Social Dialogue[14], computed from the 2011 REPONSE survey on managers, employees and employees' representatives in firms of more than 10 employees, drawing a picture of the state of professional relationships in France. The data, available online, gives the aggregate proportion of employees' representatives and their different forms (unionised or not for example) by workforce size category. It also indicates the proportion of firms having negotiated on a specific topic in the last two years, decomposed by topic, by workforce size, by industry or by type of collective agreement.

I start by imputing the probability of not having any representative institution within the firm, which is a decreasing function of workforce size. I then run a cell analysis by examining how the magnitude of the jump in density varies with the gain and representation category. One caveat has to be made, as the data only covers firms with more than 10 employees, leaving 48.6% of our sample without any information on employees' representation.[15] I then focus on this subsample of firms with more than 10 employees, keeping in mind this limitation.

Table 12 shows that the gain category seems to matter more than the quality of representation in explaining the magnitude of the bunching. Indeed, as the probability of having no representation within the firm increases, keeping the gain category fixed, the propensity to bunch does not seem to vary significantly, or slightly increases, indicating, if any, a negative correlation between the quality of the representation and the magnitude of bunching. On the contrary, the magnitude of bunching increases almost systematically as the gain category increases, keeping the probability of being represented fixed. The

[14]DARES, Directorate of research activity, studies and analyses

[15]Firms of less than 10 employees face no legal obligation in terms of employees' representation.

Table 12: Log discontinuity estimates by gain and representation categories

		Gain category			
		$gain < 0.1$	$0.1 \leq gain < 0.15$	$0.15 \leq gain < 0.2$	$0.2 \geq gain$
Probability of having no representative within the firm	$p \leq 0.05$	.09568	.09744	.16337*	.39973***
		(.37148)	(.18412)	(.08929)	(.07152)
	$0.05 < p \leq 0.1$	.25452	.33265*	.18852**	.39394***
		(.468713)	(.18518)	(.08880)	(.06927)
	$0.1 < p \leq 0.5$	-.06454	.32650	.19934	.65682***
		(.45927)	(.28568)	(.15456)	(.11770)
	$p > 0.5$	.14372	.58716*	.20545	.41178***
		(.62489)	(.31582)	(.14480)	(.10643)

** p<0.05, ** p<0.01, *** p<0.001*

bunching is always significant and of high magnitude in the highest gain category, no matter the forms and intensity of representation in the firm. Focusing on this category, we observe that the magnitude of bunching tends to increase as the probability of having no representation increases. It would suggest that representation structures, within the firm, are not necessarily helpful in negotiating the extension of work contracts, but it is more the way different categories of workers, more or less skilled or educated, are able to mobilise the available resources that seems to matter. The elasticity estimates for the corresponding cells can be found in Appendix E (Table 19.

Table 12 indicates that individual characteristics, correlated to individual preferences or ability to bargain, have a greater impact on bunching than the quality of representation at the firm level. Yet, it should be noted that the way the quality of representation is measured is very broad – the probability of having no representation at all decomposed by large workforce size categories – and the forms of representation are likely to vary within each category. In addition, this analysis leaves aside all firms with 10 employees or less, which represents almost half of the sample, and describes only correlations with the magnitude of the jump in density.

To complement this picture, I compute a proxy for bunching at the firm level. For any firm with more than 2 layoffs in the period of interest, I compute the proportion of workers

with a seniority at lay-off lying in a small window above one year – which is an indicator of bunching. It should be noted that 23% of the sample are firms dismissing only one person, and are then excluded from this analysis. Among those firms, the proportion of firms with some of their dismissed workers located just above one year is 4.34% if we take a five days window, indicating that the bunching is concentrated among a small number of firms. Keeping in mind that, as a consequence, the sample size is small, I observe that the propensity to bunch at the firm level is negatively and significantly correlated with the workforce size. In Table 20 of Appendix F, I regress the propensity to bunch on individual characteristics as well as representation indicators from the REPONSE survey or directly on workforce size. Potential gain, education and sex, always have a positive and significant effect, whereas variables related to the representation structures – *e.g.* probability of having a work council, a unionised delegate, workforce size – are not significant, or have a low magnitude negative effect. These results go in the same direction as the previous one, suggesting that the representation in the firm, at least in terms of volume, does not seem to favour more bunching.

As I have no precise data on the quality of representation within the firm, I can use a fixed-effect logit model to determine, within a firm, which individual characteristics are associated with a higher propensity to bunch. I define as bunching any individual with a seniority at dismissal falling between 365 and 397 days, as it corresponds to the bunching area for most bandwidths. I consider a logit model as my outcome is a binary variable, and I use firm fixed-effects to neutralise any characteristic specific to the firm, that I am not able to capture with the information at hand. Again, the limitation of this analysis is that I use only the subsample of firms for which I have several observations (*i.e.* several persons dismissed), and with some variation in the bunching dummy. It leaves me with 19,838 observations distributed in 3,396 firms.

Table 13 shows that potential gain, age, education level all have a positive effect on the propensity to bunch. Though, part of the effect of potential gain is captured by the other characteristics, as having a higher potential gain, and then higher earnings, is also

associated with a higher level of education, a higher age and a higher chance to be a male.

Table 13: Fixed-effect logit of the propensity to bunch

	Propensity to bunch	Propensity to bunch
Potential gain from ASP	2.4502*	2.4064*
	(1.3862)	(1.378)
Education level		.0305**
		(.0130)
Age		.0043*
		(.0022)
Sexe		-.0814
		(.0565)
Being an executive		-.0541
		(.0918)

** p<0.05, ** p<0.01, *** p<0.001*

Table 13 indicates that, keeping all firms characteristics constant – including some unobservable management practices or representation quality on which we have no precise information – the propensity to bunch is positively correlated to the level of the potential gain. When adding some other characteristics – which are themselves correlated to the potential gain – the coefficient of the potential gain decreases. Education level and age are both positively and significantly correlated to the propensity to bunch. It could mean that, keeping firm's characteristics and incentives constant, more educated and older workers have preferences encouraging bunching, or that they are more able to take advantage of the representation structures that exist in the firm, or even that there is some heterogeneity in management practices (if the employer acts differently according to the type of employee).

