UNIVERSITÀ DELLA CALABRIA

Dipartimento di Economia e Statistica
Ponte Pietro Bucci, Cubo 0/C
87036 Arcavacata di Rende (Cosenza)
Italy
http://www.ecostat.unical.it/

Working Paper n. 16 - 2009

ABSENTEEISM IN THE ITALIAN PUBLIC SECTOR: THE EFFECTS OF CHANGES IN SICK LEAVE COMPENSATION

Maria De Paola
Dipartimento di Economia e Statistica
Università della Calabria
Ponte Pietro Bucci, Cubo 1/C
Tel.: +39 0984 492459
Fax: +39 0984 492421
e-mail: m.depaola@unical.it

Valeria Pupo
Dipartimento di Economia e Statistica
Università della Calabria
Ponte Pietro Bucci, Cubo 1/C
Tel.: +39 0984 492456
Fax: +39 0984 492421
e-mail: v.pupo@unical.it

Vincenzo Scoppa
Dipartimento di Economia e Statistica
Università della Calabria
Ponte Pietro Bucci, Cubo 1/C
Tel.: +39 0984 492464
Fax: +39 0984 492421
e-mail: v.scoppa@unical.it

Ottobre 2009

Absenteeism in the Italian Public Sector: The Effects of Changes in Sick Leave Compensation

Maria De Paola, Valeria Pupo, Vincenzo Scoppa*

Department of Economics and Statistics, University of Calabria

In this paper we analyse how the absence behaviour of Italian public sector employees has been affected by a law, passed in June 2008, reducing sick leave compensation and increasing monitoring intensity. We use micro-data on a sample of about 860 workers, employed at an Italian public administration, for years going from 2005 to 2009. We estimate the effect of the reform using linear and non-linear estimators. As predicted by agency theory, individuals react to economic incentives: the employees in our sample have considerably reduced their absences under the new regime. Since the reform has affected employees in a non uniform way, we show that the reduction of absenteeism is significantly stronger for employees suffering higher earning losses. Results also show that while the reform has reduced the duration of short absence spells, the duration of long spells has increased. We argue that this is due to the non-linearity of earning losses introduced by the new law.

Keywords: Worker Absenteeism; Moral Hazard; Shirking; Sickness; Insurance Contracts.

JEL classification: J41, J45; M52; D86; C20

1. Introduction

Absenteeism represents a problem for the public sector of many countries. A number of works shows that public employees are more prone to taking sick leaves compared to similar employees working in the private sector (Barmby, Ercolani and Treble, 2002; Winkelmann, 1999; Banerjee, et al., 2004). This phenomenon has reached in Italy very relevant proportions: according to the data from the Italian Economic Minister (Ministero dell'Economia e delle Finanze, Ragioneria Generale dello Stato), in year 2007 the Italian public sector employees took on average 15.1 days off due to sick-leave, 30% more than their private sector counterparts.

These impressive figures in public sector absence rates produce direct costs, in terms of continued wage payment to absent workers, and indirect costs due to the adverse effects on the quality of services offered.

With the aim to reduce the level of absenteeism among Italian public employees, in June 2008 the minister of the Public Administration, Renato Brunetta, has proposed a reform (in force since the 25th of June 2008 and approved definitively by the law No. 133 of 2008)

* E-mail addresses: m.depaola@unical.it; v.pupo@unical.it; v.scoppa@unical.it. We would like to thank Mariarosaria Agostino, Giovanni Anania, Giorgio Brunello, Paola Cardamone, Giuliana De Luca and Michela Ponzo for useful suggestions and comments. The usual disclaimers apply.

changing both sick leave compensation and the intensity of monitoring of health status of absent employees. Before the reform, public sector employees were entitled to the full replacement of income for the first nine months of sickness and the intervention of an "official medical check" was left to the discretion of the employer. The law 133/2008, instead, has established that for each day of absence due to illness there will be a cut in some wage components (such as non-base wage and productivity bonuses, which generally amount to 10-20% of the total remuneration), for the first 10 days in each spell of absence. On the other hand, workers remain fully ensured for the days of absences exceeding the first 10 days in a single spell. A second important innovation introduced by the law was the imposition of a medical mandatory check even in the event of a single day of sick leave.

Since workers are now only partially insured against earning losses due to sickness and because the monitoring has become more frequent, the cost of being absent from work has increased. Under the prediction of moral hazard theories that insured employees change their behaviour in relation to the generosity of sickness insurance, the reform should have produced a reduction in absences. On the other hand, the law has in practice increased the cost of returning to work after 10 days, since in the case in which the worker founds himself in the necessity to start a new absence spell he will incur again in wage reductions. As a consequence, workers on long absence spells may opportunistically decide to prolong the duration of their sickness leaves.

