The effects of expanding the generosity of the statutory sick leave insurance: the case of a French reform

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***Abstract*—**This paper evaluates an expansion of employer-mandated sick leave insurance in the French private sector that took place in 2008. The reform is two-folded: the maximal employer waiting period to benefit from complementary payment from the employer was reduced from 10 to 7 days and the minimum required tenure to be entitled from 3 years to 1 year. We use a difference-in-differences method in which control groups are defined according to the collective bargaining agreement (CBA) employees belong to. Indeed, thanks to complementary insurance provided by CBAs, employees were not affected the same way by the reform.

We find global significant positive effect of the reform but with great variations according to employees' gender and category. The reduction of minimum tenure requirement was concentrated on a less numerous group but had a bigger impact from the affected individuals viewpoint than the waiting-period fold of the reform.

I. Introduction

Sickness insurance aims at protecting employees against income losses due to workplace absence. In France, around one fifth of workers take absence spells each year. The total sick leave payments by the social security amounted to 5.4 billion euros in 2007 and 6.2 billion euros in 2012. It contributes to several issues related to labor market outcomes (like labor costs and productivity) and health outcomes. The duration and frequency of sick leave spells are hence of great interest in health politics decision making. This paper studies the effect on the duration and frequency of sick leave spells of a 2008 reform that expanded the generosity of sickness insurance benefits and reduced the requirements to be entitled.

Several empirical studies suggest that the generosity of the paid sick leave is related to the frequency and duration of sick spells (see for example Johansson and Palme (1996) for the Swedish case and Frick and Malo (2008) for international comparisons). More recently, Ziebarth and al. (2014) have assessed the impact of a German reform on the sick leave's employees' behavior. That reform increased the mandatory sick leave benefits from 80% of the wage to 100%. The main result of the paper is that expanding the generosity of sickness insurance system increases the frequency and duration of sickness absence spells. Ziebarth and al. (2010) estimate the reform effects of a reduction from 100% to 80% in statutory sick pay levels on sickness absence behavior. This measure increased the proportion of employees having zero days of absence between 6 and 8%.

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II. Literature

The determinants of sickness absence are potentially numerous and vary greatly over the publications: health status, gender, income level, working conditions and sickness insurance. Economic research on absenteeism can be grouped into three categories (Afsa and Givord, 2009), and the classic work-leisure trade-off is the simplest model (Allen, 1981), with the drawback that incentives are supposedly essentially monetary. Employees seek to maximize their utility function under budgetary constraints. Periods of absenteeism are adjusted according to the loss of earnings and applicable monetary penalties. This result is confirmed by an empirical study conducted on French medico-administrative data showing that an employee's current wage has a negative effect on the duration of sick leave and that high wage increases over the long term tend to reduce sick leave duration among men and increase duration among women (Ben Halima and Regaert, 2013).

Certain studies have placed the emphasis on the level of work effort supplied by the employee with work attendance as a modality. In the absence of information on an Employee's health status, the work effort supplied can be interpreted in terms of moral hazard. In this context, a reduction in sickness insurance coverage levels (wage-replacement rate) reduces the rate of absenteeism. Studies in the second group follow Shapiro and Stiglitz's (1984) model, which distinguishes the utility of work attendance from the utility of non-attendance. Employees choose the level of effort guaranteeing an income level that maximizes their utility. Absenteeism can thus represent the difference between the effort expended and the contracted working hours. As employers are unable to fully understand employee's reasons for missing work due to sickness (due to a lack of awareness of the worker's effort and health status), they are consequently confronted with the classic problem of moral hazard.

Taking health status into account as a factor determining the utility of attending work constitutes the third approach, which attempts to reintroduce the notion of health status as a decisive variable in taking sick leave. Without being totally absent in the first two groups (Allen, 1981; Barmby, Sessions and Treble, 1994 ;Galizzi and Boden., 2003), the health status

dimension is not a core element of their paradigms. Health-related absenteeism is no longer an individual choice (work-leisure trade-off; effort function) but can be the result of deteriorated health status, either through illness or difficult working conditions (Ose, 2005). Recent studies (Afsa and Givord, 2009) have effectively underlined the significant role played by working conditions in Employee absenteeism. Grignon and Renaud (2007) dissociated sick leave, the result of employees' choices (ex post moral hazard), from absenteeism due to working conditions, which is the responsibility of the employer, by controlling for health status (ex ante moral hazard).

III. The French Sickness Insurance System

The French sickness benefit system is composed of several tiers that may be characterized by their status (mandatory or optional) and their funding (by Social security or by employer). This particular structure founds its roots in the history of the French social protection. Social protection systems were often constituted on a professional basis, and the generalization and standardization of social security coverage was based on the provision of universal guaranteed minimum benefits while maintaining the level of complementary sickness benefits negotiated on a professional basis.

The French sickness benefit system may be devided into four components. The Social security covers the first tier, which guarantees a mandatory and uniform benefit (first tier, S1). The employer adds a complementary benefit on CBA grounds that comprises a mandatory part and an optional one because this complementary benefit is agreed between employers and employees, but the law fixes a mandatory minimum. For clarity sake, we will distinguish the mandatory part of the complementary benefit (E1) from its optional part (E2). Finally, the employer may also subscribe another private insurance (E3).

A. The two mandatory tiers

The first tier (S1, Fig. 1) guarantees a mandatory and uniform benefit. Social Security covers the wage replacement benefit of up to 50% under certain conditions and within the limits of the 1/720th of the Social Security annual threshold after a three-day waiting period. The daily threshold amounts to 32.87 € in 2015. It may be enhanced considering family status.

The second tier (E1, Fig. 1) is the mandatory part of the complementary benefit. The employer is charged with paying complementary benefit after an employer waiting period so as to reach a global wage replacement rate of 90% for the first 30 days, then 66.6% for the following 30 days. These periods are extended according to employee tenure.

Employees are entitled to the complementary benefit only if they fulfill a *minimum tenure requirement*, which depends on the CBAs and may vary from one month to 3 years. The reform has reduced the threshold for the minimum tenure requirement from 3 years to 1 year.

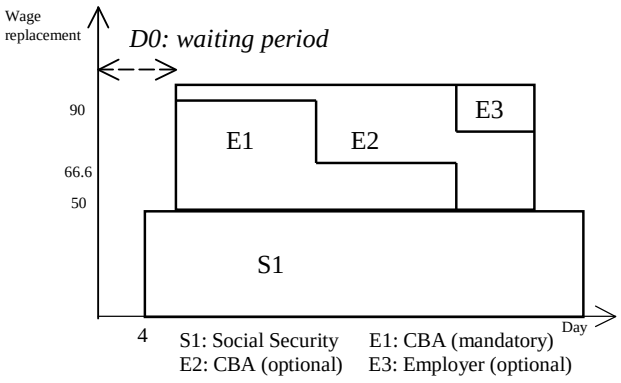
The reform has also reduced the employer waiting period for the complementary benefit from 10 days to 7 days. The employer waiting period and the minimum tenure requirement are key-parameters in our study.