All in all, if these results are more suggestive than conclusive, they tend to show that the representation structures are not necessarily helpful in negotiating the extension of the contract, or that, at least, individual characteristics seem to matter more when it comes

to explaining bunching. It could also indicate an heterogeneity in the representation quality according to the level of education or skills, within the same firm.

6 Robustness Checks

6.1 Round-Number Fixed Effects

Following Kleven and Waseem (2013), I use an alternative strategy to take into account round-number fixed effects. Indeed, it is reasonable to think that the distribution of seniority at dismissal will exhibit small peaks at regular intervals, as, for example, employers may lay off the first day of the month. This would mechanically lead to higher densities at seniority values around multiples of 30, though it would not be driven by any strategic behaviour. Accounting for this phenomenon allows to measure the optimisation behaviour at the one-year threshold, clear of the effect of being at a round month and year value.

A simple way of doing this is to add to the density regression round-number fixed effects, that is to say a dummy equal to one for each value of seniority around a multiple of 30. To account for the fact that a month lasts either 28, 29, 30 or 31 days we choose the bandwidth such that the round-number dummy is equal to one for any number i meeting the following condition: $k - 0.1 \leq \frac{i}{30} \leq k + 0.1, k \in \mathbb{N}$.

The density regression becomes:

$$Den_s = \sum_{j=0}^{J} \beta_j \cdot (L_s)^j + \gamma_1 \cdot \mathbb{1}_{L_l \leq L_s < L^*} + \gamma_2 \cdot \mathbb{1}_{L^* \leq L_s \leq L_u} + \rho \cdot \mathbb{1}_{k-0.1 \leq \frac{L_s}{30} \leq k+0.1, k \in \mathbb{N}} + \nu_i$$

Adding these round-number fixed effects to compute the density does not change much the results (Table 14). Not surprisingly, the parameters are a bit lower, as we remove part of the bunching only due to the regularity in hiring and firing dates.

Though taking into account the regularity in starting and ending dates of work con-

Table 14: Reduced-form elasticity estimates
with round-number fixed effect

L_u	397	397	398
L_l	308	310	333
Seniority window	[120;540]	[180;540]	[0;730[
b	5.05	5.18	4.35
m	5.26	5.28	4.45
Average max compensation duration below	462 days	462 days	468 days
Average max compensation duration above	420 days	420 days	420 days
Average standard benefit below	37.6	37.5	37.9
Average CSP benefit above	53	53.1	53.1
ϵ_{above}	0.0494	0.0497	0.0465
ϵ_{below}	0.0515	0.0506	0.0476

** p<0.05, ** p<0.01, *** p<0.001*

NOTE: The elasticity is computed using the same formula as in Chetty et al. (2011) : $\frac{b/L^*}{\Delta_C/C_{min}}$

tracts leaves the results virtually unchanged, a more comprehensive consideration of all non *CSP*-related factors may be needed, to provide an accurate measure of the behavioural response to incentives created by the *CSP*. This is a rationale justifying the use of a difference-in-bunching strategy, further developed in the next subsection.

6.2 The Difference-in-Bunching Strategy

The presence of a small discontinuity in the density in the period preceding the introduction of the *CSP* (referred from now on as the pre-*CSP* period) justifies the use of a difference-in-difference strategy (as in Brown (2013) in the case of retirement decisions), to neutralise the effect of other factors unrelated to the behaviour of interest. The methodology consists in measuring the pure *CSP*-related bunching as the excess mass relative to the counterfactual density, no longer computed by fitting the empirical one excluding an area around the notch point, but by taking the pre-*CSP* density. Using the pre-*CSP* density allows to take into account any pattern in the seniority distribution at

dismissal that would not be a response to financial incentives. The identification relies on the assumption that, absent the notch, the *shape* of the distribution of the number of WLER against the seniority value should be the same in both periods.[16] If this assumption holds, taking the difference between the observed distributions before and after the introduction of the *CSP* isolates the bunching exclusively due to the incentives created by the *CSP*.

A comparison of the pre and post-*CSP* densities on the whole distribution (Figure 6) and on a tightened 6-months window around the notch point (Figure 7) is a first evidence that the period preceding the introduction of the *CSP* can be convincingly used as a counterfactual. We observe that, when we choose a 6-months window, the two curves cross at the left hand side of the cutoff around the value 180. The fact that the missing mass is more spread out than the bunching peak can justify the need to take a larger window at the left hand side of the cutoff, to be sure we are not missing to measure the missing people who have strategically retimed their dismissal and who should have had a seniority lower than 180 days. Then, I also use a window from 120 to 540 days, as shown on Figure 8.

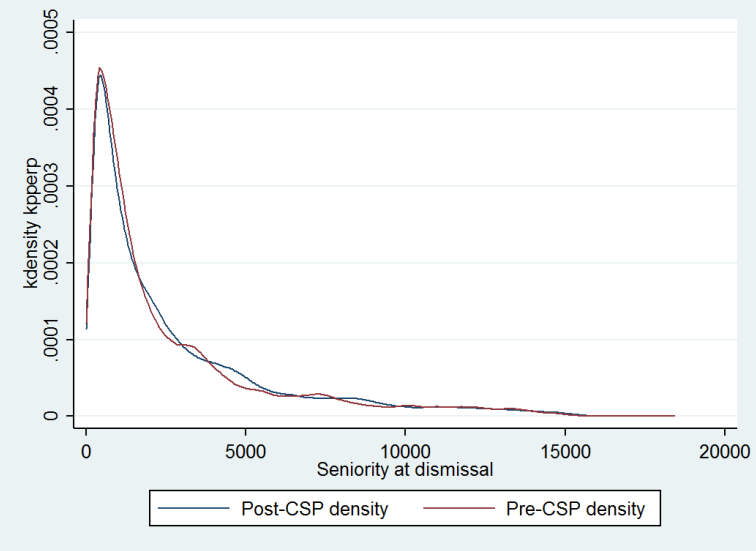
Figure 8 clearly shows that both densities are at the same level and have the same shape, excepted around the notch point. The post-*CSP* density shows a hole before the threshold, and a spike after, as compared to the pre-*CSP* density.

