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► **To cite this version:**

Camille Signoretto. Mutually agreed termination, job destruction and dismissals: An empirical analysis based on French firm data (2006-2009). *International Journal of Manpower*, 2016, 37 (8), pp.1365-1386. 10.1108/IJM-11-2014-0224 . hal-01446429

HAL Id: hal-01446429

<https://hal.science/hal-01446429v1>

Submitted on 2 Jan 2023

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Mutually Agreed Termination, Job Destruction and Dismissals.

An Empirical Analysis based on French Firm Data (2006-2009)

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1. Introduction

Since 2008, French labour law has included a new way of terminating open-ended employment contracts (*contrats à durée indéterminée* or CDI). The specificity of this new termination procedure – in French *rupture conventionnelle* (or RC) – is based on its mutual agreement, i.e. RC cannot be imposed either by employers or by the employees. Such contract termination by mutual agreement can be seen as a relaxation of regulation concerning CDIs, and especially of the dismissal legislation (OECD, 2009). Indeed, economic analysis essentially treats such separation rules as labour market rigidities, and so recommendations based on this economic analysis have focused on a relaxation of contract termination rules, to make the labour market more flexible and improve the reallocation of labour, which is an important source of productivity growth and thus economic activity (OECD, 2010). These macroeconomic considerations are reflected in employers' behaviour in arbitrating between costs and benefits when deciding on whether to hire or fire. But, they also affect the choice of the type of hiring and/or separation used, by changing the relative cost between different types of separation for example.

In this context, and given its strong growth in the CDI terminations (Sanzeri, 2013), RC appears to be a success, and its consequences on the labour market are not insignificant. This is especially true in France where employment protection legislation (EPL) is often criticised for its rigidities. Yet, few studies have analysed the effects of this new legal rule on firms' behaviour, using firms' datasets. This article therefore provides some initial understanding and assessment of the economic effects of RC. One of its novelties is to rely on two types of theoretical and empirical literature: i) the traditional literature concerning worker and job flows, and ii) more recent work related to the economics of law, studying the strategic use of the

different types of separation by employers. More precisely, the purpose of the article is to study the possible impact of the introduction of the RC on two decisions by employers: i) the decision to separate with an employee or even to destroy a job, and ii) the use of one form of separation rather than another. The approach I use here is essentially empirical, focusing on an econometric analysis of a sample of firms constituted by matching a database on employee movements (the EMMO-DMMO) with surveys of company accounts (EAE-Esane).

The rest of the article is organized as follows. Section 2 reviews the theoretical and empirical literature examining the impact of the presence of separation costs on the level of job and worker flows, as well as on employers' use of the different ways in which CDIs may be terminated. In line with these theoretical and empirical results, Section 3 shows why the introduction of RC or mutually agreed termination may be considered as a relevant subject of study in analysing the impact of how the law changes the costs and difficulties of dismissal. This then allows hypotheses to be formulated for testing. Section 4 presents the construction of the sample of firms and selection of appropriate variables, as well as the econometric approach used. The latter is based on the construction of two similar firm groups, regarding their use of RC. Then, I compare the evolution of the employment decisions of each group using a difference-in-differences approach. Finally, Section 4 also comments the results of the econometric estimations.

2. Theoretical and Empirical Literature

2.1 Impact of dismissal costs on employment levels and flows

Theoretically, the rules governing termination of the employment relationship are primarily perceived through the associated costs to employers. Analysis of the effect of adjustment costs on the level and flows of jobs is usually carried out in inter-temporal models of labour demand with adjustment costs (Bertola, 1990; Bentolila and Bertola, 1990; Bentolila and Saint Paul, 1994), as well as in matching models, which endogenize the decisions on whether to create or destroy jobs (Pissarides, 2000; Mortensen and Pissarides, 1994, 1999). According to these models, the existence of separation costs can affect the choice made by an employer in terms of hiring and firing. In downswings of the economic cycle, the high costs of separation will reduce dismissals due to costs. In contrast, in upswings, the high costs of separation reduce hirings as employers anticipate these costs, should they have to lay off employees in a subsequent downturn. The net effect on employment levels will then depend on the impact these

contradictory effects have on hiring and firing. In addition, the impact of adjustment costs on the level of employment will depend on the initial level of employment in the firm, due to the presence of an area of inaction caused by the existence of these costs. Finally, this impact will also depend on the initial level of adjustment costs (see for example Bentolila and Saint-Paul, 1994). The modelling assumptions used, in particular about the shape of the production function and the nature and persistence of uncertainty, also play a role in determining the outcome of the models (Ljungqvist, 2002). Thus, the existence of adjustment costs leads firms to pursue a strategy of reducing both job creation and destruction. This in turn tends to lower job flows.

While theoretical models have yielded ambiguous results, a large empirical literature has also developed. Microeconomic analysis, which is of specific interest here, focuses on legislative changes in some Continental European countries¹ or in some US states² which have had an impact on the evolution of separation costs (i.e. natural or quasi-natural experiments). But again, the empirical results are generally mixed. Thus, to cite just a few studies, research concerning Italy shows that dismissal costs reduce worker and job flows (Kugler and Pica, 2008),³ or reduce the probability of a firm's growth around exemption thresholds (Schivardi and Torrini, 2008). Using US data, Autor *et al.* (2007) found that the adoption of wrongful-discharge protection by state courts in the US from 1970 to 1999 had a negative effect on job flows, particularly in manufacturing, and on firm entry. In contrast, in other countries such as Germany, the results are not consistent because changes in the threshold scale exempting small establishments from dismissal protection provisions has had no significant effect on worker turnover or job creation in small establishments (see Bauer *et al.*, 2007; Burgert, 2005). Similarly, no significant impact is identifiable on job or worker flows from reforms of dismissal rules in Sweden (Von Below and Thoursie, 2010) and Portugal (Martins, 2009). Finally, while Miles (2000) finds no significant impact of the introduction of unfair dismissal laws in some US states on aggregate employment, Autor *et al.* (2006) estimate that the adoption of such rules is associated with a slight reduction in the employment rate in these states. In general, this lack of clear empirical results could be explained by the institutional framework, as the weight and scope of each reform of dismissal rules differs between countries or between US states.