B. The two optional levels

The third tier (E2, Fig. 1) is the optional part of the complementary benefit. This tier depends highly on the CBA and is very heterogeneous because it is negotiated between employers and employees within branches.

The fourth tier (E3, Fig. 1) is optional and heterogeneous. It is negotiated at the firm level. We present it for the sake of completeness of the global landscape but it not taken into account in the rest of the study due to insufficient data. The first three tiers that are studied here give a lower bound of the level of indemnification of each employee.

Fig.1: Sickness Payment Structure



Note: this graphic represents the day-by-day wage-replacement rate for a typical CBA. The first mandatory tier (S1) includes the part paid by Social security. The second tier (complementary benefit stemming from the CBA and financed by employer) falls into two parts: the mandatory component (E1) and the optional one (E2). The complementary benefit is provided to individuals fulfilling the minimum tenure requirement of the CBA and after a waiting period (D0). The last tier (E3) includes potential insurance subscribed by employer on individual basis (we have no data on this tier, it is only a fictional representation).

IV. Data

The 2008 reform has changed some of the key parameters of the French sick leave system. To identify the real level of coverage of each employee, it is necessary to get precise

information on the indemnification parameters of their CBA, in particular the employer waiting period and the minimal tenure requirement to be entitled to the complementary benefit.

The evaluation of the reform also requires information on the main outputs we investigate, that is the duration and frequency of sickness spells at the employee level.

This section describes the two main data sources we used to that purpose and the way they were merged together.

A. The HYGIE database provides detailed information on sick leave spells at the employee level

The HYGIE database provides a detailed description of sick leave spells for a representative sample of General Health Insurance scheme beneficiaries. It constitutes a unique source of information that has its origins in the study of the mechanisms of sick leave in the private sector conducted by the Institute for Research and Information in Health Economics (IRDES) following a call for tender launched by the Ministry of Health Directorate for Research, Studies, assessment and Statistics (DREES). The database was created in order to carry out the required research and contains necessary information both on Employees' sick leave behaviour and associated healthcare consumption, Employees' individual and professional contexts and a number of characteristics concerning the companies employing them.

The 2007-2009 HYGIE data are issued from the merger of Pension Fund (CNAV) data and Health Insurance Fund for Salaried Workers (CNAMTS) data. More specifically, files were extracted from the National Career Management System (SNGC) grouping together all private sector Employees in France, and the National Statistical Beneficiary System (SNSP) grouping together all private sector retired people, matched with sickness benefits data taken from the National Health Insurance Inter-regime Information System (SNIIR-AM). CNAV data constituted the point of entry with a random sample of beneficiaries aged from 22 to 70 years old having contributed to the general pension fund at least once during their lives. The CNAMTS data concerns both primary and secondary beneficiaries of the General Health Insurance scheme who received sickness benefits for at least one spell of sick leave during the year 2004 and/or 2005. Matching CNAV and CNAM-TS data sources enabled the construction of the HYGIE database panel composed of 538,870 beneficiaries from 2005 to 2010.

The panel constitutes a representative sample of private sector employees and includes precise information on employees, the companies employing them and their healthcare consumption. This weighting was used to estimate global cost (not the econometric estimates). The spells lasting more than 90 days (less than 3% of the total spells) were dropped because of the very particular determinisms and mechanisms that lie behind that kind of sickness absence, specially the third tier of sickness insurance. Moreover, those are systematically controlled by Social security agents, which constitutes a drastic selection process and sweep out all moral hazard issue.

B. An Innovative Database on Collecive Bargaining Agreements (CBAs) gathering indemnification parameters

We systematically analyzed 46 of the most representative collective agreements. Out of this work we built an innovative data set describing the indemnification scheme of the 46 most representative CBAs, covering 60 % of the employees of the HYGIE database.

In the majority of cases, CBAs make provisions for different sickness benefit plans according to employee categories. Each collective agreement was declined by socio-professional category. In total, 80 different legislative schemes were were identified and documented. As a priority, we studied CBAs covering the largest number of employees in the database.

The database on collective agreements provides a complete indemnification scheme description of all CBAs that have been analyzed, including firms with no CBA. The main variables used here are related to employer waiting period and minimum tenure requirement, but the database also describes other indemnification parameters (like benefit durations and wage-replacement rates).

The structure of the D_0 is very different depending on the socio economic class (cf. Table 2). Most executives have a D_0 equal to zero (69%). On the other hand only 17% of the employees and 27% of the laborers have a D_0 equal to zero. We can see that there are more employees and laborers with a high D_0 than Supervisors and executives.

C. Merging the HYGIE and the CBA databases

To enrich the HYGIE data base with CBA's indemnification parameters, we first merged the HYGIE data base with an employer repertoire connecting employers with their CBAs through a CBA identifier. In the French system, every CBA is registered by the Ministry of Labour and receives an administrative identifier. We also know from the repertoire if the employer is not affiliated to any CBA, which is the case for about 15 % of the sample.

The employer identifier and the CBA identifier allowed us to merge the HYGIE data base with our CBA data base and calculate indemnification parameters for all employees within the 46 analysed CBAs, as well as those not covered by any CBA. We restrict our analysis to individuals for which indemnification parameters are known (60 % of the initial sample).

The other treatments of the data are as follows. We deleted individuals that have been unemployed for more than a semester as well as retired people. We only keep employed

individuals observed all along the 2007-2009 periods and who have not switched for a different CBA during this period. The final sample is composed of more than 138 000 individuals (cf appendix).

V. Policy Reform

The "Accord national interprofessionnel" (ANI) of 11 January 2008 on the modernization of the French labor market introduced several changes in the labor market organization. One of the main axes of the reform was to decrease the importance of seniority in every aspect of the field (privileges, bonuses, etc.). We focus on two particular folds of the reform which modified the compensation of sick leave. Both aspects concern the complementary sick leave benefit (tiers E1 and E2).

A. First Fold Of The Reform: Reduction of The Maximal Employer Waiting Period

The first measure of the reform we consider is a reduction of the period from 10 days to 7 days. We will refer to this measure as the « waiting period fold » of the reform. Before the reform, complementary benefit provision used to start at the latest on the 11th day of the sickness spell. After the reform, the complementary benefit provision begins at the latest on the 8th day.