The post-*CSP* distribution exhibits a clear hole on the left-hand side of the cutoff, with the corresponding spike on the right-hand side, spread approximately over 4 bins. As compared, the pre-*CSP* distribution show some small spikes at regular intervals of the distributions, corresponding to round months numbers. Indeed, this spike is present at the one-year threshold, but its shape does not differ from the shape of any other round-number spike, and in particular, it is not preceded by a missing mass on the left side of the cutoff.

I reproduce the two reduced-form methodologies, adjusting the formula from Chetty et al. (2011) by measuring the b as the mass between the before and after densities, or

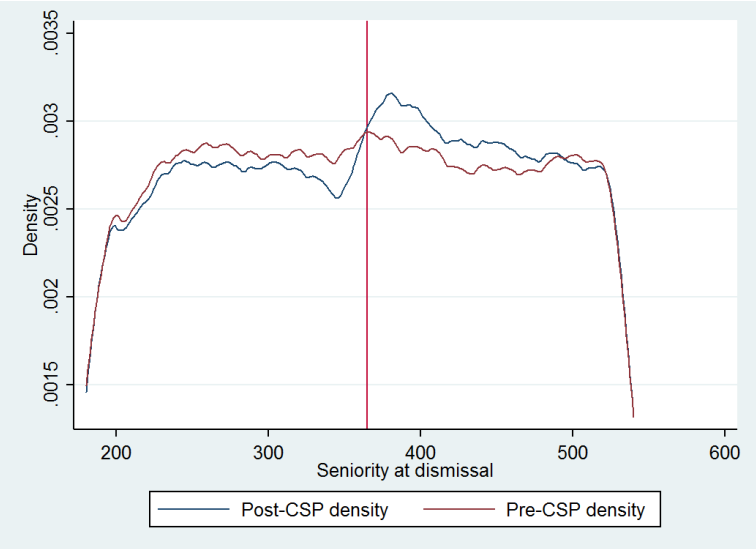
[16]The raw number of WLER can vary across time, as long as the distribution of seniority at dismissal stays unchanged in both periods.

Figure 6: Pre and Post-*CSP* seniority density on the whole distribution



Source: FNA.
Binsize: 10. Pre and post-*CSP* distributions have been fitted by a 7^{th} order polynomial to compute the counterfactual.

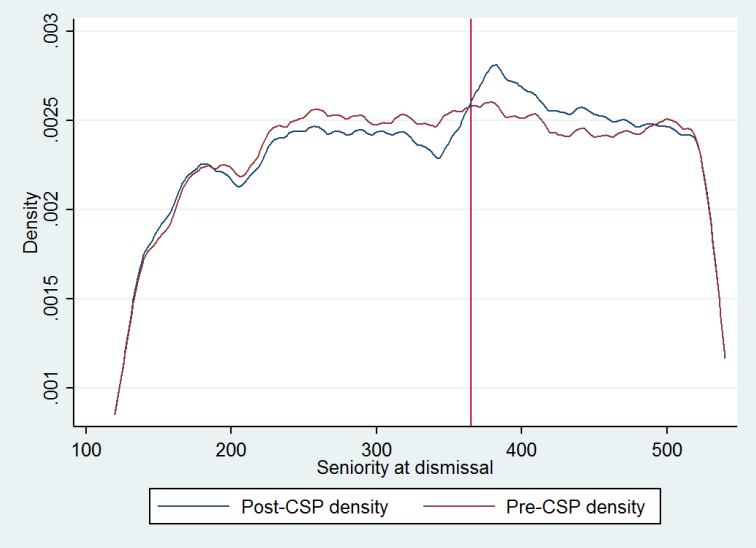
Figure 7: Pre and Post-*CSP* seniority density around the notch (180-540 days)



Source: FNA.
Binsize: 10. Pre and post-*CSP* distributions have been fitted by a 7^{th} order polynomial to compute the counterfactual.

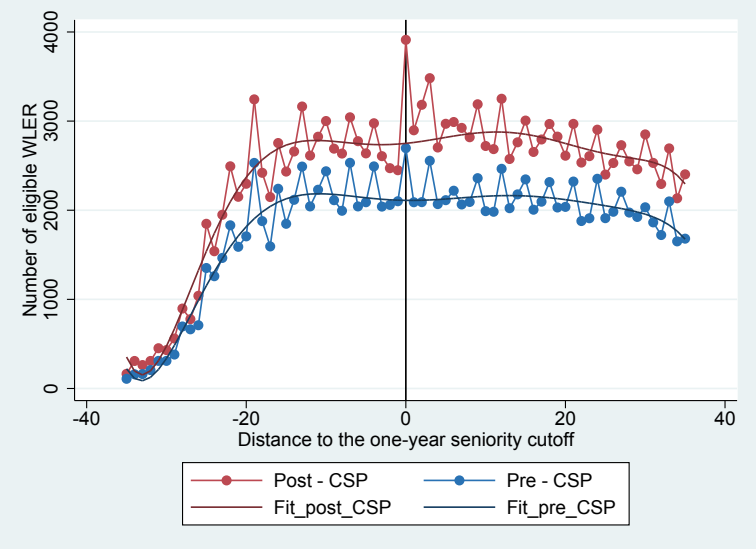
by using the observed response in extension days.