Thus, the dynamic models of labour demand and matching models are often used in the empirical analysis of the effects of separation costs (and more generally of employment protection legislation) on the level of unemployment and employment, as well as on worker

and job flows. However, these models do not look at the composition of separation costs which appear only as exogenous constraints that firms must deal with. More recent theoretical analyses, dating from the 2000s and developed in the economics of law, specifically consider these costs and show up the existence of uncertain costs related to workers' rights to challenge unfair dismissal in the courts.

2.2 Effects of litigation risk on separation costs and on employers' behaviour

In the analytical representation of dismissal protection legislation as a cost, direct costs (such as severance payments) can be distinguished from indirect costs. The latter include costs of compliance with procedures (bureaucratic costs) and the time during which the employee remains with the firm until his/her departure (often equated with a loss of productivity). Another indirect cost, which is inherently uncertain, concerns the possibility of the employee to file a suit against the firm for unfair dismissal. This may result in an additional cost to the employer if the court decision is favourable to the employee (i.e., when dismissal is recognized as unfair). By taking into account this uncertain cost component, the theoretical bargaining models (Malo, 2000; Malo and Perez, 2003; Goerke and Pannenberg, 2009) have renewed the analysis of the impact of separation costs on employer behaviour. In particular, they show that severance pay negotiated at the time of dismissal will be higher if there is a strong risk that the dismissal may be considered as unfair in court, and if the compensation decided by the court is high. The probability of an agreement between employees and employers on the negotiated severance pay is also much higher when there is no legal rule on the amount of compensation for unfair dismissal: i.e., the amount of such compensation is uncertain (which is the case in the US). In line with these models, other studies (Galdon-Sanchez and Guell, 2004; Langlais, 2008; Malo, 2000; García-Martínez and Malo, 2007) reveal strategic use of the different types of dismissal by employers (redundancy, i.e. dismissal for economic reasons *vs.* dismissal for misconduct or insufficient competence).⁴ Such behaviour depends on the risk of litigation associated with each of these types of dismissal and its impact on their costs. Specifically, these models attempt to explain the substitution of dismissal for economic reasons by dismissal for misconduct. This substitution is based primarily on the fact that the direct and/or indirect costs of dismissal for misconduct are lower than for dismissal for economic reasons. In addition, in Spain (Malo, 2000), the probability that dismissals are recognized as unfair is higher in the case of an economic reason, because the courts' criteria relating to dismissal for economic reasons are less precise. Although the institutional framework varies from one country to another, this

theoretical literature leads to a main result: the legal framework and court rulings on unfair dismissal tend to increase the initial cost (the negotiated severance pay) or the final cost (compensation for unfair dismissal). This in turn has an impact on employers' choices concerning the types of dismissal. Employers tend to choose the type of dismissal with lowest probability of being ruled as unfair and with the least costs attached, should the employee win in court.

Paradoxically, the empirical literature to test the predictions of these theoretical models is scarce. Theoretical studies which do look at the empirical aspects of their model (Galdon-Sanchez and Guell, 2004; Langlais, 2008) usually restrict themselves to providing characteristics of employees' recourse to the courts and their chances of winning their cases. García-Martínez and Malo (2007) show that in the Spanish case there is a strategic use of the dismissal legislation (collective *vs.* individual) because the legal procedures are not used as they were defined. Indeed, individual dismissals are used by firms to reduce their workforces for economic reasons, and not for disciplinary reasons as the legal framework sets out. But, studies generally do not test empirically the hypothesis of the strategic use of different types of dismissal according to their risks of litigation. Some research does show up the effects which the presence of a legal system may have on the use of one type of employment contract rather than another. For example, taking US data, Miles (2000) and Autor (2003) show the positive effect of the adoption in some states of unjust dismissal doctrine on the use of temporary employment and outsourcing. Using French data, Bourreau-Dubois *et al.* (2011) analyse the impact of litigation risk over dismissal on how fixed-term contracts (called *contrats à durée déterminée* in French, or CDD) were used in France in the 2000s. The authors found a positive link between litigation risk (measured by two indicators, namely an index of conflict intensity and the rate of judgments) and the use of CDDs. However, the effect is fairly small, and is sensitive to changes in econometric estimates. Thus, these studies suggest that by increasing the separation costs of permanent jobs (CDIs in France), litigation risk has a larger impact on the behaviour of employers. This is because arbitration in terms of costs not only concerns the types of separation for permanent jobs, but also the types of employment (permanent or temporary, as well as outsourcing).

By drawing together the theoretical and empirical literature, it is possible to show how the costs of adjustments taken in their widest sense influence worker and job flows on the one hand, and

the choice of types of separation on the other hand. It is within this general approach that I study the impact of the introduction of mutually agreed termination (RC) on these two aspects of employer decisions. This is because the creation of RC as an additional form of terminating a CDI (under French legislation) modifies both the level of separation costs and the difficulties of separation for employers.

3. The Creation of Mutually Agreed Termination (RC) in 2008

Mutually agreed termination – *rupture conventionnelle* or RC – was introduced into French labour law in 2008. It became the third way of ending an open-ended contract – *contrat à durée indéterminée* or CDI, alongside resignation and dismissal. As a reminder, resignation is based on a voluntary decision by the employee to leave his/her job, and therefore carries no costs for the firm. In contrast, dismissal occurs following a decision by the employer and must follow established procedures defined by law. It entails an amount of severance pay determined in legislation or collective agreements. Moreover, depending on the reason for dismissal (economic or personal), the procedures may be different: for example with additional rules to be followed in the case of dismissal for economic reasons. Compared to these two types of separation, the RC is a contract termination decided by mutual agreement between the employer and the employee, i.e. it is a joint initiative. It therefore does not have to be justified, unlike the dismissal, which makes it attractive to employers. As for the employee, he/she may benefit from unemployment insurance and severance pay equivalent to dismissal, unlike in the case of resignation. Finally, RC has a formal framework: employees' have the possibility to be assisted by a third party (workers' representatives within the company, for example), a 15-day period during which each party can withdraw its consent, and finally approval of the termination by the labour administration. This new type of separation has met with rapid success in view of the use made of it by employees and employers (Minni, 2013).