In other word, the level of indemnification improved for all employees with an employer waiting period longer than 7 days in 2007 and fulfilling the minimum tenure requirement (which is the case for all employees with 3 years tenure or more). For example, the wage-replacement rate for employees with a 10-day employer waiting period rose from 50% to at least 90% on days 8, 9 and 10 of any sickness spell (Fig. 2). On the contrary, indemnisation conditions remained unchanged for employees with an employer waiting period less or equal to 7 days in 2007.

FIG.2: EFFECT OF THE REFORM ON THE STATUTORY MINIMUM FOR INDIVIDUALS WITH AT LEAST 3 YEARS TENURE

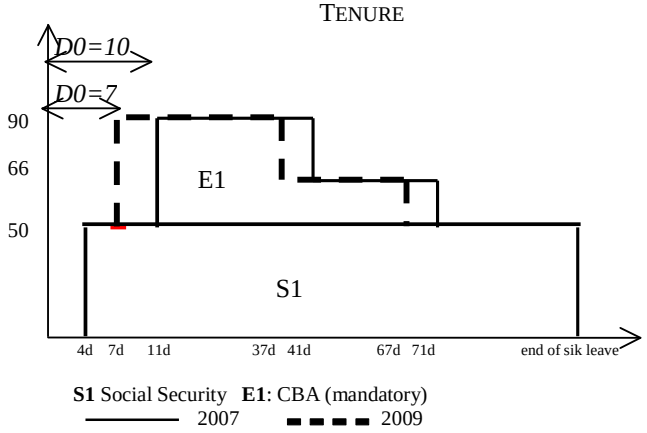
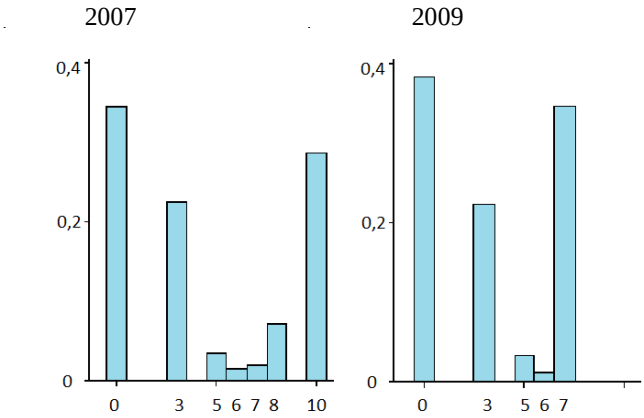


Fig.2 Note: this graphic represents the day-by-day wage-replacement rate in restriction to the mandatory components (S1 and E1), for individuals who meet the Minimum Tenure Requirement in 2007 and for CBAs with a waiting period of 10 days in 2007. It is the case for individuals with 3 years of tenure covered by a CBA with a waiting period of 10 days.

Employees really affected by the reform are actually quite numerous. In 2007, 28 % of employees in ours sample had an employer waiting period longer than 7 days, most of whom had indeed a 10-day waiting period (Fig. 3).

Fig.3 Distribution of employees, according to their waiting period length, in 2007 and 2009



Note: these two graphics represent the distribution of employees in 2007 and 2009, according to the waiting period length of their CBA (D0). In 2007, more than 30% of employees had a D0 between 8 and 10 in our sample.

The distribution of the employer waiting period varies greatly between categories of workers. Executives for instance benefit from more generous conditions than other categories (Fig. 4).

TABLE 1 WAITING PERIOD DISTRIBUTION IN 2007, BY CATEGORY

D_0	Executives		Supervisors		Employees		Laborers	
0	12,504	69%	5,912	46%	5,440	17%	5,918	27%
3	1,901	10%	3,499	27%	8,331	26%	5,681	26%
5	0	0%	0	0%	774	2%	2,232	10%
6	233	1%	140	1%	490	2%	525	2%
7	195	1%	451	3%	909	3%	190	1%
8	0	0%	692	5%	4,638	15%	879	4%
10	3,339	18%	2,244	17%	11,399	36%	6,466	30%
Total	18,172	100%	12,938	100%	31,981	100%	21,891	100%

Note: this table shows the distribution of the waiting period D_0 in 2007, by category. 69% of executives had no waiting period in case of sickness absence.

B. Second Fold Of The Reform: Reduction of Required Seniority to be Entitled

The 2008 reform brought another important change that we investigate in this study: the minimum tenure requirement to be entitled to complementary benefit (tiers E1 and E2) was reduced from 3 year to 1 year. We will refer to this first fold as the « *tenure fold* » of the reform.

Like the waiting period fold of the reform, things remained

unchanged for part of employees because the minimum tenure requirement they were submitted to in 2007 was already under or equal to 1 year. The distribution of this parameter in 2007 shows that it was indeed the case for a great majority of them.

Unlike the waiting period fold, employees really affected by the tenure fold of the reform are not very numerous because the treatment condition implies two restrictive criteria: the first criterion is to have less than 3 years of tenure and the second criterion is to have a minimum tenure requirement 1 or 2 years in 2007. The latter condition is fulfilled by only 33% of the sample (Table 2).

Table 2 Distribution of employees, according to their minimum tenure condition, in 2007

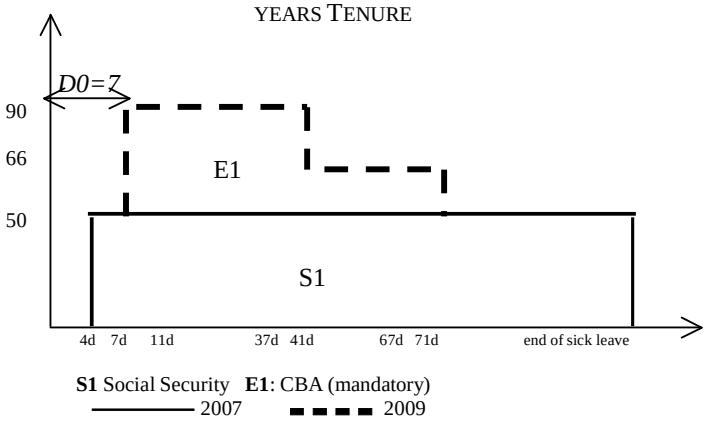
Minimum tenure requirement in 2007	Frequency	Percent
0	5,108	2.89
1 month	5,844	3.31
3 months	1,727	0.98
4 months	1,216	0.69
6 months	2,396	1.36
1 year	102,768	58.20
2 year	3,626	2.05
3 year	53,887	30.52
Total	176,565	100.00

Note: 58% of employees are subject to minimum tenure condition of 1 year to be entitled to complementary benefit and 31% of 3 years

Even if the tenure fold of the reform is targeted on a small population, the reduction of minimal tenure drastically changed the indemnification level for these particular treated individuals. Before the reform, they benefitted only from the Social security tier (S1), namely a wage-replacement rate of 50% from the 4th day of the sickness spell on. After the reform, their wage-replacement rate climbs up to 90% at least (S1+E1 tiers) and the provision period starts at the latest on the 8th day of the spell, which makes quite a difference (Fig. 4). Most of the time, it starts even sooner.