Figure 8: Pre and Post-*CSP* seniority density around the notch (120-540 days)



Source: FNA.
Binsize: 10. Pre and post-*CSP* distributions have been fitted by a 7^{th} order polynomial to compute the counterfactual.

Figure 9: Pre and Post-*CSP* bunching at the seniority threshold



Source: FNA.
Binsize: 10. Pre and post-*CSP* distributions have been fitted by a 7^{th} order polynomial to compute the counterfactual.

Table 15: Difference-in-bunching elasticity estimates

Technique	Excess and missing masses					Extension days response				
Time period	Sept, 2009 - Sept, 2014			Jan, 2011 - June, 2012		Sept, 2009 - Sept, 2014			Jan, 2011 - June, 2012	
L_u	409	409	409	409	409	409	409	409	409	409
L_l	297***	280***	295***	282***	284***	297***	280***	295***	282***	284***
	(11.8822)	(12.0219)	(10.6504)	(8.841)	(8.4872)	(11.8822)	(12.0219)	(10.6504)	(8.841)	(8.4872)
Seniority window	[120;540]	[180;540]	[0;730[	[120;540]	[180;540]	[120;540]	[180;540]	[0;730[	[120;540]	[180;540]
b	4***	4***	5.31***	6.89***	6.57***	4***	4***	5.31***	6.89***	6.57***
	(0.5257)	(0.5562)	(0.8327)	(1.1882)	(1.2442)	(0.5257)	(0.5562)	(0.8327)	(1.1882)	(1.2442)
m	3.96***	4.03***	5.40***	6.97***	6.52***	3.96***	4.03***	5.40***	6.63	6.52
	(0.5219)	(0.5301)	(0.8223)	(1.174)	(1.1296)	(0.5219)	(0.5301)	(0.8223)	(1.174)	(1.1296)
ϵ_{above}	0.0339***	0.0324***	0.0449***	0.0586***	0.0559***	0.0472***	0.0430***	0.0449***	0.0452***	0.052***
	(0.0043)	(0.0045)	(0.0071)	(0.001)	(0.0108)	(.0026)	(0.0020)	(0.0026)	(0.003)	
ϵ_{below}	0.0336***	0.0327***	0.0456***	0.0593***	0.0555***	0.1107***	0.1615***	0.1137***	0.1638***	0.1555***
	(0.0043)	(0.0044)	(0.0068)	(0.0097)	(0.0099)	(0.033)	(0.0379)	(0.0315)	(0.031)	(0.0293)

** p<0.05, ** p<0.01, *** p<0.001*

Using the pre-*CSP* density as counterfactual yields estimates close to those obtained with the computed density, though a bit lower, which is partly due to the fact that the difference in average capital of those below the cutoff in the pre-*CSP* period and those above the cutoff in the post-*CSP* area is larger than when we use the computed counterfactual. All in all, the difference in elasticities is small, and the difference in excess and missing mass between the two techniques is even smaller, suggesting that non-*CSP* factors do not play a major role in explaining the bunching. Most of the observed bunching can then be imputed to a behavioural response to incentives created by the *CSP*: the method using the missing mass between both densities with a six months bandwidth indicates that a 10% increase in total benefits capital leads to a 1.2 day of contract extension, measured at one year, as compared to a 1.83 days extension when using the computed density. Although this estimate seems small, we should keep in mind that: (i) as a difference-in-differences estimate, it should identify the pure behavioural response clear from any other effects; (ii) it captures a behavioural response attenuated by a partial bargaining power and optimisation frictions.

I make the time window vary, to ensure that I am not capturing the effect of the change in the economic context between September, 2009 - August, 2011 and October, 2011 - September, 2014. Thus, I restrict the window to two 8 months periods, between January, 2011 and June, 2012. I get estimates of the same order of magnitude, though slightly higher, potentially due to the fact that the economic situation has improved from 2009 to 2014, reducing the number of economic dismissals and the need to optimise unemployment compensation. In any case, the small difference between the estimates make us feel comfortable in using a wider time window to increase sample size and precision without biasing the results.

The small gap in elasticities obtained with the computed counterfactual density and with the difference-in-bunching strategy ensures that the observed bunching is mostly a behavioural response to a higher unemployment compensation.

7 Concluding Remarks

The impact of UI parameters on employment outcomes has drawn some attention in recent years, in particular since we observe that the interaction of UI and the labour market can influence the forms of employment: by taking into consideration the shortening of employment spells and allowing workers to be covered even between two short work contracts, the UI has sometimes been accused of encouraging the development of these precarious forms of work.

If the setting under study here does not influence the dismissal decision, it has an impact on its timing, and therefore, on the duration of the employment spell. Bunching evidence, identified as being mostly due to the design of the *CSP*, is used to quantify the sensitivity of the duration of the contract to financial incentives. Bunching behaviour is the result of the bargaining of employer and employee who agree to maximise joint surplus by extending the contract when it is profitable to both parties. These strategic behaviours have several consequences in terms of public policy implications. First, it can encourage to maintain a poor match while it not efficient anymore. It also allows employers to soften the conditions of the redundancy plan, reducing the risk of having their reputation harmed or of paying damages, thanks to a transfer from the State. They can use the *CSP* as an instrument for social peace, without bearing the cost of such a strategy, and without internalising it in the conditions of the breach of the contract

The direct cost of this behaviour can be doubled-up with an indirect cost, if the fact of receiving higher benefits itself influences the duration of the subsequent unemployment spell. Indeed, to determine the ultimate welfare impact of this delay strategy, we would need to measure the effect on unemployment duration. This is challenging, precisely because the bunching observed implies that there is a selection issue when ones wants to compare populations on both sides of the cutoff. A first intention-to-treat estimate measured on the eligible population in the highest potential gain category shows a positive and significant effect of the *CSP* on unemployment duration of about 20 days (Appendix G). It suggests that those workers with the highest propensity to bunch have also longer unemployment spells, triggering again additional cost to the UI, while we do not observe

any effect on the lowest gain category where no significant bunching occurs. Yet, we are not able to distinguish a selection effect from the pure moral hazard effect of the *CSP*.