3.1 A less stringent legislation

Given its characteristics, RC can be likened to a cut in separation costs and greater ease of separation for employers, compared to the other form of terminating a CDI they can use, namely dismissal. First, by relying on the indicator of employment protection legislation (EPL), constructed by the OECD to measure the strictness of the rules governing the employment relationship, it is possible to consider that RC facilitates the termination of a CDI. Indeed, several components can be distinguished in the sub-indicator of regulations concerning

individual dismissals (see Venn, 2009): i) "procedural inconveniences" (the notification procedures and their attendant delay); ii) the notice and severance pay for no-fault individual dismissals; and finally iii) the difficulty of dismissal (definition of unfair dismissal, a trial period, compensation for unfair dismissal, the possibility of reinstatement after unfair dismissal, and the maximum time to make a claim of unfair dismissal). RC has thus changed several elements relative to dismissal legislation: while severance benefits must be equivalent to those for dismissal, there is no mandatory notice period. Then, the definition of an "unjust mutually agreed termination" does not make sense *a priori*, since it does not have to be justified. In fact, it is more complex for an employee to file a suit against the firm arguing that the RC is unfair, given that it is supposedly based on the mutual agreement of both parties, and given the procedural safeguards surrounding the agreement (Berta *et al.*, 2012). Finally, the period in which an employee has the right to file a suit is much shorter in the case of RC than that of dismissal (one year *vs.* two years for dismissal due to personal reasons). Thus, RC seems to loosen the law on terminating CDIs by reducing the difficulty of separation for employers, mainly because RC lowers the probability of litigation by the employee. The introduction of RC should therefore facilitate separations and reduce separation costs through the reduction of uncertainties over costs related to the possibility that termination might be considered unfair.

3.2 Hypotheses

In view of the results of the theoretical models and empirical evidence presented above, two types of effects of the introduction of RC may be expected. One is on worker and job flows, and the other on the choice of the type of separation used by employers. However, these two hypotheses are not mutually exclusive and they have to be discussed together to understand the existing links between them.

A first effect concerns the costs of separation. According to the results of dynamic models of labour demand and matching models, lower separation costs could have a positive impact on worker and job flows, though the overall impact on the employment level remains difficult to predict. A first *hypothesis H1* can thus be put forward: by reducing the cost of separation, RC facilitates hires and separations, and more specifically job creation and destruction. Accordingly, an overall increase in worker and job flows is to be expected. The second effect concerns possible substitutions between the RC and the other types of existing separations. The strategic use of different types of CDI termination follows directly from theoretical bargaining

models. Indeed, in line with these models, reducing the risk for an employer of being faced with unfair termination could reduce the overall cost of termination (although this is constrained by the level of the statutory minimum severance pay). The result could be that employers substitute dismissals with RC. Moreover, another type of substitution may exist, if the behaviour of the employees is considered. Indeed, RC may seem more advantageous to employees compared to resignation, because employees can obtain severance payments and have access to unemployment benefits. A second *hypothesis H2* can thus be put forward with respect to these two types of substitutions: by reducing the risk that termination is deemed unfair, substitution between RC and dismissals (for whatever reason) may occur; whereas given the advantages of RC for employees, substitutions of resignations by RC are also expected. Moreover, as RC was introduced during a year of economic crisis which led to specific changes in all forms of contract termination (Ettouati, 2011), and given these substitution behaviours, it is to be expected that the use of dismissals for personal reasons and resignation would fall strongly in firms using RC, while the use of dismissals for economic reasons may be expected to have risen less.

These two hypotheses can be discussed together. First, as RC is a type of CDI separation, it may seem obvious, even tautological, that its implementation will increase CDI exits. In fact, this is not that simple because RC also depends on substitution behaviour. Indeed, if RC were to substitute for other types of existing separation systematically, then the level of overall CDI exits should be the same. It is only if RC leads to terminations which would not have occurred without it, that overall CDI exits should increase. Next, the second link between the two hypotheses is related to job creation. According to the literature presented above, job creation should be enhanced by the introduction of RC. However, the evolution of job creation also provides information on possible substitutions between the different types of separations, and especially with dismissals for economic reasons. Within France's legal framework, dismissal for economic reasons used to destroy a job cannot be followed by a job creation.⁵ Therefore, firms that used separations for economic reasons, whether it be under the legal form of a dismissal for economic reasons or by RC, will create fewer jobs than others.

I test these two hypotheses with a sample of firms constructed from matching two databases on workforce movement in establishments and on firms' income statements. To this end, I run a propensity score matching method to construct two similar firm groups, which differ only in the fact that one uses RC and the other does not. Next, a difference-in-differences approach is

used: I compare the evolution of employment decisions of the two firms' groups in order to identify the specific effect of RC in user firms.

4. Empirical Analysis

4.1 Data and sample construction

Matching data for establishments on workforce movement (EMMO-DMMO)⁶ and data on firms' accounts and finances (EAE-Esane)⁷ provides a database that brings together indicators of the human resources management, job flows and firms' economic performance. The first database contains monthly or quarterly information on entries (by type of contract) and on exits (type of contract terminations), for establishments in mainland France. The second database collects economic and financial information of firms' income statements. Several steps were taken to match these two bases. First, the database was constructed at firm level: i.e., the information from the EMMO-DMMO database on establishments is aggregated at firm level. Next, workforce movements are annualized to compare them with the annual economic indicators constructed from EAE-Esane. Finally, various stages in the matching process lead to the removal of establishments from the EMMO-DMMO database, when they are not found to belong to any firm in the EAE-Esane database, and vice-versa for some firms that cannot be matched with any establishment in the EMMO-DMMO database.

Finally, from the matched database, only firms with data for consecutive years (2006 to 2009) are retained. I was thus able to obtain a sample comprising 6,302 firms, which were tracked for four years (balanced panel). The sample is not representative of all French firms. For example, it over-represents the industry sector (almost 50 % of firms) and large companies (almost 50% are firms with 100 or more employees).⁸ In addition, variables for workforce management and job flows are all lower than levels found in all French firms (see Appendix A).