It is why we consider that the tenure fold is also very important and deserves particular attention, even if it is more complicated to evaluate.

FIG.4: EFFECT OF THE TENURE FOLD OF THE REFORM ON THE STATUTORY MINIMUM FOR INDIVIDUALS WITH 1 OR 2 YEARS TENURE



Note: this graphic represents the day-by-day wage-replacement rate in restriction to the mandatory components (S1 and E1), for individuals who meet the Minimum tenure requirement in 2009 but not in 2007. It is the case for individuals with 1 or 2 years of tenure covered by a CBA with minimal requirement of 3 years in 2007 (the requirement is reduced to1 year in 2009 after the reform).

C. Empirical strategy to evaluate the two folds of the reform

The empirical strategy to evaluate the two folds for the reform (waiting period and minimum tenure) will be different.

Concerning the first fold of the reform (the waiting period fold), we restrict the sample to individuals with 3 years of tenure in 2007, in order to make sure that they were entitled to complementary benefit. Moreover, the sample will be a balanced panel in order to control the unobservable individual heterogeneity.

Concerning the second fold of the reform, we only keep employees under CBAs with minimum tenure requirement of 3 years. The reform impacted no one in CBAs with minimum tenure requirement of 1 year or 2 years. Contrary to the first fold evaluation, we use a pseudo panel strategy because the treated group should contain individuals with 1 or 2 years of tenure in 2007 and 2009.

VI. FIRST FOLD OF THE REFORM: REDUCTION OF THE MAXIMAL EMPLOYER WAITING PERIOD

A. Identification Strategy: a Difference-In-Differences Approach with matching

We use a diff-in-diff model that will allow us to estimate the impact of the reform on the duration of the sickness leave and on the probability to report sick.

$$Y_i = \alpha_0 + \alpha_1 \delta_{treated} + \alpha_2 \delta_{post-reform} + \alpha_3 \delta_{DiD} + \beta X + \varepsilon \quad (3)$$

The deltas are dummies ($\delta_{treated}$ equals 1 if the individual is treated 0 otherwise, $\delta_{post-reform}$ equals one if the observation is after the reform, and $\delta_{DiD} = \delta_{treated}\,\delta_{post-reform}$). δ_{DiD} is the parameter of interest, X is a vector of covariates.

X contains sex, age, residence region, firm size, firm sector, socio economic category, regional unemployment rate, health indicators (we used the number of previous visits to a physician and number of days spent in the hospital as a proxy of the health status of the individual) and salary .
Y_i stands for our outcome variable, and can be the number of sickness spells, the number of absence days in summer, winter, and during all year.

We choose to do the difference in difference between 2007 and 2009 so as to make sure the reform was fully implemented. The reform fold we are considering is a cut in the maximal length of the employer waiting period D0 from 10 days to 7 days.

To make sure that the cut was applied, *we restrict the sample to individuals with at least 3 year tenure in 2007.* Moreover, to eliminate any influence of the second fold of the reform, all groups will be individuals that *stayed in the same job during all the period 2007-2009.*

B. DID with Matching Methodology

We combined DID and matching to enhance the robustness of our results. Usually matching consists in finding one treated individual and one non-treated individual that are very similar, which means, the individuals will have the same covariates or matching variables. In order to take into account a great number of matching variables, we rather used propensity score matching. This method reduces the vector of covariates to a unique score which is the probability of being treated, given one's individual characteristics. Individuals with similar probability of being treated are matched together.

The method is two-staged. In the first stage, we run a probit model of the treated on the covariates to estimate the propensity scores of being treated for each individual of the sample. In the second stage, we run a DID regression using the probabilities to compute weights. For each treated each non treated has a weight that is a negative function of the difference of the treated probability of being treated and the probability of the non-treated of being treated.

C. Treatment Group

The reform cut the maximal length of the employer waiting period D0 from 10 days to 7 days. Treated1 group is consequently defined as those individuals whose D0 was between 8 and 10 days in 2007.

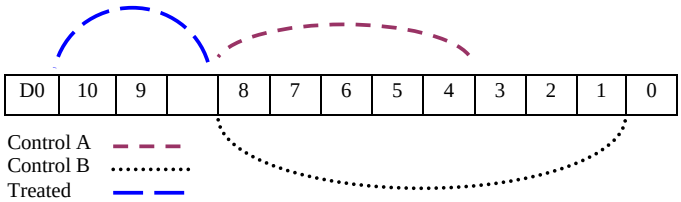
D. Control Groups

The most extended non-treated group encompass all individuals who had in 2007 an employer waiting period less or equal to 7 days. Within this non-treated group we define 2 nested control groups of increasing extent as a consequence of a trade-off between the control group size and its closeness to the Treated 1 group. Indeed, on the one hand, it is likely that individuals with less generous sickness insurance have a closer behavior to the treated. On the other hand, restricting ourselves to people with D0 close to (but less than) 7 leads to quite a small control group. Finally, 2 groups have been defined (Fig. 5):

-Control A are the individuals who have an employer waiting period of 3 or more days ($3 \le D_0 \le 7$)

-Control B is composed of all the non-treated. ($D_0 \le 7$)

FIG 5 GROUPS DESCRIPTION



In every group, employees have at least the required tenure (3 years) to make sure that they actually benefit from complementary sick leave insurance. The treated group comprises 35,956 individuals, Control A is the smallest control group with about 29,715 individuals and Control B is the largest with 66,630 individuals.

TABLE 3: TREATED AND CONTROL GROUP SIZES

Groups	Treated 1	Control A	Control B
Description	$D_0 > 7$	$3 \le D_0 \le 7$	$D_0 \le 7$
Number of individuals	35,956	29,715	66,630

Note: for the tenure fold of the reform, the treated group comprises 35,956 individuals and the control A group 29,715 individuals. Individuals in all groups have 3 years or more of tenure, so that they are eligible for complementary benefit.

The mean difference test in number of absence days between the Treated 1 group and the Control groups, shows a signficative difference between the Treated 1 group and generous Control B group for men (- 0.27 day) and for women (- 0.58 day). Compared to Control A group, the Treated 1

group has significantly less sick leave days for men (- 0.56 day), and for women (- 0.69 day).