The typical buncher profile reveals that workers more likely to bunch, and then to take advantage of the design of the *CSP*, are more educated, more skilled, and better integrated to the labour market (with higher earnings and working hours). Our analysis at the firm level indicates that the individual characteristics are the ones that matter the most in explaining the bunching, whereas the representation structures do not seem to favour bunching. It means that those persons that are the less in difficulty on the labour market are the ones that are more able to mobilise the bargaining resources and to get a higher compensation. This finding raises some questions on the efficiency of the UI at targeting the population most in need and further away from the labour market.

References

Acemoglu, Daron and Robert Shimer, "Productivity gains from unemployment insurance," *European Economic Review*, 2000, *44* (7), 1195–1224.

Baguelin, Olivier and Delphine Remillon, "Unemployment insurance and management of the older workforce in a dual labor market: Evidence from France," *Labour Economics*, 2014, *30*, 245–264.

_ **et al.**, "Dismissals scheduling and the employment of older workers," *Economics Bulletin*, 2016, *36* (4), 2443–2453.

Baily, Martin Neil, "Some aspects of optimal unemployment insurance," *Journal of Public Economics*, 1978, *10* (3), 379–402.

Brown, Kristine M, "The link between pensions and retirement timing: Lessons from California teachers," *Journal of Public Economics*, 2013, *98*, 1–14.

Card, David, Raj Chetty, and Andrea Weber, "The spike at benefit exhaustion: Leaving the unemployment system or starting a new job?," Technical Report, National Bureau of Economic Research 2007.

Centeno, Mário, "The match quality gains from unemployment insurance," *Journal of Human Resources*, 2004, *39* (3), 839–863.

Chetty, Raj, "A general formula for the optimal level of social insurance," *Journal of Public Economics*, 2006, *90* (10), 1879–1901.

_ **, John N Friedman, Tore Olsen, and Luigi Pistaferri**, "Adjustment costs, firm responses, and micro vs. macro labor supply elasticities: Evidence from Danish tax records," *The quarterly journal of economics*, 2011, *126* (2), 749–804.

Christofides, Louis N and Chris J McKenna, "Unemployment insurance and moral hazard in employment," *Economics Letters*, 1995, *49* (2), 205–210.

Engen, Eric M and Jonathan Gruber, "Unemployment insurance and precautionary saving," *Journal of monetary Economics*, 2001, *47* (3), 545–579.

Feldstein, Martin and James Poterba, "Unemployment insurance and reservation wages," *Journal of Public Economics*, 1984, *23* (1), 141–167.

Goupille-Lebret, Jonathan and Arturo Infante, "Impact des droits de succession sur le comportement d'accumulation du patrimoine," *Revue française d'économie*, 2016, *31* (1), 187–206.

Green, David A and Timothy C Sargent, "Unemployment insurance and job durations: seasonal and non-seasonal jobs," *canadian Journal of Economics*, 1998, pp. 247–278.

_ **and W Craig Riddell**, "Qualifying for unemployment insurance: An empirical analysis," *The Economic Journal*, 1997, pp. 67–84.

Gruber, Jonathan, "The consumption smoothing benefits of unemployment insurance," Technical Report, National Bureau of Economic Research 1994.

Kleven, Henrik J and Mazhar Waseem, "Using notches to uncover optimization frictions and structural elasticities: Theory and evidence from Pakistan," *The Quarterly Journal of Economics*, 2013, p. qjt004.

McCrary, Justin, "Manipulation of the running variable in the regression discontinuity design: A density test," *Journal of Econometrics*, 2008, *142* (2), 698–714.

Meyer, Bruce D, "Unemployment insurance and unemployment spells," 1988.

Ours, Jan C Van and Milan Vodopivec, "Does reducing unemployment insurance generosity reduce job match quality?," *Journal of Public Economics*, 2008, *92* (3), 684–695.

Rebollo-Sanz, Yolanda, "Unemployment insurance and job turnover in Spain," *Labour Economics*, 2012, *19* (3), 403–426.

Saez, Emmanuel, "Do taxpayers bunch at kink points?," *American Economic Journal: Economic Policy*, 2010, *2* (3), 180–212.

Shimer, Robert and Ivan Werning, "Reservation wages and unemployment insurance," *The Quarterly Journal of Economics*, 2007, *122* (3), 1145–1185.

Unedic, "Note Eclairages numéro 10, licenciés économiques et CSP, una analyse comparée," Technical Report, Unedic 2015.

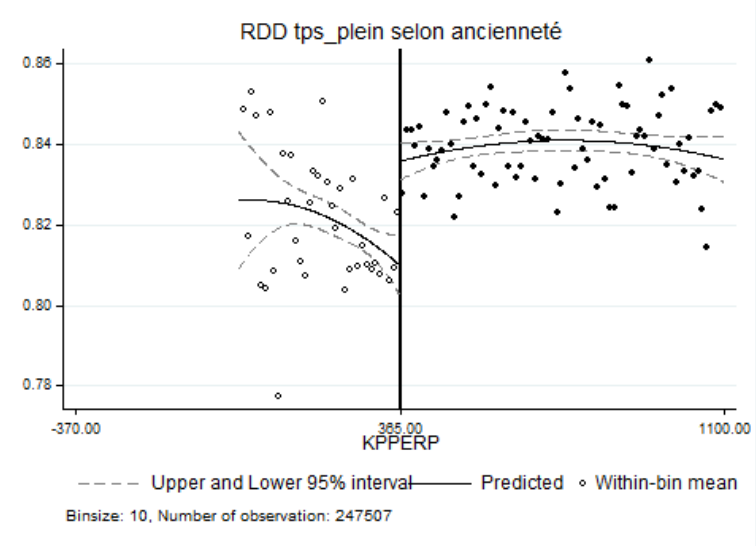
Appendix A Decision to Accept the CSP

Table 16: Consequences of accepting the *CSP* and their valuation

All workers accepting the *CSP*	Guidance and counselling	+ / - : depending on preferences
	No waiting period	+
	Less contributions on ASP/ASP-ARE VS ARE	+
	Right to accept very short-term contracts limited	-
If seniority ≥ 365 days	No advance notice or compensation in lieu of notice	+ : can be felt difficult to keep on working in the firm while knowing you are dismissed - : If the return to the labour market anticipated as quick, the worker can use hours of job-search provided for in most of the collective agreements during his notice
	80% replacement rate VS 57.4% to 75%	+++