The dependent variables are selected to test the hypotheses put forward above. They are constructed using the definitions commonly found in the literature on job and worker flows. For example, the construction of the variables for job flows (see table I) is based on the definitions of job creation and destruction rates,⁹ and net job growth rate, as stated by Davis and Haltiwanger (1999). These indicators are supplemented by variables characterizing the worker flows, as calculated by the DARES unit of the Ministry of Labour (see Ettouati, 2011): worker turnover rates, exit rates, entry rates, CDI worker turnover rates, exit rates from CDIs,

and entry rates into CDIs. A distinction has been made between overall worker flows and CDI worker flows, because the RC is a type of CDI separation, and so it can affect CDI flows first. Finally, the other types of CDI separation rates are as follows: dismissals for economic reasons rates, dismissals for personal reasons rates, resignations rates (see table I).

Table I: Definition of the Dependent Variables and Economic Indicators

- Variation in jobs = $\Delta N = N_t - N_{t-1}$
- Job creation rate = $\frac{\Sigma \Delta N}{0,5(N_{t-1} + N_t)} \times 100$ with $\Delta N > 0$
- Job destruction rate = $\frac{\Sigma |\Delta N|}{0,5(N_{t-1} + N_t)} \times 100$ with $\Delta N < 0$
- Net job growth rate = job creation rate - job destruction rate
- Exit rate = $\frac{\text{number of total exits during year}}{\text{average number of employees}} \times 100$
- Entry rate = $\frac{\text{number of total entries during year}}{\text{average number of employees}} \times 100$
- Worker turnover rate = (exit rate + entry rate)/2
- Rate of dismissals for economic reasons = $\frac{\text{total number of dismissals for economic reasons in year}}{\text{average number of employees}} \times 100$
- Rate of dismissals for personal reasons = $\frac{\text{total number of dismissals for personal reasons in year}}{\text{average number of employees}} \times 100$
- Rate of resignations = $\frac{\text{total number of resignations in year}}{\text{average number of employees}} \times 100$
- Rate of CDI exit = $\frac{\text{exits by resignation, dismissals and retirements}}{\text{average number of employees}} \times 100$
- Rate of CDI entry = $\frac{\text{number of total CDI entries during year}}{\text{average number of employees}} \times 100$
- CDI worker turnover rate = (total number of CDI entries in year + total number of CDI exits in year)/2
- Rate of profit = $\frac{\text{net profit}}{\text{fixed assets at end of financial year}} \times 100$
- Rate of gross margin = $\frac{\text{gross operating profit}}{\text{value added}} \times 100$
- Economic rate of return = $\frac{\text{gross operating profit}}{\text{fixed assets at end of financial year}} \times 100$
- Rate of value added = $\frac{\text{value added}}{\text{sales}} \times 100$
- Market power = market share - number of firms by sector; with market share =

$$\frac{\text{sales of the firm}}{\text{sum of sales of the sector of the firm}} \times 100$$

$$\text{- Log of payroll per capita} = \log \frac{\text{wages and social insurance}}{\text{average number of employees}}$$

The economic indicators were also constructed to allow firms to be characterized in the most comprehensive manner possible. More specifically, these include: the rate of profit and its growth rate, the gross margin rate and its growth rate, the growth rate of sales, the economic rate of return and its growth rate, the value added rate and its growth rate, market power, the share of exports in sales and the growth rate of the 'current result before tax' (see table I for their more precise definitions). It became necessary to introduce all of these variables to characterize the economic situation of firms, though care must be taken not to introduce collinearity between them.

Finally, a payroll per capita variable is also introduced to characterize the types of workforce management practiced by firms. It is controlled by proxies reflecting the structure of employment by qualification and by age, so that it can be interpreted as an indicator of the generosity of pay practices.¹⁰

4.2 Econometric strategy

To be able to identify a specific effect of the introduction of RC in user firms, it is necessary to estimate the difference in the evolution of the variables of interest on two comparable firm groups. In our case, since RC was introduced for all firms, there is no control group in principle. Therefore, a propensity score matching has to be undertaken before estimating difference-in-differences regressions. I could not find a better econometric strategy to resolve this identification problem.¹¹ Yet, even if the results need to be carefully interpreted by emphasising the 'local' nature of the observed effects, I think a such study provides information on the use of this new type of separation and raises important issues. Then, the first step of the econometric strategy is to create a group of firms which do not use the RC, as similar as possible to a second group of firms which use it. To this end, I use a propensity score matching method. The second step estimates the difference in the evolution of the variables of interest, using a difference-in-differences approach.

4.2.1 The propensity score matching method

The principal group only includes the firms that have used RC. Then, a counterfactual has to be found for each of these firms, i.e. a firm with the same observable characteristics but which did not use RC.¹² A propensity score matching procedure is then used to form the group of firms not using RC, as the counterfactual group.

Depending on the property highlighted by Rosenbaum and Rubin (1983), conditional independence on observable variables implies conditional independence on the propensity score: $Y_0 \perp T|X \implies Y_0 \perp T|P(X)$, where Y_0 is the potential outcome, T is the dummy variable which equals 1 if the firm uses RC and 0 otherwise, and X denotes the covariates. This method is used to have matched firms, based on their propensity score and not on all covariates, because this propensity score appears as a summary value of this set of covariates. Matching for the propensity score thus renders those observable characteristics of firms, which explain the choice of using RC or not (T), independent of the potential outcome (Y_0). The first step in matching is to calculate the propensity score. This is done using a logistic specification which considers, here, the probability of having used at least one RC in 2009. The variables used in the logit are selected according to the impact they may have on both the probability of using RC, and on the dependent variables used in the OLS regressions estimated after. In short, the variables necessary to obtaining the property of conditional independence must be found. In addition, attention must be paid to the fact that these variables need to be measured before the introduction of the RC, in order to avoid endogeneity problems. Finally, the predictive capabilities of the model can be evaluated using standard tests for the association of predicted probabilities and observed responses. A second step then involves the verification of the existence of a common support region between the distributions of the propensity score of the two groups. Otherwise the matching cannot be done. To obtain broad common support, the logit specification should not be the most suitable one. Two types of methods exist to validate the condition of common support: either only the density range common to both groups (the minima and maxima criterion) is retained, or the minima and maxima of the distribution (10% or 20%, etc.) of the propensity score (the trimming method) are excluded. Here, both methods have been used, with an exclusion threshold of 10% of the minima and maxima (the score range runs from 0.1 to 0.9). Finally, matching is performed using different methods or algorithms (the nearest neighbour, the kernel, the radius, etc.). I chose to use the nearest neighbour method with a Greedy SAS macro, described in Parsons Lori (2001). This should lead to the construction of

two similar groups of firms in terms of a set of observable characteristics. To verify that the matching achieved for this objective (the “balancing property” of the propensity score), a test of equality of means can be performed on a set of observable variables, between the two groups of firms after matching (the *t-test* method, see Rosenbaum and Rubin, 1985). The validity of the test may then lead to specification changes of the logit (especially at the level of firms’ economic characterization), until there are no longer any significant mean differences between the two groups.