TABLE 4: DIFFERENCE BETWEEN TREATED1 AND NON TREATED

		Men			Women		
		Mean	**Diff**	**T-stat**	**Mean**	**Diff**	**T-stat**
Number of sickness days							
Treated 1		3.247			4.800		
	Control A	3.806	-0.559	-7.573	5.494	-0.695	-8.152
	Control B	3.516	-0.269	-4.461	5.384	-0.584	-8.191
Probabilty of Sickness							
Treated 1		0.170			0.221		
	Control A	0.202	-0.032	-12.326	0.245	-0.024	-9.096
	Control B	0.193	-0.023	-10.810	0.258	-0.037	-16.351

Note: This table shows the mean difference test in number of absence days between the Treated1 group and the Control groups in our 2007-2009 sample

VII. SECOND FOLD OF THE REFORM: REDUCTION OF THE MINIMAL TENURE REQUIREMENT

In this section, we present the strategy performed to evaluate the "tenure fold" of the reform.

A. Identification Strategy: a Pseudopanel Difference-In-Differences Approach

First of all, we have to discard employees under CBAs with minimum tenure requirement less or equal to 1 year in 2007 because within those CBAs, no employee was treated. As minimum tenure requirement is 1 year or 3 years for almost all CBAs (table 2), *we only keep employers under CBAs with 3 years as minimal tenure in 2007*.

Treated 2 and controls groups are defined according their tenure duration. Treated 2 are individuals with one and two years of tenure in 2007 and in 2009. Tenure mechanically increases for employees who don't change employer. It is important to separate this mechanical increase in tenure effect from the actual effect of the reform. This implies, in the difference-in-differences approach, to calculate evolutions of the outputs for individuals with the same tenure in the two periods rather than to compare outputs of the same people in the two periods.

Within a given group, individuals are not necessarily the same in 2007 and 2009.. Indeed, as treated individuals must have 1 or 2 years tenure, they can hardly be the same in 2007 and 2009. Indeed, all individuals who don't change employer between 2007 and 2009 will have at least 3 years tenure in 2009 and will automatically meet the minimum tenure requirement independently of the reform.

For this reason, treated and control groups were defined according to their current individual characteristics according to a pseudo-panel approach.

The estimation strategy is the same as the classical difference-in-differences in VII-A, but with a different definition of the treated and control groups.

B. Treatment Group

For Treated 2 and Control groups, we only keep individuals with minimum tenure requirement equal to 3 years in 2007.

The individuals in the baseline group are the ones that did not have in 2007 the required tenure (3 years) to benefit from complementary sickness insurance in 2007, that is individuals with one or two years of tenure. The post reform groups are individuals with one or two years of tenure *in 2009*.

TABLE 5: TREATED 2 AND CONTROL GROUP SIZES

Groups	Treated 2	Control C	Control D
Description	Tenure <3	Tenure≥ 3	3≤Tenure≤ 8
Number of individuals	12,440	41,440	25,467

Note: for the tenure fold of the reform, the treated group comprises 12,440 individuals, control C group 41,440 individuals and Control D group 25,467. Individuals in all groups have 3 years as minimal tenure in their CBAs.

C. Control Groups

Two control groups were defined, as a trade-off between the size of the groups and the closeness to the treated. The largest control group (noted C) comprises all non-treated (but having minimum tenure requirement equal to 3 years in 2007). The second control group (noted D) comprises only individuals of C having tenure between 3 and 8 years.

The mean difference test in number of absence days between the Treated 2 group and the Control groups, shows a signficative difference between the Treated 2 group and the largest Control C group. for men (- 0.88 day) and for women (- 1.21 day). Compared to Control C group, the Treated 2 group has significantly less sick leave days (- 1.02 day) for men, and for women (- 0.96 day). The probability of sickness absence is much higher for control groups (+ 4.9 percentage points for men and 2.5 percentage points for women in control C group).

TABLE 6: DIFFERENCE BETWEEN TREATED 2 AND NON TREATED

		Men			Women		
		Mean	**Diff**	**T-stat**	**Mean**	**Diff**	**T-stat**
Number of sickness days							
Treated 2		2.295			3.521		
	Control C	3.316	-1.021	-10.652	4.490	-0.969	-9.295
	Control D	3.183	-0.888	-8.984	4.738	-1.217	-10.635
Probabilty of Sickness							
Treated 2		0.122			0.172		
	Control C	0.172	-0.049	-14.645	0.207	-0.025	-10.587
	Control D	0.168	-0.045	-12.835	0.216	-0.044	-12.122

Note: This table shows the mean difference test in number of absence days between the Treated 2 group and the Control groups in our 2007-2009 samples.

VIII. RESULTS

A The Change In D_0, Treated 1

To estimate the impact of the first fold of the reform (reduction of the employer waiting period), we use a diff-in-diff method with matching between 2007 and 2009. The so-called group « Treated 1 » was compared to the different control groups. We only comment the results obtained with the largest Control B group. Control A group is composed of employees with lower level of wage-replacement rates.

Many estimations were run by subpopulations defined by gender and social professional category. We also run estimations in restriction to spells of different durations: 0-7 days, 0-10 days, 0-30 days, 0-90 days (cf. Tables 12-13). Table 7 present only the results considering sick durations up to 90 days.

TABLE 7: DIFF-IN-DIFF WITH MATCHING RESULTS FOR TREATED 1

		Control A		Control B	
		Estimates	SE	Estimates	SE
Number of sickness days	All	**0,507**	0,116	**0,499**	0,147
	Men	**0,377**	0,144	**0,476**	0,192
	Women	**0,453**	0,177	0,180	0,217
Probabilty of Sickness	All	**0,009**	0,004	0,004	0,005
	Men	**0,011**	0,005	-0,002	0,006
	Women	0,004	0,005	0,003	0,007

Note: This table presents the DID matching estimates and the standard errors. The significant coefficients are in bold. The covariates used were: age, residence department, firm region, firm size, firm sector, socio economic category, regional unemployment rate, salary and previous year health indicators (number of visits to a generalist. to a specialist and number of hospitalization days).
Source: Panel HYGIE

Globally, taking Control A as reference group, the employer waiting period reduction had a positive effect on the number of sickness days (+ 0.5 day) according to the matching-DiD method (cf. Table 7). The effect is positive and significant for women (+ 0.4 day) and for men (+ 0.3 day). From the preferred specification (Control A), we infer that the reform increased the probability of sickness by 0.9 percentage points for all individuals and 1.1 percentage points form men.
The reforms don't have significant effect for women on the probability of sickness absence.