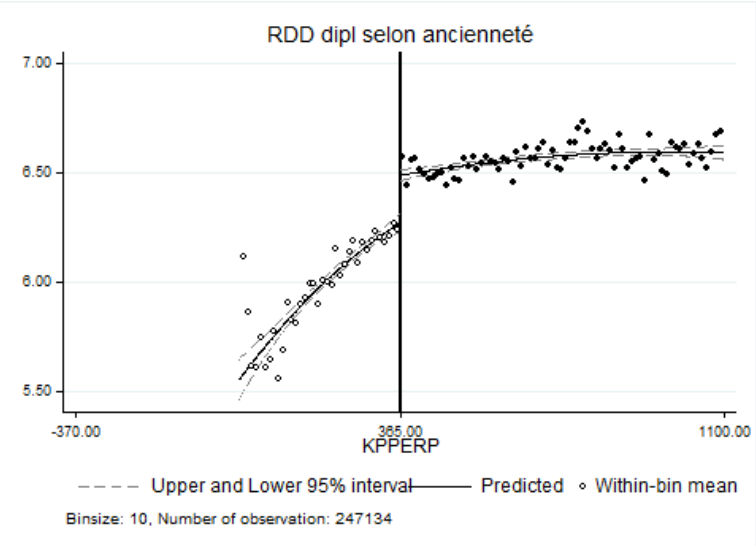
Appendix B Typical Buncher Profile

Figure 10: Distribution of the proportion of full-time workers with respect to seniority (France, 2011-2014)



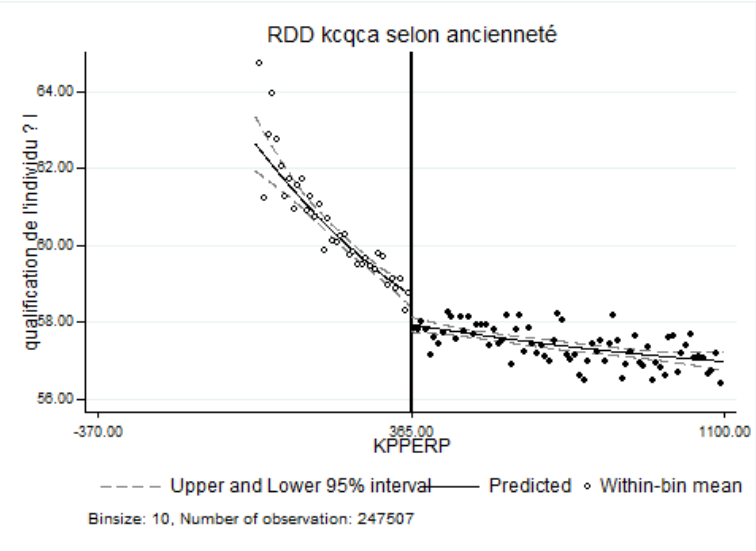
Source: FNA.
SAMPEL: The whole population of unemployed persons eligible to the *CSP* entering unemployed between October, 2011 and September, 2014. Binsize: 10, bandwidth: 100.

Figure 11: Distribution of the education level with respect to seniority (France, 2011-2014)



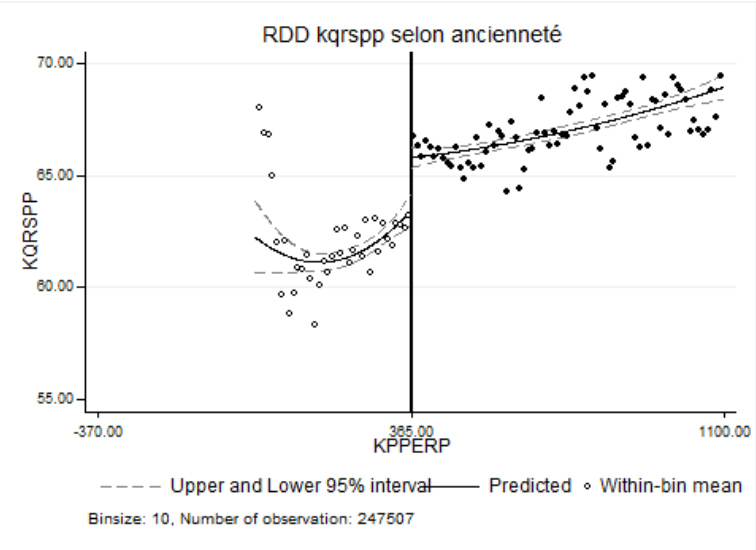
Source: FNA.
SAMPEL: The whole population of unemployed persons eligible to the *CSP* entering unemployed between October, 2011 and September, 2014. Binsize: 10, bandwidth: 100.