We investigate the effects of the reform on employees absence behaviour using a unique dataset on a sample of about 860 workers employed mainly in administrative jobs in an Italian public organization, which provided us with very accurate register administrative data. We observe absence behaviour for each day in the period going from January 2005 to June 2009. In addition, we have information on some important individual characteristics and job attributes.

Since workers included in our sample are covered by the same compulsory insurance programme, we do not face any selection problem in estimating the effects of the reform. Moreover, since the same employees are observed before and after the implementation of the reform, composition and heterogeneity effects are not relevant in our analysis and we are confident that the effect we estimate is causal.

To disentangle the effects of the policy intervention from other confounding factors related to temporal trends or individual characteristics, we estimate a simple model relating the number of days of absences of an employee in a given quarter on a vector of individual characteristics, dummies for quarters, a quadratic time trend and a dummy variable, *Reform*, taking value one for the period during which the new law was in force (July 2008-June 2009). We use both a OLS estimator (controlling also for individual fixed effects) and a count estimator, to take into account the particular nature of our dependent variable.

From our analysis it emerges that absenteeism has been strongly affected by the policy intervention introduced in 2008. We find a reduction in absences of about 49%. The effect seem stronger for females (–56%), which are typically characterized by higher absence rates, but it is relevant also for men, for whom we observe a reduction of 40%.

Since the new law has increased the cost of being absent in proportion to the non-base component of the wage, we have tried to understand whether the reduction of absences is directly related to the costs suffered by employees. At this aim, we have enriched our model using as explanatory variables the employee non-base wage and an interaction term between this component and the dummy *Reform*. From our estimates, it emerges that after the reform workers with a higher non-base wage have reduced their absences significantly more than workers with lower non-base wage. The evidence on the heterogeneous impact of the reform reassures us that our estimates are not capturing other causes of absenteeism, intervening simultaneously to the new regime.

We have also investigated the effect of the reform on the probability of being absent and on the length of absence spells. In line with the fact that due to the reform the cost of beginning a work absence spell has unambiguously increased for workers, we find that the probability of being absent has been strongly reduced. As far as the effect on the length of absence spells is concerned, it emerges that while the duration of short absences spells has reduced, the new regime has induced workers to prolong absence spells with a duration higher than 10 days. This latter result could be due to the non-linearity of earning losses introduced by the new regime, which continues to provide full insurance for days of absence exceeding 10.

The paper is organized as follows. Section 2 discusses the related literature. In section 3 the institutional framework, the data and some descriptive statistics are presented. In section 4 to analyze the effects of the reform on employees' absence behaviour we estimate both a OLS and a negative binomial model. Section 5 presents probit estimates of the probability of being absent. In section 6 we investigate the effects of the reform on the duration of absence spells. Section 7 concludes.

2. Related Literature

A growing economic literature is devoting attention to absenteeism analysing the effects on worker behaviour of a large number of variables (see, among others, Dionne and Dostie, 2007; Barmby, Ercolani, and Treble, 2002). Some of these variables are related to individual characteristics (gender, age, education, health status, etc.), while others are related to contractual and institutional aspects (such as the generosity of sickness benefits, the degree of employment protection, firm size, type of job, labour market conditions, etc.).

Since the worker's effective state of health is typically costly to observe for the employer or for public authorities (and even for qualified physicians), sickness insurance creates a classical moral hazard problem for workers, who, given the prospect of gaining a wage without providing any effort are induced to take days off work. This opportunistic behaviour tend to be encouraged by employment protection measures.

A number of works have focused their attention on the relationship between firing costs and absence behaviour showing that workers on fixed term contracts or on probation, for which contractual arrangements are characterized by less severe firing restrictions, present lower absence rates (Ichino and Riphahn, 2005; Riphahn, 2004; Arai and Thoursie, 2005; Scoppa, 2009). Other works have highlighted a positive relationship between firm size and absence rates, which can be explained in relation to the higher monitoring costs faced by larger firms (Winkelman, 1999). Moreover, absence behaviour has also been shown to be negatively related to unemployment, since the threat of termination to prevent shirking tends to be related to labour market conditions (Leigh, 1985, Hesselius, 2007).

The effects of sickness absence insurance, providing compensation for wage losses due to temporary illnesses, have been less investigated. This is especially true if we consider the huge literature on a similar form of insurance as unemployment benefits. The lack of research on this particular form of insurance is probably due to the limited availability of suitable data on employees absence behaviour. Empirical investigations trying to analyse the effects of changes in the level of insurance are based on the experience of few countries.