4.2.2 A difference-in-differences approach

The central idea here is to compare the evolution of different variables of interest in both groups before and after the introduction of the RC, and to consider that the difference in the evolution of these two groups can be due to the introduction of the RC. More precisely, two dimensions are taken into account: i) the time dimension, i.e. the comparison before/after the introduction of the RC; and ii) the comparative dimension between the group of user firms and the counterfactual group of non-users. The first difference relates to the evolution of the dependent variable before and after the introduction of the RC for each group. It eliminates the initial differences that may exist between the two groups (individual fixed effects). The second difference is based on the difference of change between the two groups. It allows elimination of the time evolution which is assumed to be identical if the RC did not exist (common time effect). The latter hypothesis, of “time-invariance”, is generally considered to be strongest in the difference-in-differences approach, because it means that the dependent variable in both groups would have evolved in the same way in the absence of the RC. One way to test this is to see if the dependent variable evolves in the same way for the two groups before the introduction of the RC (graphically or by applying the estimate of difference-in-differences to the years in which there was no reform of the law).

Formally, it is assumed that the dependent variable is explained by a model with the following form:

$$Y_{it} = \gamma + X_{it}\beta + \varepsilon_{it} \quad \text{with } t = 08 \text{ (for 2008)} \quad (1)$$

$$Y_{it} = \gamma + X_{it}\beta + \delta T_i + \varepsilon_{it} \quad \text{with } t = 09 \text{ (for 2009)} \quad (2)$$

in which Y_{it} corresponds to the dependent variable in the firm i for year t , with $t \in \{08 ; 09\}$; γ is a constant term; T_i is a dummy variable taking the value 0 for non-user firms (in the

counterfactual group), and 1 for user firms (in the principal group); X_{it} is a vector of covariates for each firm i and each period t ; δ is the parameter measuring the effect of the implementation of RC on the dependent variable Y ; and ε_{it} is the error term. The latter term can be broken down in the following way: $\varepsilon_{it} = \phi_i + \theta_t + \mu_{it}$, where ϕ_i refers to the fixed individual effect, θ_t represents a common time effect, and μ_{it} a centered random variable, with an average of zero.

An ordinary least-squared (OLS) regression of Y_{it} is then run to estimate the parameter δ measuring the effect of the RC in user firms:

$$Y_{it} = \alpha_0 + \alpha_1 t_{i,1} + \alpha_2 T_{i,1} + \delta(t_{i,1} * T_{i,1}) + X_{it}\beta + \varepsilon_{it} \quad (4)$$

where Y_{it} is the dependent variable in the firm i for period t ; T_i takes the value of 0 if the firm belongs to the counterfactual group of RC non-users and 1 if it belongs to the group of users; and t_i takes the value of 0 for 2008 and the value of 1 for 2009. The year 2008 was chosen as the reference year, that is to say, before the implementation of the reform. It should however be remembered that the RC appeared in the middle of 2008, but less than 1% of the sample of firms used it in this year. I decided to remove this 1% of firms from the sample and to keep 2008 as the base year, because 2007 would have been problematic given the way the economic crisis of 2008 severely impacted on the evolution of the dependent variables and induced a stronger cyclical difference when 2007 is compared to 2009.

4.3 Estimation results

4.3.1 Results of the propensity score matching

To calculate the propensity score, a logit regression of the probability for a firm to have used at least one RC in 2009 is estimated (see table II). Variables on firms' characteristics, on firms' economic situations, and firms' workforce management are introduced in the logit estimation. All of these variables are necessary to obtain two groups of firms which are not different in a set of observable characteristics. The non-collinearity between all of the economic variables introduced has been verified before.

Table II: Propensity score estimation (Logit regression)

Explanatory variables	Coeff.	Std. Err.
Firm size in 2008 (ref: 100 employees and more)		
10-49 employees	-0.699**	(0.354)
50-99 employees	-0.434***	(0.061)

Sector of activity in 2008 (ref: <i>market services</i>)		
<i>Construction</i>	-0.098	(0.121)
<i>Industry</i>	0.171**	(0.077)
Profit rate in 2008	-0.000	(0.000)
Growth rate of the profit rate between 2008 and 2009	-0.000	(0.000)
Profit rate in 2008 (ref: <i>negative or none</i>)		
<i>Positive</i>	-0.050	(0.073)
Gross margin rate in 2008	0.000	(0.000)
Growth rate of gross margin rate between 2006 and 2007	-0.000	(0.000)
Growth rate of the gross margin rate between 2008 and 2009 (ref: <i>positive or less at the distribution 3rd quartile</i>)		
<i>Negative or none</i>	0.270***	(0.093)
<i>Positive or greater at the distribution 3rd quartile</i>	0.179*	(0.103)
Growth rate of sales between 2008 and 2009 (ref: <i>negative or none</i>)		
<i>Positive</i>	-0.232***	(0.073)
Economic rate of return in 2007	-0.000	(0.000)
Growth rate of the economic rate of return between 2008 and 2009	-0.000	(0.000)
Value added rate in 2008	0.001	(0.000)
Growth rate of the rate of value added between 2006 and 2007	-0.000	(0.000)
Growth rate of the rate of value added between 2007 and 2008	-0.000	(0.000)
Growth rate of the rate of value added between 2008 and 2009 (ref: <i>negative or none</i>)		
<i>Positive</i>	0.117*	(0.065)
Market power in 2008	0.003	(0.009)
Share of exports in the sales in 2006	0.001	(0.001)
Variation of the share of exports in the sales between 2006 and 2007	-0.003	(0.004)
Growth rate of the 'current result before tax' between 2008 and 2009	-0.000	(0.000)
Log of payroll per capita in 2008	0.720***	(0.098)
Distribution of movements excluding transfers and movements of CDD by occupations in 2008 (ref: <i>workers</i>)		
<i>Managers</i>	0.007***	(0.001)
<i>Intermediate professions</i>	0.007***	(0.002)
<i>Employees</i>	-0.002	(0.001)
Distribution of movements excluding transfers and movements of CDD by age in 2008 (ref: <i>30-49 year olds</i>)		
<i>Young persons (less than 30 years old)</i>	-0.000	(0.002)
<i>50+ years old</i>	-0.004**	(0.002)
Intercept	-3.791***	(0.383)
<hr/>		
Number of observations	6,205	
Missing values for the response or explanatory variables	97	
Value of the dependant variable		
<i>Concluded at least one mutually agreed termination</i>	1,779	
<i>Did not concluded any mutually agreed termination</i>	4,426	
Percent concordant in the association of predicted probabilities and observed response	65.8%	