The impact of the first fold of the reform with reference to Control B group gives the same global result on sick leave duration (+ 0.5 day).

The results by social categories are presented in Tables 12. According to this method, the reform had a positive effect for executives (+ 0.9 day) and for laborers (+ 0.6 day). For women, the effect is significant and positive for executives (+ 1.1 day), supervisors (+ 0.7 day) and a higher effect of reform for laborers (+2.7 days). For men, we find positive effect for executives (+ 1.1 day) and still positive but lower for laborers (+ 0.1 day) and with duration of sick leave less than 10 days.

The reduction of the employer waiting period had a weak impact on the probability of taking a sickness absence by social categories (Table 13). In short, it has extended a bit the duration of absence spells but not multiplied them. The magnitude of the effect of the reform ranges between 0 and 2 percentage points and is much higher for female laborer (+ 7.8 percentage points in reference to Control A group).

B. The Change In Tenure, Treated 2

To estimate the effect of the reform on the treated 2 group, we also used a diff in diff with matching approach, but we used a pseudo panel variant (section VII.A.).

Globally, the second fold of the reform (reduction of the minimum tenure) had a positive effect (+ 0.9 day on sickness duration and 1.5 percentage point on sickness probability). The effect on duration is more important for women (+ 1.23 day and) than for men (+ 0.5 day). It is the same for sickness probability (+ 2.9 percentage points for women).

TABLE 8: DIFF-IN-DIFF WITH MATCHING RESULTS FOR TREATED 2

		Control C		Control D	
		Estimates	**SE**	**Estimates**	**SE**
Number of sickness days	All	**0,891**	0,191	**0,854**	0,234
	Men	**0,480**	0,244	0,401	0,297
	Women	**1,236**	0,288	**1,132**	0,350
Probabilty of Sickness	All	**0,015**	0,006	0,010	0,008
	Men	0,000	0,009	0,001	0,011
	Women	**0,029**	0,010	0,018	0,011

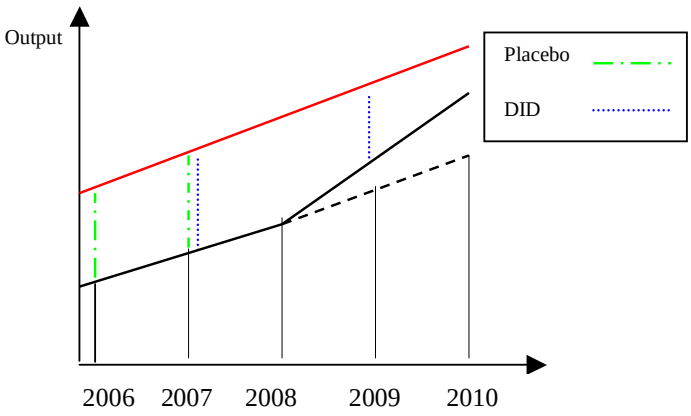
Note: This table presents the DID matching estimates and the standard deviation. The significant coefficients at the 10 % level are in bold. The covariates used were: age, gender, residence department, firm region, firm size, firm sector, socio economic category, regional unemployment rate, salary and previous year health indicators (number of visits to a generalist. to a specialist and number of hospitalization days).
Source: HYGIE-CBA panel

IX. ROBUSTNESS CHECKS: PLACEBO 2006-2007

As a robustness check, we run placebo diff-in-diff regressions in order to test the consistency of our estimates. One of the main hypotheses in our estimation strategy is the common trend assumption: the change in the behavior of the treated and of the non-treated is supposed to have been the same in the absence of a reform.

Where there is no treatment. We did a DID (so called Placebo regression) regression as explained in VII.A but between 2006 and 2007. There is no treatment in this timelapse and so we expect that the difference in difference estimates is not significant. If they are not, the common trend assumption will be more credible. It is true that our in our difference in difference is between 2007 and 2009, and it would be ideal to make a placebo that covered 3 years. We can only do a placebo between 2006 and 2007 (cf. Table 9-10).

In 2008 the economic crisis started. This might have an effect on the individual's behavior regarding sick leave. The effect of the crisis however started to have an impact in France only in 2009, therefore we can exclude the effect of the crisis from the placebo regression.



As concerning the waiting period fold of the reform, the overall placebo regressions show no significant result (table 9), either on number of sickness days nor on sickness probability. This is also the case when considering only women. For men , only the regression on the number of days off gives a significant and positive effect.

TABLE 9: PLACEBO LINEAR DIFF-IN-DIFF RESULTS FOR TREATED 1

		Control A		Control B	
		Estimates	SE	Estimates	SE
Number of sickness days	All	0,379	0,250	0,330	0,202
	Men	**0,821**	0,339	0,271	0,262
	Women	0,030	0,359	0,342	0,307
Probability of Sickness	All	-0,001	0,008	-0,002	0,007
	Men	0,001	0,012	-0,008	0,010
	Women	-0,002	0,011	0,004	0,010

Note: This table presents the Placebo Linear DID estimates in 2006-2007 and the standard deviation. The significant coefficients at the 10 % level are in bold. The covariates used were: age, gender, residence department, firm region, firm size, firm sector, socio economic category, regional unemployment rate, salary and previous year health indicators (number of visits to a generalist. to a specialist and number of hospitalization days).
Source: HYGIE-CBA panel

As concerning the tenure fold the reform, estimated parameters are all non significant (table 10).

TABLE 10: PLACEBO LINEAR DIFF-IN-DIFF RESULTS FOR TREATED 2

		Control C		Control D	
		Estimates	SE	Estimates	SE
Number of sickness days	All	0,075	0,215	-0,170	0,223
	Men	-0,185	0,298	-0,184	0,297
	Women	0,269	0,309	-0,220	0,327
Probability of Sickness	All	0,000	0,007	-0,006	0,007
	Men	-0,007	0,010	-0,008	0,010
	Women	0,006	0,010	-0,006	0,010

Note: This table presents the Placebo Linear DID estimates in 2006-2007 and the standard deviation. The significant coefficients at the 10 % level are in bold. The covariates used were: age, gender, residence department, firm region, firm size, firm sector, socio economic category, regional unemployment rate, salary and previous year health indicators (number of visits to a generalist. to a specialist and number of hospitalization days).
Source: HYGIE-CBA panel

X. Conclusion

This paper evaluates the "Accord national interprofessionnel" (ANI) of 11 January 2008 on the modernization of the French labor market introduced several changes in the labor market organization. One of the main axes of the reform was to decrease the importance of seniority in every aspect of the field (privileges, bonuses, etc.). The reform is two-folded: the maximal employer waiting period to benefit from complementary payment from the employer was reduced from 10 to 7 days and the minimum required tenure to be entitled from 3 years to 1 year.