A number of empirical analyses have been conducted considering Sweden, while little is known for other European countries. Johansson and Palme (2002 and 2005) consider the impact of a Swedish reform, which increased the cost of absences, on workers behaviour. From their analyses it emerges that employees reduce their rates of absenteeism when they experience a wage decrease upon absence. In a similar vein, Pettersson-Lidbom and Thoursie (2008) show that an increase in the benefit levels in Sweden in 1987 led to an increase in the incidence of absence spells. Henrekson and Persson (2004) using time series data from 1955 to 1999 confirm that more generous sick leave compensation lead to higher absenteeism rates.

Ziebarth (2009) focuses on a change in the Germany's Statutory Health Insurance, taking place in 1996 and concerning the income replacement level for spells of sickness exceeding six weeks. His findings suggest that the reform has produced a small decrease in the duration of long-term absenteeism only for the poor and middle-aged full-time employed persons.

Curington (1994) and Meyer et al. (1995) examine the effects of several legislative changes in benefit levels on absence using US data. They show that increases in these benefits produce an increase of employees' opportunistic behaviour.

An international comparison of the effects of sickness benefits on individual absenteeism is provided by Frick and Malo (2008). Using cross-section data from the European Survey on Working Conditions they show that individuals tend to be more absent in countries with higher level of sickness benefits.

All in all, from the existing literature it emerges that reduction in sick pay may help at solving moral hazard problems that seem to be responsible for a considerable fraction of workplace absences. However, the literature on this issue provides evidence only for a small number of countries. Our analysis is an attempt to reduce this gap by providing evidence on a country that has not been investigated by previous works and contributing to a better understanding of the relationship between incentives and absence behaviour.

3. Institutional Framework, Data and Descriptive Statistics

Until June 2008 employees in the Italian public sector were fully-insured against earning losses due to illness. According to the National Collective Employment Contract of public sector, public employees were entitled to the full replacement of wage income for the first nine months of illness.

A decree approved by the Italian Government on the 26th June 2008 (and subsequently passed in the law 133/2008), has established that for each day of absence employees will incur a reduction in pay (for the first ten days of each absence spells), although not all components of salary will be affected. More precisely, wage cuts will apply to ancillary economic benefits and productivity bonuses, which make up approximately 10-20% of an employee total wage: therefore, the reform has reduced the replacement rate from 100% to a range of 80-90%.

In addition to the reduction of the replacement rate, while previously sickness absences could be justified with a medical certificate by the individual own GP, the new regime has established that the employee's health status must be certified with an official medical check by a physician appointed by a public authority (even for one day of absence).

We exploit the changes introduced by the law 133/2008 to analyse the effects produced by different levels of sick leave compensation and monitoring intensity on the absence behaviour of a sample of workers employed at an Italian public administration. Our sample consists of 859 employees and we have information on their absence behaviour for each day in the period going from the 1st of January 2005 to the 30th of June 2009.[1] In addition, we have information on a number of personal characteristics (such us gender, age, education, marital

[1] The data have been organized to guarantee anonymity to individuals.

status, etc.) and on some relevant job features (such as qualifications and wage, decomposed in the components affected and not affected by the new regime).[2]

We use these information to create three measures of absence behaviour: the first is represented by the number of days of sick leave took by the workers in each quarter (*Sickness Absences*); the second is a dummy variable taking value one when the worker in a given quarter is absent at least one day (*Absent*); the third (*Absence Duration*) is the duration in days of each absence spell.

We observe 859 workers for a maximum of 18 quarters, leading to a total of 12,857 worker-quarter observations. Since some employees have been hired after January 2005 and some others retired before June 2009, the panel is not balanced. However, 637 workers are observed for all the 18 quarters.

In Table 1 we report some descriptive statistics on the employees analyzed in this study. They are on average 49 years old, about 42% of them are female and 63% are married with an average number of dependent children equal to 1.28.[3] The average tenure is around 14 years.[4] About 6% of the sample workers are on fixed term contracts, while 1.7% of them have a part-time job. Nearly 42% of workers live in the same area of their workplace.[5] The average yearly gross wage is 23,800 euro, while the non base wage is 2,230 euro.[6] 28% of employees in our sample have attained a College degree (unfortunately, we have almost 200 missing values for this variable).

As far as occupational variables are concerned, it is relevant to notice that the workers we consider are mainly employed in administrative jobs, which can be classified along 3 main levels: at the lower occupational level ("qualification B") is employed 15% of the employees, 53% of them have a job classified at the lower-intermediate level ("qualification C") and 32% at upper-intermediate level ("qualification D").

[2] We also have information on other kind of absences due to family or study leaves allowed by the Italian law that are not affected by the reform.
[3] Unfortunately we do not have information on the age of children.
[4] For employees hired before 1996 *Tenure* might be measured with errors because of some problems present in the old personnel archive of the organization.
[5] The dummy "*Living near work*" is equal to 1 if the employee lives in the same municipality where the workplace is located or in neighbouring municipalities, and zero otherwise.
[6] Nominal values have been transformed in 2008 euro using the ISTAT "consumer price index for blue and white-collar worker households".