Notes: Logit model estimating the probability of having concluded at least one RC in the year (1: concluded; 0: otherwise). ***: significance at 1 %; **: significance at 5 %; *: significance at 10 %.

Source: author's calculations using a sample of firms constructed from the EMMO-DMMO (Dares) and EAE surveys (Insee).

Field: Firms of more than 10 employees in the non-farm business sector.

After calculating this propensity score, the matching leads to the constitution of an overall sample of 3,514 firms. This sample is broken down into two groups of 1,757 firms. While the

propensity score was calculated on an initial sample of 6,302 firms (split into 1,793 firms that used an RC in 2009 and 4,509 firms that had not), matching led to the removal of 2,788 firms. The latter includes 2,749 non-users of an RC which did not constitute a counterfactual that is sufficiently close to user firms: i.e. whose propensity scores were not close enough. Moreover, 33 firms using RC were also excluded as their propensity score was not in the common support: it was either too weak or too strong (the minima and maxima method). Finally, trimming the common support led to 3 firms being removed in both groups. Thus, firms that did not use RC and firms that did become similar on their observable characteristics, except the use of RC.

It is then necessary to check that these two groups of firms are similar in their observable characteristics. Tests for equality of means and frequency make it possible to verify that the group of firms using RC is similar to the group of non-user firms which are thus matched. Table III shows up the lack of a significant difference for variable mean averages which had been used to calculate the propensity score between the two groups. Beyond the equality of means observed for some economic variables, I also wanted to verify that there had been no difference in the evolution of these firms' economic situations. Firms must indeed be subject to the same changes and economic shocks, so that such differences do not explain the results of the estimates of the difference-in-differences. Additional tests show that the two groups of firms experience similar trends for the median of the economic indicators used in the calculation of the propensity score (see Appendix B).

Table III: Differences in means of covariates between the two groups of firms before and after propensity score matching

	BEFORE MATCHING			AFTER MATCHING		
	Non-users	Users	Mean difference	Non-users	Users	Mean difference
Firm Size in 2008 (%)						
10-49 employees	1.1	0.6	**	0.6	0.4	ns
50-99 employees	51.1	39.9	***	42.0	40.1	ns
100 employees or more	47.8	59.5	***	57.4	59.5	ns
Sector of activity in 2008 (%)						
Industry	46.2	53.9	***	55.1	54.3	ns
Construction	9.8	7.2	***	7.2	7.3	ns
Market services	44.0	38.9	***	37.7	38.4	ns
Profit rate in 2008 (%)	212.6	185.0	ns	197.6	201.3	ns
Growth rate of the profit rate between 2008 and 2009 (%)	-28.4	-63.0	ns	-46.4	-52.4	ns
Profit rate in 2008 (%)						
Negative or none	22.6	24.1	ns	23.7	23.9	ns
Positive	77.4	75.9	ns	76.3	76.1	ns
Gross margin rate in 2008 (%)	6.3	16.5	ns	17.5	15.8	ns
Growth rate of the gross margin rate between 2006 and 2007 (%)	38.2	21.1	ns	13.5	25.6	ns
Growth rate of the gross margin rate between 2008 and 2009 (%)						
Negative or none	60.0	63.6	***	63.9	63.9	ns
Positive or less at the distribution 3rd quartile	14.9	12.3	***	12.1	12.5	ns
Positive or greater at the distribution 3rd quartile	25.1	24.1	ns	24.0	23.6	ns
Growth rate of sales between 2008 and 2009 (%)						
Negative or none	71.6	76.3	***	76.8	76.0	ns
Positive	28.4	23.7	***	23.2	24.0	ns
Economic rate of return in 2007 (%)	199.4	117.5	ns	111.5	121.0	ns
Growth rate of the economic rate of return between 2008 and 2009 (%)	-533.6	203.3	ns	-75.0	-144.2	ns
Value added rate in 2008 (%)	-263.9	33.5	ns	34.6	33.4	ns
Growth rate of the rate of value added between 2006 and 2007 (%)	10.0	2.5	ns	1.5	2.7	ns
Growth rate of the rate of value added between 2007 and 2008 (%)	-9.2	-1.2	ns	1.0	-1.5	ns
Growth rate of the rate of value added between 2008 and 2009 (%)						
Negative or none	39.6	38.5	ns	38.5	38.1	ns
Positive	60.4	61.5	ns	51.5	51.9	ns
Market power in 2008	0.8	1.2	***	1.2	1.2	ns
Share of exports in the sales in 2006 (%)	13.3	19.1	***	19.7	18.9	ns
Variation of the share of exports in the sales between 2006 and 2007	0.3	0.2	ns	0.3	0.2	ns
Growth rate of 'current result before tax' between 2008 and 2009 (%)	-26047.2	-276.9	ns	-90.4	-43.4	ns
Log of payroll per capita in 2008	3.6	3.8	***	3.8	3.8	ns
Distribution of movements excluding transfers and movements of CDD by occupations in 2008 (%)						
Managers	14.0	23.0	***	21.7	22.6	ns
Intermediate professions	14.4	18.3	***	18.8	18.3	ns
Employees	20.7	14.5	***	14.1	14.4	ns
Workers	48.4	42.4	***	42.9	42.9	ns
Distribution of movements excluding transfers and movements of CDD by age in 2008 (%)						
Young persons (less than 30 years old)	36.0	34.3	***	33.9	34.2	ns
30-49 year olds	44.4	48.0	***	47.7	47.9	ns
50+ years old	17.5	16.7	*	16.4	16.8	ns
Number of firms	4,509	1,793		1,757	1,757	

Notes: t-test method to estimate the significance of the mean or frequency difference. ***: significance at 1 %; **: significance at 5 %; *: significance at 10 %.