Figure 12: Distribution of the level of qualification with respect to seniority (France, 2011-2014)



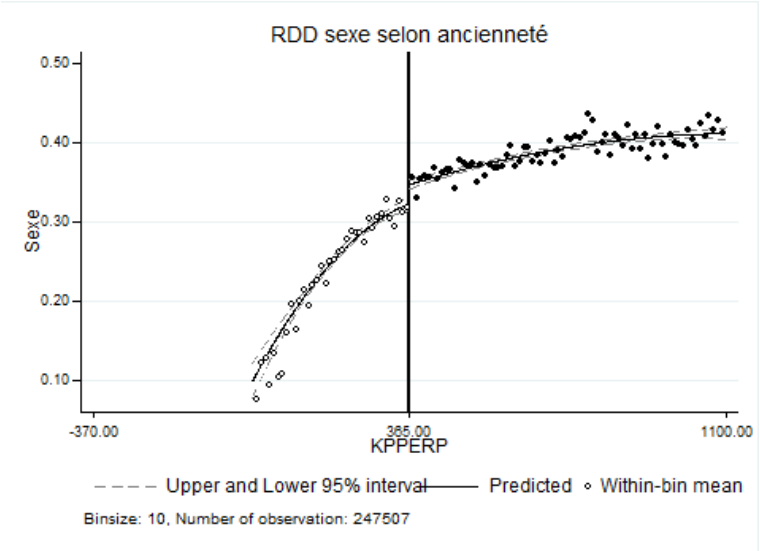
Source: FNA.
SAMPEL: The whole population of unemployed persons eligible to the *CSP* entering unemployed between October, 2011 and September, 2014. Binsize: 10, bandwidth: 100.

Figure 13: Distribution of the level of previous earnings with respect to seniority (France, 2011-2014)



Source: FNA.
SAMPEL: The whole population of unemployed persons eligible to the *CSP* entering unemployed between October, 2011 and September, 2014. Binsize: 10, bandwidth: 100.

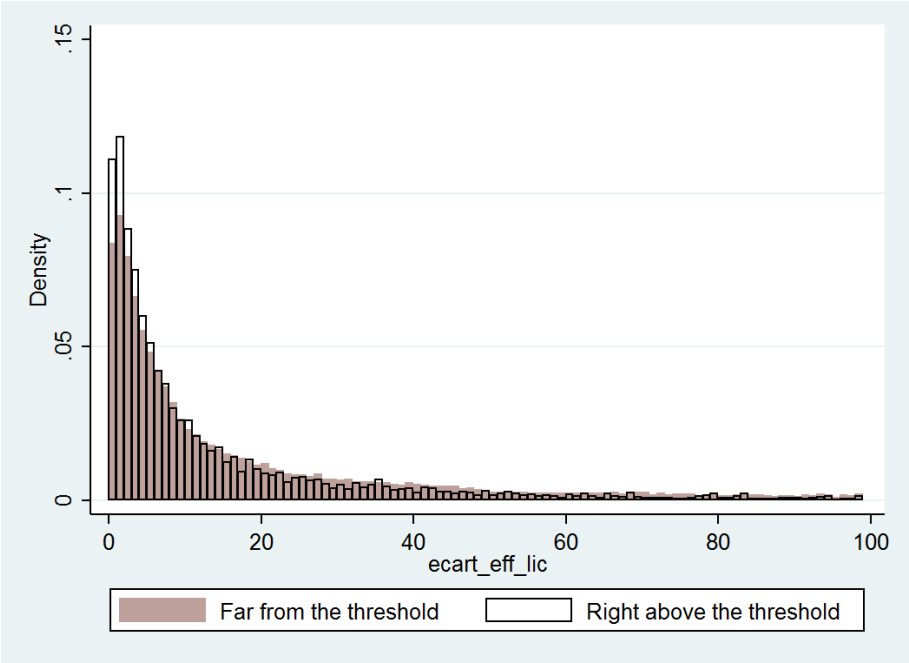
Figure 14: Distribution of the proportion of women with respect to seniority (France, 2011-2014)



Source: FNA.
SAMPEL: The whole population of unemployed persons eligible to the *CSP* entering unemployed between October, 2011 and September, 2014. Binsize: 10, bandwidth: 100.

Appendix C Evidence of Contract Extension

Figure 15: Difference between total workforce size and number of laid-off workers within the same dismissal plan (France, October 2011-September 2014)



Source: FNA.
NOTE: The dismissal plan gathers all dismissals from the same employer on a 30 days period. Being right above the cutoff means having a seniority lying between 365 and 380 days (included).

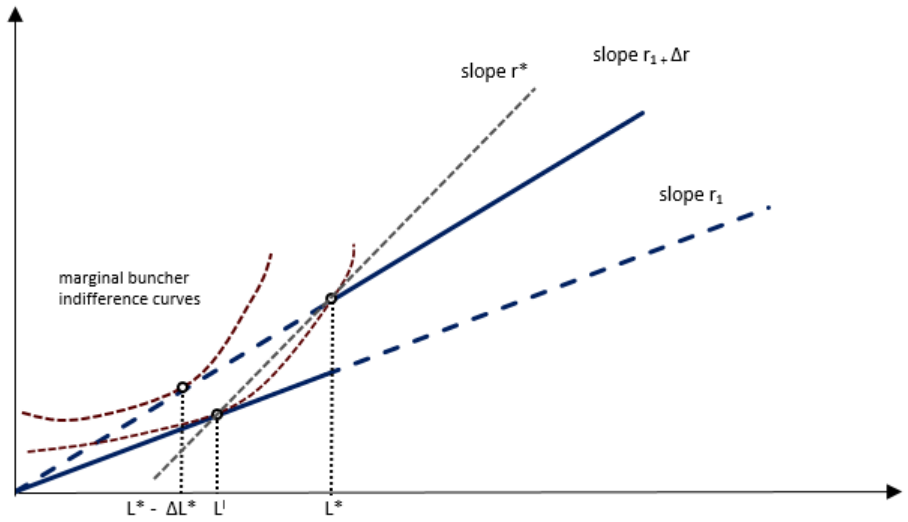
Table 17: Dismissal rank within the same redundancy plan

Dismissal rank	Far from the threshold		Right above the threshold	
	$Seniority <$ 365 or $Seniority >$ 380	$Seniority <$ 365 or $Seniority >$ 390	$365 \leq Seniority \leq$ 380	$365 \leq Seniority \leq$ 390
1^{st} position	47.9%	47.9%	35.1%	35.7%
2^{nd} position	30.2%	30.1%	40.6%	41%
3^{rd} position	22%	22%	24.4%	23.3%

NOTE: We have considered all the plans gathering more than one dismissal from the same employer within a 30 days period
(excluding single dismissal plans and dismissals where the employer identifier is missing)

Appendix D Upward Notch in the Budget Set

Figure 16: Notch in the budget set



The replacement rate jumps from r_1 to $r_1 + \Delta r$ at L^*, making all individuals located between $L^* - \Delta L^*$ and L^* on the pre-notch distribution bunch at the notch point.