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	859	48.558	9.147	23	67
Female	859	0.424	0.494	0	1
Married	859	0.629	0.483	0	1
Dependent Children	859	1.283	1.082	0	5
Living near work	859	0.414	0.492	0	1
Tenure	859	13.616	8.477	0	35.583
Fixed-Term contract	859	0.064	0.245	0	1
Part-Time	859	0.017	0.130	0	1
Non-base Wage (,000 €)	859	2.231	0.542	0.24	3.451
Total Wage (,000 €)	859	23.823	5.403	1.358	62.953
Qualification B	859	0.153	0.360	0	1
Qualification C	859	0.531	0.499	0	1
Qualification D	859	0.316	0.465	0	1
College Degree	594	0.282	0.450	0	1

Table 2 reports average days of absence (panel a) and the probability of being absent at least one day for each quarter (panel b) before and after the enforcement of the law (figures in bold refer to the period after the reform). On average, employees were absent 3.91 days before the reform[7] and 1.97 days after. The probability of being absent was of 0.53 before the enforcement of the law and it decreased to 0.29 afterwards. From Table 2 it is also possible to see that absence behaviour is strongly affected by seasonal factors: absences are more frequent in January-March, while it does not emerge a clear time trend.

Table 2. Sickness absences and probability of being absent

(a)	Sickness absences				
	2005	2006	2007	2008	2009
January-March	4.628	3.867	4.366	4.602	**2.195**
April-June	3.951	3.127	4.521	4.016	**1.478**
July-September	3.968	3.016	3.849	**2.091**	
October-December	3.897	3.142	3.930	**2.129**	

(b)	Absent at least one day				
	2005	2006	2007	2008	2009
January-March	0.612	0.548	0.550	0.628	**0.315**
April-June	0.537	0.520	0.560	0.553	**0.260**
July-September	0.472	0.473	0.493	**0.279**	
October-December	0.510	0.491	0.546	**0.293**	

The sharp reduction in absences observed since July 2008 is clearly described also in Figure 1, which shows the pattern followed by absences in the 18 quarters covered by our data. The vertical line at period 14 denotes the last period of the old regime (April-June 2008).

[7] The number of absences for year (15.64) is close to the 2007 national average of all Italian public employees (15.1).

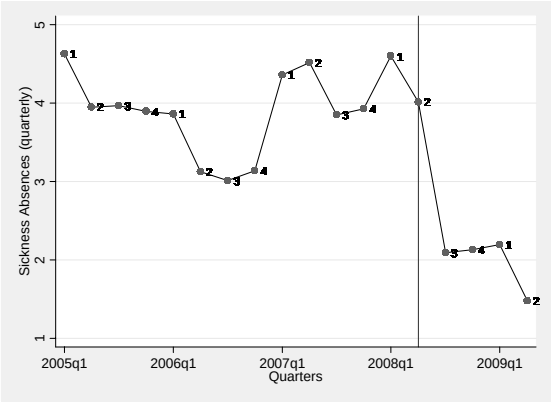


Figure 1. Sickness absences for quarters since 2005q1

Following Johansson and Palme (2005), further evidence of the effect of the reform can be gathered if one compares, for example, the absences in the second semester of 2008 (in which the reform was in force) with the absences in the first semester of the same year: absences decrease on average of about 2.2 days, from 4.3 to 2.1 (see Table 3). However, to neutralize seasonal effects occurring between the first and second semester, we operate the same difference for the year 2007 and calculate the difference-in-differences. The difference between the second and the first semester of 2007 is much smaller, equal to 0.55. Therefore, we can ascribe to the reform the difference-in-differences, that is, a reduction of 1.64 days per quarter.[8]

Table 3. Difference-in-differences estimates of the effect of reform on absenteeism

	Year 2007	Year 2008	Year 2008- Year 2007 Difference
First Semester	4.442	4.308	–0.134
	(0.234)	(0.229)	(0.327)
Second Semester	3.889	**2.110**	–1.779
	(0.229)	**(0.190)**	(0.298)
Second – First Semester	–0.552*	–2.198***	–1.645***
difference	(0.327)	(0.298)	(0.443)

Notes: Standard errors are reported in parentheses. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

In the next section we attempt to identify the causal effect of the policy intervention on absences carrying out an econometric analysis.

[8] Similar figures are obtained comparing the first semester of 2009 with corresponding semesters before the reform.