Source: author's calculations using a sample of firms constructed from the EMMO-DMMO (Dares) and EAE surveys (Insee), before and after propensity score matching.

Field: firms of more than 10 employees in the non-farm business sector.

Explanation: before propensity score matching, firms not using RC were significantly more often firms in the market services sector than firms using RC. After matching, the share of firms not using RC in the market services sector fell, and is no longer on average different from the share of firms using RC.

Thus, it is for these two groups of firms (3,514 firms a year between 2006 and 2009), with distributions of observable characteristics which are not statistically different, that the difference-in-differences are estimated.

4.3.2 Results of the difference-in-differences estimations

Firstly, results show that RC has exacerbated the decrease in net job growth rate by 1.4 percentage points (see table IV). Compared to the job creation rate of 1% observed for all firms of the sample in 2008 (see appendix A), the estimated effect of RC seems to be quite important, almost as much as the period effect (-1.3 percentage points). More precisely, this result is explained by both a significant decrease in the job creation rate in firms using RC and a stronger rise in the job destruction rate in these same firms. If we compare the coefficient of job destruction/creation rate with its respective initial rate of 2008 (see appendix A), we find a larger effect on job destruction (0.8 percentage points compared to 2.6%) than on job creation (-0.6 percentage points compared to 3.6%). This means that there was job destruction which would not have occurred without RC in the firms using it. In addition, these results cannot be explained by differences in the changing economic situations across firms (see above and Appendix B). These results therefore do not confirm totally the theoretical predictions presented in Section 2: if RC facilitates job destructions, it should not also create more jobs. In fact, the evolution of the job creation rate can be interpreted in a different way, especially when linked to the type of contract termination used (see below), as discussed in the section presenting the hypotheses.

Regarding the overall worker flows, there is no significant RC effect. However, when the analysis is limited to CDIs only, if there is no significant effect on the CDI worker turnover rate, then RC seems to increase the CDI exit rate by 1.1 percentage points, and to accentuate the decrease in the CDI entry rate of -0.6 percentage points (see table IV). This means that the introduction of RC leads to separations which would not have occurred without it. Although this result may seem tautological at first sight, this is not the case because if RC had only led to substitutions for the other types of CDI termination (see below for the results of the substitution hypothesis), then more CDI exits would not have been observed. Nevertheless, the size of the coefficient regarding the 2008 rate of each dependant variable (see appendix A) shows that the effect of RC on job flows is more important than those on CDI worker flows.

Table IV: Results of the Differences-in-differences Estimations

<i>Worker and job flows dependant variables</i>				
	(1)	(2)	(3)	(4)
	Net job growth rate	Job creation rate	Job destruction rate	Worker turnover rate
Reform effect (difference-in-differences estimator δ)	-1.427*** (0.548)	-0.605* (0.344)	0.822** (0.383)	-0.863 (3.036)
2009 period effect (ref: 2008)	-1.349*** (0.407)	-0.133 (0.256)	1.217*** (0.285)	-1.439 (2.252)
User firms effect (ref: non-user firms)	0.387 (0.389)	0.086 (0.244)	-0.301 (0.272)	-1.747 (2.148)
Number of observations	7,028	7,028	7,028	7,028
R2	0.139	0.089	0.107	0.042

<i>Worker and job flows dependant variables</i>					
	(5)	(6)	(7)	(8)	(9)
	Exit rate	Entry rate	CDI worker turnover rate	CDI exit rate	CDI entry rate
Reform effect (difference-in-differences estimator δ)	-0.392 (3.050)	-1.337 (3.035)	0.373 (0.395)	1.085*** (0.312)	-0.607** (0.249)
2009 period effect (ref: 2008)	-0.332 (2.267)	-2.543 (2.256)	-3.401*** (0.294)	-0.842*** (0.232)	-2.894 (0.185)
User firms effect (ref: non-user firms)	-1.427 (2.162)	-2.063 (2.152)	0.391 (0.280)	0.142 (0.221)	0.334* (0.176)
Number of observations	7,028	7,028	7,028	7,028	7,028
R2	0.040	0.045	0.800	0.491	0.711

<i>Types of separations dependant variables</i>			
	(10)	(11)	(12)
	Dismissals for personal reasons rate	Dismissals for economic reasons rate	Resignations rate
Reform effect (difference-in-differences estimator δ)	-0.181** (0.088)	-0.188 (0.244)	-0.028 (0.119)
2009 period effect (ref: 2008)	-0.055 (0.065)	1.189*** (0.181)	-2.205*** (0.089)
User firms effect (ref: non-user firms)	0.062 (0.062)	0.012 (0.173)	0.135 (0.085)
Number of observations	7,028	7,028	7,028
R2	0.5495	0.0904	0.7339

Notes: Results from OLS regressions. Robust standard errors in parentheses. ***: significant at 1 %; **: significant at 5 %; *: significant at 10 %. Only interaction terms δ of DiD, period effect terms α_1 and user firms effect terms α_2 , are reported. Other control variables are the ones used in the propensity score calculation (logit regression, see table II); except for models (7), (8), (9), (10) and (12), where the dependant variable in 2008 is also introduced as independent variable to control the significative difference of α_2 revealed without it (cf. Givord, 2010).

Source: author's calculations on a sample of firms constructed using the EMMO-DMMO (Dares) and EAE surveys (Insee), after propensity score matching.

Field: firms of more than 10 employees or more in the non-farm business sector.