Appendix E Heterogeneity by gain category

Table 18: Differences in observable characteristics by gain categories

	Age	Sex	Education level	Proportion of executives	Proportion of intermediate professions	Proportion of unskilled employees	Proportion of skilled employees	Proportion of unskilled workers	Proportion of skilled workers
2^{nd} gain category	1.0625***	-.0573***	.0202	-.0013	.0017	-.0526***	.0224***	-.0032	.0329***
	(.1091)	(.0049)	(.0203)	(.0033)	(.0021)	(.0029)	(.0056)	(.0027)	(.0046)
3^{rd} gain category	2.0151***	-.144***	.279***	.0048	.0078***	-.1175***	.0246***	-.015***	.0954***
	(.1008)	(.0046)	(.0188)	(.0031)	(.0019)	(.0026)	(.0052)	(.0025)	(.0042)
4^{th} gain category	5.8161***	-.2507***	1.0104***	.173***	.0496***	-.1827***	-.038***	-.0577***	.0557***
	(.0996)	(.0045)	(.0186)	(.0031)	(.0019)	(.0026)	(.0051)	(.0025)	(.0042)
Constant	36.5246***	.5967***	5.6701***	.0055	.0041*	.2199***	.5228***	.1029***	.1448***
	(.0980)	(.0044)	(.01825)	(.003)	(.0019)	(.0026)	(.005)	(.0025)	(.0041)

** p<0.05, ** p<0.01, *** p<0.001*
NOTE: The reference category is "1^{st} gain category"

Table 19: Elasticity estimates by gain and representation categories

		Gain category			
		$gain < 0.1$	$0.1 \leq gain < 0.15$	$0.15 \leq gain < 0.2$	$0.2 \geq gain$
Probability of having no representative within the firm	$p \leq 0.05$	.0154	.185	.0355	.0495
		(.3487)	(2.1677)	(.18)	(.2526)
	$0.05 < p \leq 0.1$	–	.011	.0062	.1074*
		–	(.1294)	(.015)	(.0642)
	$0.1 < p \leq 0.5$	–	–	.072	.0612*
		–	–	(.0568)	(.0329)
	$p > 0.5$	–	–	.0289	.0682*
		–	–	(.0316)	(.0359)

** p<0.05, ** p<0.01, *** p<0.001*
NOTE: The bunching boundaries change with gain category. The area used for estimating the counterfactual is included between 180 and 540 days. The polynomial fitting the seniority bin count is of order 4. Standard errors are calculated using a bootstrap procedure generating seniority distributions and associated estimates by random resampling. 200 replications. The empty cells are those for which I could not find a value for M and B to converge.

Appendix F Impact of Individual and Firms' Characteristics on Propensity to Bunch

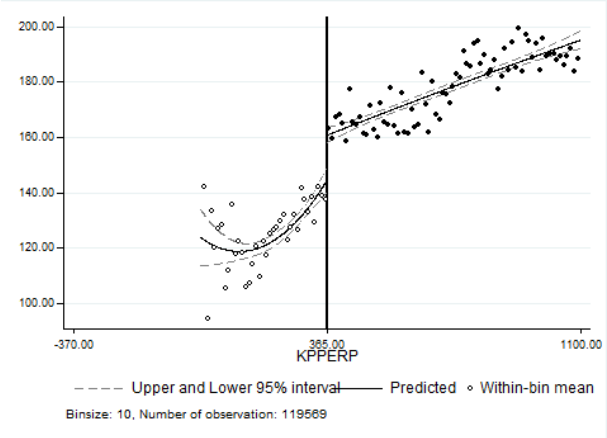
Table 20: Logit model on propensity to bunch

	Propensity to bunch	Propensity to bunch	Propensity to bunch
Potential gain	1.403638***	1.397635***	1.249442*
	(.2514381)	(.2529513)	(.4913836)
Education level	.0567225***	.0574443***	.0531391***
	(.0055986)	(.0056078)	(.01009)
Age	.0042388***	.0042643***	.0018906
	(.0009846)	(.0009859)	(.0017692)
Sex	.1165235***	.116092***	.115917**
	(.0221166)	(.0221874)	(.0400252)
Being an executive	.1716293***	.1730862***	.1103645
	(.0402472)	(.040391)	(.0617812)
Workforce size	-.0004814***		
	(.0000876)		
Workforce size category		-.0117347**	
		(.0044994)	
Proba of having a unionised rep			-.1132072
			(1.504067)
Proba of having a work council			-.6683384
			(5.085477)
Proba of having at least one staff rep			-.2669206
			(1.284029)
Proba of having at least one unique rep body			.2559616
			(2.397695)
Proba of having a health and safety committee			.470253
			(3.34815)
Constant	-3.06808***	-3.055762***	-2.800797***
	(.0646402)	(.065114)	(.4052817)
N	115203	114840	38550

** p<0.05, ** p<0.01, *** p<0.001*
Propensity to bunch is defined as the probability of having a seniority between 365 and 397 days, relative to having a seniority lower than 365 or between 397 and 540 days.

Appendix G Compensated Unemployment Duration for High Potential Gain Workers

Figure 17: Compensated unemployment duration for those with a potential gain ≥ 0.2 ppts (October 2011-September 2014)



Source: FNA