4. The Impact of the Reform on Days Of Absence: OLS and Count Model Estimates

Following Ichino and Riphahn (2005) in this section we firstly use a linear estimator to estimate several specifications of the following model:

$$E(Absences_{it} \mid X) = \alpha + \beta(reform) + \delta Z_{it} + \gamma Quarter_j + \phi(TimeTrend_t) + \varepsilon_{it}$$

The dependent variable $Absences_{it}$ represents for employee *i* the number of days of absences due to sickness in a given quarter *t* (*t*=2005q1-2009q2); *Reform* is a dummy for the period (July 2008-July 2009) covered by the new regime; Z_{it} is a vector of individual characteristics which could affect absences (age, gender, marital status, children, etc.), *Quarters* are dummies for capturing seasonal effects, *Time Trend* is a quadratic time trend to take into account temporal trends, ε_{it} is an error term.

Results using OLS are reported in Table 4. In all the specifications, standard errors are robust to heteroskedasticity and are clustered to take into account within-individual correlation of the error terms (Moulton, 1990).

In Column (1) are reported results of our basic specification in which we control only for quarterly dummies and a quadratic time trend, without individual controls. Results show that the reform has determined a reduction of absences of 2.1 days per quarter, which represents a reduction of about 49% with respect to the year 2007. The coefficient is statistically significant at the 1 percent level (*t*-stat=–7.8). Quarterly dummies confirm a seasonal pattern in absences, with the first quarter (January-March) showing more absences (the reference category is the second quarter). The coefficients on the time terms are not significantly, implying that employee absences do not follow a clear time trend.[9]

In column (2) we control for individual characteristics: age, gender, marital status, number of dependent children, tenure, dummies for whether the employee is on fixed term contract or has a part-time job, and a dummy indicating if the employee lives near the workplace. Results show – in line with the existing literature – that absences are higher for females (1.72 days more than males), increase with age (1.1 days every 10 years), are much lower for workers on fixed-term contracts. Living near the workplace significantly reduces absences. On the other hand, we do not find any statistically significant effect for marital status and for the number of children.[10]

[9] We also experimented controlling for a linear trend, a cubic trend and using yearly dummies (not reported) obtaining very similar results.

[10] This might be due to the fact that in Italy public employees can use special leaves for family needs.

Remarkably, controlling for individual characteristics does not change at all the effect of the reform on absences: the coefficient (and its standard error) in column (2) is almost unchanged.

Table 4. The impact of the reform on employee absences. OLS regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reform	-2.100***	-2.090***	-1.566***	-2.289***	-2.061***	-2.030***	-1.854***
	(0.269)	(0.268)	(0.285)	(0.268)	(0.272)	(0.273)	(0.281)
First Quarter	0.515***	0.498***	0.498***	0.500***	0.546***	0.500***	0.548***
	(0.145)	(0.145)	(0.145)	(0.145)	(0.153)	(0.161)	(0.168)
Third Quarter	-0.036	-0.014	-0.016	0.030	-0.114	-0.050	-0.168
	(0.191)	(0.190)	(0.190)	(0.191)	(0.197)	(0.191)	(0.201)
Fourth Quarter	0.007	0.051	0.050	0.088	-0.047	0.054	-0.096
	(0.177)	(0.177)	(0.177)	(0.178)	(0.176)	(0.183)	(0.191)
Linear term of the time trend	-0.061	-0.200	-0.215	-0.748*	-0.520	0.913***	0.835**
	(0.303)	(0.300)	(0.300)	(0.441)	(0.432)	(0.343)	(0.366)
Quadratic term of the time trend	0.021	0.035	0.038	0.113	0.060	-0.109*	-0.116*
	(0.056)	(0.056)	(0.056)	(0.073)	(0.072)	(0.061)	(0.065)
Age		0.112***	0.112***	0.112***	0.099***		
		(0.023)	(0.023)	(0.023)	(0.024)		
Female		1.722***	2.002***	1.787***	1.906***		
		(0.298)	(0.330)	(0.303)	(0.328)		
Married		0.021	0.023	0.083	0.382		
		(0.392)	(0.392)	(0.386)	(0.407)		
Children		0.042	0.043	0.012	-0.158		
		(0.155)	(0.155)	(0.153)	(0.157)		
Living near work		-0.883***	-0.880***	-0.821***	-0.540*		
		(0.286)	(0.286)	(0.291)	(0.311)		
Tenure		0.018	0.017	0.039	0.043*		
		(0.023)	(0.023)	(0.026)	(0.024)		
Fixed-Term Contract		-1.315***	-1.351***	-1.210***	-1.366***		
		(0.356)	(0.356)	(0.357)	(0.400)		
Part-Time Job		-0.895**	-0.876**	-1.417***	-1.270**		
		(0.427)	(0.435)	(0.494)	(0.506)		
Reform*Female			-1.257***				
			(0.342)				
Non-base Wage				-0.709*	-0.827**	0.997***	0.759**
				(0.378)	(0.387)	(0.285)	(0.323)
Reform*(Non-base Wage)				-0.741**	-0.916**	-0.706**	-0.668**
				(0.362)	(0.376)	(0.315)	(0.334)
Constant	3.779***	-2.046**	-2.144**	-0.002	0.532	0.021	0.815
	(0.382)	(0.901)	(0.904)	(1.564)	(1.568)	(0.974)	(1.085)
Observations	12857	12857	12857	12857	11194	12857	11194
R-squared	0.011	0.048	0.049	0.050	0.049	0.014	0.016
Number of Employees	859	859	859	859	637	859	637
Sample	Whole	Whole	Whole	Whole	Balanced	Whole	Balanced
Individual Fixed Effects	NO	NO	NO	NO	NO	YES	YES