Next, the impact of the introduction of RC on workforce management and in particular on the possibilities of substitutions for other types of CDI terminations is tested using the dismissals

for economic reasons rate, the dismissals for personal reasons rate, and the resignations rate (see table IV). Consistent with the theory, the results show substitutions of dismissals for personal reasons by RC, since it reduces litigation risks and separation costs. However, the dismissal for personal reasons rate decreased by 0.2 percentage points in user firms, which appear to have paid relatively little regard to the value of the dismissal for personal reason rate in 2008 (2.2%, see appendix A). On the other hand, the evolution of the dismissal for economic reasons rate and changes in the resignation rate are not significantly different between the two groups of firms. Then, there would have no substitution behaviour between these two types of separation and the RC. However, because the institutional framework concerning separations for economic reasons is specific in France, this lack of impact estimated from the rate of dismissals for economic reasons may be explained by the fact that firms can make job cuts by other legal means than through dismissals for economic reasons (terminations by mutual agreement, voluntary separation program, see Signoretto, 2015). Moreover, this result concerning the dismissal for economic reasons can be linked to the previously observed result on the job creation rate. The fact that the job creation rate has decreased strongly as a result of the introduction of RC supports the hypothesis of substitution with dismissal for economic reasons. Because firms are unlikely to create jobs after making redundancies, compared to after resignation or dismissal for personal reasons, a greater decline in job creation in the user firms may mean that in the absence of RC, they would have used dismissals for economic reasons. Then, these results tend to support the hypothesis of a strategic use of types of terminations, as found by García-Martínez and Malo (2007) for Spain. Finally, in the specific case of France and implementation of RC, this substitution hypothesis and the results observed here need to be discussed more. First, it remains difficult to identify substitution behaviour, as it is possible that the creation of RC has been more complex than simply using RC to replace dismissal for economic reasons on a one-for-one basis, for example. Firms may have modified their use of all the types of CDI terminations. Next, RC is an employment termination by mutual agreement: in other words, employees must agree to leave their firm. Therefore, substitution behaviour depends not only on the attitude of the employer but also on the employee.

Thus, three major results emerge from the econometric analysis. First, there was an overall increase in CDI exits in firms using RC, reflecting the idea that RC facilitates CDI separations. Then, beyond CDI exits, RC also facilitates job destruction in the user firms, in a context marked by a profound economic crisis. Finally, RC may substitute for dismissals for personal

reasons, albeit weakly. It may also substitute for dismissals for economic reasons if it is possible to judge by the decrease in the job creation rate in firms using RC. Then, RC seems to have caused both substitutions with other types of CDI separation that already exist and additional CDI separations which would not have occurred without it.

5. Conclusion

Mutually agreed termination, or *rupture conventionnelle* (RC), as a means of ending open-ended contracts (CDI) was introduced in the course of 2008, to facilitate termination of the employment relationship, and to make this legally secure by reducing the risk of litigation for employers. Then, the results of the econometric estimations show that the introduction of RC, in the context of a deep crisis, has tended to intensify the destruction of jobs and exits of workers employed on a CDI, in firms using RC compared to non-user firms which have similar observable characteristics. Substitutions with dismissals for personal reasons and for economic reasons also may have appeared, but the size of this phenomenon remains difficult to calculate precisely for each type of separation. Finally, no substitution behaviour of-resignations by RC has been found in the present empirical analysis.

Yet, the findings of this empirical analysis should be considered primarily from two points of view. The first relates to the sample of firms used, which includes many large firms, and half of which are in industry. I do not believe that this reduces the relevance of the results, but it suggests that at a generalization of the results to all French firms is premature. The second aspect concerns the very specific context of economic crisis, which characterized the introduction of RC and therefore the period of analysis. The current use of RC by employers could well be different in another context, and especially during a period of stable growth. Finally, the short time lapse between this analysis, which ends only one year after the implementation of RC (given the lack of data later), does not help in overcoming the specificities of the context of economic crisis.

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Endnotes

¹ Dismissal legislation does not apply in an identical way to firms of different sizes: e.g., in Germany, firms with less than 10 employees are exempt from applying rules on dismissals, or at least some of them are. In Italy, the equivalent threshold is for 15 employees and for 25 in Spain.

² Rules defining unfair dismissals have been implemented in some US states. These are exceptions to the doctrine of "employment at will", and include: the "implied contract exception", the "good-faith exception" and the "public policy exception".

³ Job flows cover job creation and destruction, whereas worker flows concern employee entries and exits in firms. In the latter case, the employment of a newly recruited worker does not necessarily correspond to a job creation, as the entry may compensate the exit of another employee.

⁴ French labour laws distinguish dismissal for economic reasons from dismissal for personal reasons.

⁵ French law stipulates that someone cannot be hired for the same post within six months following a dismissal for economic reasons.

⁶ The merger of the EMMO (Quarterly surveys on workforce movement: Enquêtes trimestrielles sur les mouvements de main-d'œuvre) and the DMMO (Monthly workforce movement report: Déclarations mensuelles des mouvements de main-d'œuvre). The former relates to establishments with 10-49 employees, whereas the latter concerns establishments with at least 50 employees.

⁷ The annual company surveys (EAE, which became Esane-Fare as of 2008), is a compulsory survey for companies with more than 20 employees, and which is conducted every year for all sectors of the economy.

⁸ Looking only at firms of more than 10 employees in France, industry actually accounts for less than 10% of these firms, and firms with 50 or more employees only account for 17% of all firms.

⁹ Following Duhautois (2002), I use the number of employees actually present in a firm at a particular moment. Here, as data concerning establishments has been matched with data concerning firms, the average number of employees has been calculated as the sum of employee number averages of the establishments making up the firm and included in the database.

¹⁰ The EMMO-DMMO does not provide information about the stock of employment by qualification or age. I

therefore tried to estimate the structure of employment based on job flows, assuming that firms with high rates of management turnover also employ mainly managers. I thus constructed a distribution of movements (excluding transfers between establishments and excluding CDDs) by occupations (Professions and Socioprofessional Categories – PCS –, in France) and by age. For example, the share of movements by managers indicates the ratio of the number of entries and exits of managers to the total number of entries and exits in the firm, excluding transfers and CDDs.

¹¹ Other studies may have been encountered identification problems, even if less important than I have, and consequently problems in constructing control and treatment groups. Yet, propensity score matching followed by difference-in-differences method has also been used and tested (see for example Cochar M, Junod-Mesqui B., Arnaud F. et Vermare S., 2008, “Les effets incitatifs de la prime pour l’emploi: une évaluation difficile”, *Economie et statistique*, No. 412).

¹² This method of matching makes it possible to resolve only the problem of the distinction between the two groups of firms, which differ according to observable characteristics.