The French sickness benefit system is composed of Social security and an employer complementary benefit based on CBA. Employees are entitled to the complementary benefit only if they fulfill a minimum tenure requirement, which depends on the CBAs and may vary from one month to 3 years.

We use two administrative database. The first one, the HYGIE database (2007-2009), provides a detailed description of sick leave spells for a representative sample of General Health Insurance scheme beneficiaries. The HYGIE data are issued from the merger of Pension Fund (CNAV) data and Health Insurance Fund for Salaried Workers (CNAMTS) data. The second one, the CBA database, was built from 46 of the most representative collective agreements covering 60 % of the employees of the HYGIE database and provides informations about rempacement rate by subperiod of sickness absence, the waiting period and minimum tenure requirement to benefit of complementary sick leave. The replacement rate is zero during the waiting period and then reaches a maximum value during a second (favorable) period, a less favorable value during a second period and then returns to the social security basic rate (50%).

We use a difference-in-differences with matching method in which control groups are defined according to the collective bargaining agreement (CBA) employees belong to. Indeed, thanks to complementary insurance provided by CBAs, employees were not affected the same way by the reform.

The first fold of the reform cut the maximal length of the employer waiting period from 10 days to 7 days. Treated group is consequently defined as those individuals whose waiting period was between 8 and 10 days in 2007. Control groups are picked within individuals who had in 2007 an employer waiting period less or equal to 7 days. We find global significant positive effect of the first fold of the reform (0.5 days per year on average) but with great variations according to employees' gender and category.

The second fold of the reform reduced the minimum tenure requirement to be entitled to complementary benefit from 3 year to 1 year. We only keep employees under CBAs with minimum tenure requirement of 3 years. Contrary to the first fold evaluation, we use a pseudo panel strategy because the treated group should contain individuals with 1 or 2 years of tenure in 2007 and 2009. Treated and controls groups are defined according their tenure duration. Treated are individuals with one and two years of tenure in 2007 and in 2009. Control group encompasses individuals with 3 years tenure ore more. The second fold of the reform (reduction of the minimum tenure) had a positive effect (+ 0.9 day on sickness duration and 1.5 percentage point on sickness probability).

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TABLE 11: STRUCTURE OF THE SAMPLE

	Treated 1	Treated 2	Control A	Control B	Control C	Control D
	$D_0 > 7$	Tenure<3	$3 \leq D_0 \leq 7$	$D_0 \leq 7$	Tenure≥ 3	3≤Tenure≤ 8
Dependent Variables						
Number of sickness days	4.108	2.984	4.681	4.406	3.881	3.921
Probability of sickness spell	0.198	0.150	.224	0.224	0.188	0.190
Personnal characteristics						
Men	0.443	0.557	0.478	0.520	0.518	0.525
Women	0.557	0.443	0.522	0.480	0.482	0.475
Full-Time	0.697	0.795	0.767	0.816	0.186	0.183
Other	0.303	0.205	0.233	0.184	0.814	0.817
1st Quarter of wage	0.349	0.258	0.214	0.150	0.272	0.275
2nd Quarter of wage	0.286	0.252	0.286	0.220	0.247	0.277
3rd Quarter of wage	0.195	0.245	0.326	0.300	0.264	0.267
4th Quarter of wage	0.170	0.245	0.174	0.330	0.218	0.182
Executives	0.099	0.227	0.093	0.234	0.137	0.139
Supervisors	0.099	0.160	0.136	0.198	0.091	0.089
Employees	0.563	0.325	0.405	0.313	0.477	0.498
Laborers	0.239	0.288	0.366	0.255	0.253	0.242
1-9 Employees	0.232	0.258	0.228	0.194	0.219	0.225
10-49 Employees	0.244	0.272	0.306	0.268	0.280	0.290
50-499 Employees	0.364	0.360	0.377	0.392	0.334	0.317
500-999 Employees	0.057	0.054	0.054	0.073	0.053	0.052
More than 1000 Employees	0.103	0.055	0.035	0.073	0.114	0.115

Source: Panel HYGIE

TABLE 12: DID MATCHING RESULTS OF NUMBER OF SICKNESS DAYS ON TREATED 1

Gender	Category	Duration	Control A		Control B	
			Estimates	SD	Estimates	SD
All	All	0 - 7	**0,069**	0,014	0,021	0,017
		0 - 10	**0,073**	0,020	0,014	0,024
		0 - 30	**0,177**	0,050	**0,108**	0,061
		0 - 90	**0,507**	0,116	**0,499**	0,147
	Executive	0 - 7	**0,066**	0,025	0,041	0,044
		0 - 10	0,043	0,035	0,059	0,059
		0 - 30	0,010	0,088	**0,445**	0,142
		0 - 90	**0,872**	0,205	0,079	0,367
	Employee	0 - 7	**0,059**	0,023	0,014	0,025
		0 - 10	**0,079**	0,031	0,025	0,035
		0 - 30	0,130	0,082	-0,075	0,094
		0 - 90	0,113	0,191	0,158	0,226
	Supervisor	0 - 7	-0,009	0,037	**-0,087**	0,052
		0 - 10	-0,059	0,050	-0,051	0,070
		0 - 30	0,035	0,123	**-0,388**	0,184
		0 - 90	**0,473**	0,280	0,196	0,419
	Laborer	0 - 7	**0,157**	0,033	0,004	0,036
		0 - 10	**0,165**	0,044	**-0,239**	0,049
		0 - 30	**0,350**	0,109	-0,057	0,122
		0 - 90	**0,637**	0,251	-0,031	0,291
Women	All	0 - 7	**0,040**	0,021	0,008	0,025
		0 - 10	0,027	0,029	-0,040	0,035
		0 - 30	**0,209**	0,075	**0,275**	0,090
		0 - 90	**0,453**	0,177	0,180	0,217
	Executive	0 - 7	**0,156**	0,049	0,039	0,072
		0 - 10	0,096	0,068	**-0,175**	0,103
		0 - 30	0,077	0,166	0,303	0,249
		0 - 90	**1,109**	0,393	0,228	0,619
	Employee	0 - 7	**0,050**	0,028	-0,010	0,030
		0 - 10	**0,072**	0,038	0,017	0,042
		0 - 30	0,017	0,099	0,055	0,114
		0 - 90	0,083	0,234	**-0,520**	0,275
	Supervisor	0 - 7	**-0,092**	0,056	**-0,141**	0,078
		0 - 10	**-0,143**	0,073	**-0,390**	0,103
		0 - 30	-0,028	0,182	-0,411	0,263
		0 - 90	**0,798**	0,414	0,950	0,600
	Laborer	0 - 7	**0,184**	0,087	**0,225**	0,098
		0 - 10	0,116	0,116	-0,090	0,129
		0 - 30	**1,191**	0,275	**1,920**	0,303
		0 - 90	**2,671**	0,661	**2,456**	0,688
Men	Ensemble	0 - 7	**0,083**	0,019	0,002	0,023
		0 - 10	**0,095**	0,026	0,012	0,032
		0 - 30	**0,158**	0,063	-0,121	0,081
		0 - 90	**0,377**	0,144	**0,476**	0,192
	Executive	0 - 7	0,000	0,027	0,051	0,052
		0 - 10	0,004	0,037	**0,131**	0,068
		0 - 30	0,024	0,094	**0,596**	0,161
		0 - 90	**1,054**	0,224	**-0,794**	0,472
	Employee	0 - 7	**0,097**	0,041	0,031	0,044