Notes: The Table reports OLS estimates. The dependent variable is the number of days of absence in a quarter. Standard errors (corrected for heteroskedasticity and clustered at the individual level) are reported in parentheses. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

Very similar results are obtained also when we include among the controls the individual educational attainment, restricting the analysis to the sub-sample of workers for which this information is available (not reported).

In column (3) of Table 4, using the interaction term *Reform*Female*, we investigate whether the reform has produced different effects according to gender: it emerges that females have reacted significantly more than males to the reform, reducing absences of 2.82 days (1.56+1.26) with respect to males (1.56). The effect is however strongly significant for both

genders. It is worthwhile to notice that females show typically higher absence rates and the larger impact of the policy intervention on their behavior can be explained by the larger room for reduction.

In column (4) we turn our attention to a crucial aspect of the reform of sickness insurance: whereas before the reform, for each day of sickness, 100% of employees' forgone earnings were covered, the new regime has established that the compensation level is reduced only to the "Base wage", while other components, which we define "*Non-base Wage*", will not be paid for the days of absence. The reduction applies to the first 10 days of absences in each single spell, but after the 11th day the total wage is covered as before the reform.

In our sample, the *Non-base Wage* amounts to about 10% of the total remuneration and differs according to job levels: for the median employee with a yearly *Non-base Wage* of €2,230, one day of absence corresponds to a cost of about €6.2.

We use as additional explanatory variable the *Non-base Wage* and the interaction between this variable (de-meaned) and the dummy *Reform*. Results in column (4) show that employees with a higher Non-base Wage take a lower number of days off work both before and after the reform, but in line with the theoretical predictions of agency models, the reform has determined a reduction of absences much stronger for employees for whom this wage component is more relevant. The median employee has reduced absences of 2.3 days, while for individuals with an additional *Non-base Wage* of €1,000, the absences are further reduced by 0.74 days (significant at the 5 percent level).

Figure 2 shows – based on coefficients of column (4) – the relationship between days of absences and the *Non-base Wage* before (dashed line) and after the reform (solid line): the relationship is negatively sloped under both regimes, but after the reform the impact of a higher non-base wage on absences is much stronger. Note that for employees earning negligible amount as non-base wage, the reform has caused almost no difference in their propensity to be absent. However, less than 1% of employees in our sample gain a non-base wage below 1,000 euro.

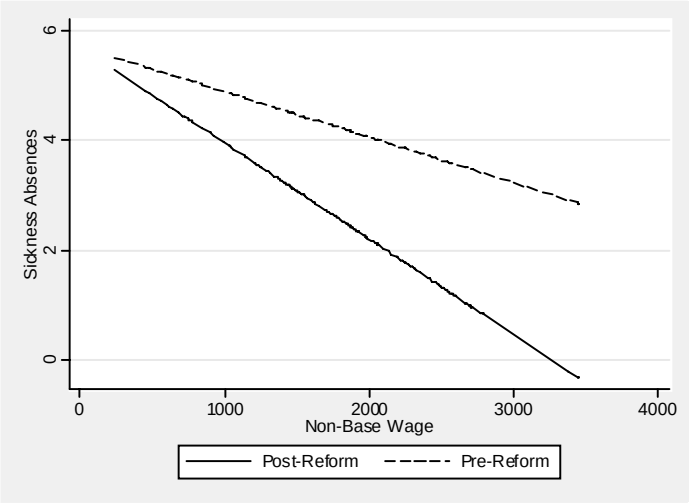


Figure 2. Sickness Absences in relation to Non-base Wage (pre and post reform)

In order to avoid the effects due to a different composition of the workforce along time, we restrict our sample to only those 637 employees which we observe for all the 18 quarters ("Balanced panel"). Results in column (5) of Table 4 are very similar to those regarding the full sample of employees.

The effect of the reform is furtherly investigated in column (6) (for the whole sample), and (7) (for the balanced panel), in which we control for individual fixed effects to take into account individual heterogeneity. Fixed effect estimates produce analogous results as regards the effect of the reform: an employee with an average *Non-base Wage* has reduced his/her sickness absences of about 2 days per quarter after the reform, while employees earning an additional 1,000 euro as non-base wage have further reduced their absences of 0.7 days.

We have also experimented including among regressors the employee's *Total Wage*. Estimates show that a higher wage significantly reduces employee absences, although in this case a serious problem of reverse causality might be present.[11] As regards the effects of the reform, results are very similar to those presented in Table 4 and are not reported.

We have shown that absenteeism changed immediately after the reform. Although implausible, an alternative explanation could be that some other determinants of absenteeism changed exactly in the same period and produced the observed effect. We are able to discard this explanation since the reform has modified in a non uniform way the cost of being absent and we show that the reaction of the employees to the reform depends on the costs they incur.

[11] One can expect employees working harder and making less absences are promoted and paid higher wages.

4.1. Estimates Using a Count Model

Since our dependent variable, *Sickness Absences*, is a count variable which takes on nonnegative integer values, in this section we estimate the effects of the reform using a negative binomial model. The simpler Poisson model is strongly rejected because of the overdispersion of our dependent variable: the variance is much higher than the mean. The likelihood ratio test for the over-dispersion parameter α shows that it is significantly different from zero, confirming that the Poisson model is not appropriate.

Estimates using the negative binomial model are reported in Table 5. Results are similar to those obtained in the previous section using linear estimators. With the introduction of the reform, sickness absences are reduced by about 45% with respect to year 2007 and the employees earning a higher non-base wage reduce significantly more their absences.

Table 5. Estimating the impact of the reform using Negative Binomial Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reform	-0.691***	-0.672***	-0.587***	-0.745***	-0.717***	-0.951***	-0.927***
	(0.098)	(0.103)	(0.124)	(0.107)	(0.105)	(0.107)	(0.108)
First Quarter	0.162***	0.163***	0.163***	0.167***	0.183***	0.271***	0.280***
	(0.041)	(0.041)	(0.041)	(0.041)	(0.042)	(0.046)	(0.047)
Third Quarter	0.009	-0.026	-0.027	-0.014	-0.051	-0.048	-0.064
	(0.054)	(0.057)	(0.057)	(0.057)	(0.061)	(0.061)	(0.065)
Fourth Quarter	0.022	0.017	0.018	0.032	0.013	-0.038	-0.048
	(0.050)	(0.050)	(0.050)	(0.051)	(0.053)	(0.052)	(0.055)
Linear term of trend	0.024	0.053	0.045	-0.055	-0.091	0.317**	0.254*
	(0.097)	(0.097)	(0.096)	(0.133)	(0.131)	(0.144)	(0.146)
Quadratic term of trend	-0.003	-0.012	-0.010	0.002	0.006	-0.038	-0.033
	(0.019)	(0.019)	(0.019)	(0.024)	(0.024)	(0.026)	(0.026)
Age		0.032***	0.032***	0.033***	0.028***		
		(0.007)	(0.006)	(0.007)	(0.007)		
Female		0.489***	0.534***	0.494***	0.524***		
		(0.084)	(0.079)	(0.084)	(0.090)		
Married		0.072	0.071	0.090	0.131		
		(0.113)	(0.113)	(0.115)	(0.125)		
Children		0.027	0.028	0.015	-0.039		
		(0.045)	(0.045)	(0.047)	(0.048)		
Living near work		-0.250***	-0.248***	-0.244***	-0.189**		
		(0.084)	(0.083)	(0.084)	(0.090)		
Tenure		0.010	0.010	0.015*	0.017**		
		(0.007)	(0.007)	(0.008)	(0.007)		
Fixed-Term Contract		-0.652***	-0.661***	-0.590***	-0.621***		
		(0.205)	(0.204)	(0.207)	(0.218)		
Part-Time Job		-0.662***	-0.652***	-0.785***	-0.707***		
		(0.240)	(0.241)	(0.247)	(0.264)		
Reform*Female			-0.218				
			(0.136)				
Non-base Wage				-0.165	-0.207*	0.429***	0.285**
				(0.102)	(0.107)	(0.110)	(0.113)
Reform*(Non-base Wage)				-0.317*	-0.430***	-0.522***	-0.496***
				(0.171)	(0.162)	(0.163)	(0.164)
Constant	1.275***	-0.673**	-0.684**	-0.252	0.122	-1.091***	0.606
	(0.112)	(0.302)	(0.299)	(0.459)	(0.453)	(0.389)	(0.396)
Observations	12857	12857	12857	12857	11194	12857	11194
Log pseudolikelihood	-26499.828	-26134.687	-26131.623	-26117.101	-22974.209		
Number of Employees	859	859	859	859	637	859	637
Sample	Whole	Whole	Whole	Whole	Balanced	Whole	Balanced
Individual Fixed Effects	NO	NO	NO	NO	NO	YES	YES