	0 - 10	**0,134**	0,055	0,048	0,061
	0 - 30	**0,415**	0,142	**-0,410**	0,159
	0 - 90	0,320	0,308	**1,309**	0,370
Supervisor	0 - 7	0,032	0,051	**-0,229**	0,074
	0 - 10	-0,035	0,069	**-0,189**	0,097
	0 - 30	0,063	0,168	0,221	0,250
	0 - 90	0,143	0,378	**-1,034**	0,587
Laborer	0 - 7	**0,142**	0,035	**-0,100**	0,038
	0 - 10	**0,134**	0,047	**-0,241**	0,052
	0 - 30	-0,104	0,113	**-0,639**	0,130
	0 - 90	-0,083	0,259	-0,267	0,318

Note: This table presents the DID matching estimates and the standard deviation. The significant coefficients at the 10 % level are in bold. The covariates used were: age, gender, residence department, firm region, firm size, firm sector, socio economic category, regional unemployment rate, salary and previous year health indicators (number of visits to a generalist. to a specialist and number of hospitalization days).

Source: HYGIE-CBA panel

TABLE 13: DID MATCHING RESULTS OF PROBABILITY OF SICKNESS SPELL ON TREATED 1

Gender	Category	Duration	Control A		Control B	
			Estimates	SD	Estimates	SD
All	All	0 - 7	**0,013**	0,003	0,005	0,003
		0 - 10	**0,013**	0,003	0,004	0,004
		0 - 30	**0,011**	0,004	0,003	0,004
		0 - 90	**0,009**	0,004	0,004	0,005
	Executive	0 - 7	**0,012**	0,005	**0,018**	0,008
		0 - 10	0,008	0,006	**0,019**	0,009
		0 - 30	0,003	0,007	**0,034**	0,011
		0 - 90	**0,016**	0,007	0,011	0,012
	Employee	0 - 7	**0,013**	0,004	0,003	0,005
		0 - 10	**0,014**	0,005	0,004	0,005
		0 - 30	**0,011**	0,006	-0,001	0,006
		0 - 90	0,002	0,006	-0,004	0,007
	Supervisor	0 - 7	-0,002	0,007	-0,014	0,010
		0 - 10	-0,009	0,008	-0,011	0,011
		0 - 30	-0,008	0,009	**-0,026**	0,013
		0 - 90	-0,005	0,009	**-0,024**	0,014
	Laborer	0 - 7	**0,029**	0,006	0,002	0,007
		0 - 10	**0,028**	0,007	**-0,021**	0,008
		0 - 30	**0,022**	0,008	**-0,018**	0,009
		0 - 90	**0,020**	0,008	-0,011	0,009
Women	All	0 - 7	**0,009**	0,004	0,003	0,005
		0 - 10	**0,008**	0,004	-0,002	0,005
		0 - 30	**0,009**	0,005	0,009	0,006
		0 - 90	0,004	0,005	0,003	0,007
	Executive	0 - 7	**0,027**	0,009	0,018	0,014
		0 - 10	**0,019**	0,011	-0,008	0,016
		0 - 30	0,007	0,012	0,002	0,018
		0 - 90	**0,024**	0,013	-0,002	0,020
	Employee	0 - 7	**0,012**	0,005	-0,001	0,006
		0 - 10	**0,014**	0,006	0,001	0,006
		0 - 30	0,005	0,007	0,000	0,008
		0 - 90	-0,006	0,007	**-0,016**	0,008
	Supervisor	0 - 7	**-0,019**	0,011	**-0,026**	0,015
		0 - 10	**-0,025**	0,011	**-0,052**	0,016
		0 - 30	**-0,022**	0,013	**-0,045**	0,018
		0 - 90	-0,010	0,013	-0,026	0,019
	Laborer	0 - 7	**0,032**	0,017	**0,045**	0,019
		0 - 10	0,027	0,018	0,020	0,020
		0 - 30	**0,061**	0,020	**0,103**	0,022
		0 - 90	**0,078**	0,020	**0,100**	0,022
Men	Ensemble	0 - 7	**0,014**	0,004	0,000	0,004
		0 - 10	**0,015**	0,004	0,001	0,005
		0 - 30	**0,010**	0,005	**-0,012**	0,006
		0 - 90	**0,010**	0,005	-0,002	0,006
	Executive	0 - 7	0,000	0,005	**0,018**	0,010
		0 - 10	0,000	0,006	**0,025**	0,011

	0 - 30	0,002	0,007	**0,055**	0,013
	0 - 90	**0,015**	0,008	-0,001	0,015
Employee	0 - 7	**0,016**	0,008	0,006	0,008
	0 - 10	**0,020**	0,009	0,008	0,009
	0 - 30	**0,025**	0,010	-0,005	0,011
	0 - 90	**0,020**	0,011	**0,029**	0,012
Supervisor	0 - 7	0,007	0,010	**-0,041**	0,014
	0 - 10	-0,002	0,011	**-0,038**	0,015
	0 - 30	-0,002	0,013	**-0,033**	0,019
	0 - 90	-0,006	0,014	**-0,054**	0,020
Laborer	0 - 7	**0,025**	0,007	**-0,025**	0,007
	0 - 10	**0,022**	0,007	**-0,039**	0,008
	0 - 30	0,002	0,008	**-0,057**	0,009
	0 - 90	0,002	0,009	**-0,043**	0,010

Note: This table presents the DID matching estimates and the standard deviation. The significant coefficients at the 10 % level are in bold. The covariates used were: age, gender, residence department, firm region, firm size, firm sector, socio economic category, regional unemployment rate, salary and previous year health indicators (number of visits to a generalist. to a specialist and number of hospitalization days).
Source: HYGIE-CBA panel