Notes: The Table reports negative binomial regressions. The dependent variable is the number of days of absence in a quarter. Standard errors (corrected for heteroskedasticity and clustered at the individual level) are reported in parentheses. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

5. The Effects on the Probability of Being Absent

The variable *Days of Absence* is heavily concentrated on 0: about 52% of employees has 0 days of absence in a given quarter. Moreover, a small fraction of employees has more than 30 days of absences and the estimates could be heavily influenced by these observations.

Therefore, as robustness check, in this section, we estimate the probability that a worker has been absent for at least one day during a given quarter. More precisely, we build the dependent variable $Absent_{it}$ that takes value equal to one if worker *i* was absent for at least one day in a given quarter *t* and zero otherwise.

In Table 6 are reported the same specifications presented in Table 4 using an OLS estimator. In columns 1-5 we report estimates obtained using a Probit model, while in columns 6 and 7 are reported estimates of a linear probability model in which we control for individual fixed effects.[12]

In column (1) are presented the results of our basic specification, in which we control only for quarterly dummies and a quadratic time trend. In line with the fact that the reform has unambiguously increased for employees the cost of *beginning* a new absence spell, it emerges that after the reform the probability of being absent has decreased of about 25.7 percentage points, from an observed probability of being absent of 48%, implying a reduction of more than 50%. The estimates reported in column (2), controlling for individual characteristics, show very similar results. In column (3), it is possible to see that females have reduced their probability of being absent more than males, but the effect is rather imprecisely estimated (*p*-value: 0.19).

Starting from column (4) we estimate the interaction between the *Non-base Wage* and the *Reform*. Estimates results confirm that employees with a higher *Non-base Wage*, which is proportional to the cost of being absent, after the reform have reduced significantly more their probability of being absent. The results of estimates controlling for individual fixed effects in columns (6) and (7) confirm these findings. The interaction term *Reform**(*Non-base Wage*) is significant at the 1 percent level.[13]

[12] We obtain almost identical results if we use a linear probability model for all specifications.

[13] A very similar effect emerges when we look at the number of absence spells: the number of spells for each employee (per quarter) has reduced from 1.57 to 0.77 after the reform.

Table 6. The impact of the reform on the probability of being absent

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Reform	-0.257***	-0.268***	-0.254***	-0.286***	-0.278***	-0.248***	-0.246***
	(0.017)	(0.018)	(0.021)	(0.018)	(0.019)	(0.017)	(0.018)
First Quarter	0.046***	0.047***	0.047***	0.047***	0.052***	0.042***	0.048***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)
Third Quarter	-0.043***	-0.043***	-0.043***	-0.038***	-0.048***	-0.043***	-0.050***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)	(0.010)	(0.011)
Fourth Quarter	-0.011	-0.008	-0.008	-0.004	-0.006	-0.010	-0.012
	(0.010)	(0.011)	(0.011)	(0.011)	(0.012)	(0.010)	(0.011)
Linear term of trend	0.012	0.005	0.004	-0.058**	-0.049	0.069***	0.066***
	(0.017)	(0.018)	(0.018)	(0.029)	(0.030)	(0.020)	(0.022)
Quadratic term of trend	-0.001	-0.000	-0.000	0.009*	0.007	-0.009**	-0.009**
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.004)	(0.004)
Age		0.003*	0.003*	0.003*	0.004*		
		(0.002)	(0.002)	(0.002)	(0.002)		
Female		0.193***	0.201***	0.201***	0.215***		
		(0.024)	(0.026)	(0.024)	(0.026)		
Married		0.011	0.011	0.017	0.033		
		(0.033)	(0.033)	(0.032)	(0.035)		
Children		0.026**	0.026**	0.023*	0.013		
		(0.012)	(0.012)	(0.012)	(0.013)		
Living near work		-0.054**	-0.054**	-0.047*	-0.051*		
		(0.024)	(0.024)	(0.024)	(0.026)		
Tenure		0.004**	0.004**	0.006***	0.005**		
		(0.002)	(0.002)	(0.002)	(0.002)		
Fixed-Term Contract		-0.165***	-0.167***	-0.154***	-0.167***		
		(0.055)	(0.055)	(0.056)	(0.062)		
Part-Time Job		-0.117	-0.117	-0.170**	-0.132		
		(0.087)	(0.087)	(0.083)	(0.098)		
Non-base Wage				-0.078***	-0.083***	0.079***	0.055***
				(0.027)	(0.031)	(0.017)	(0.019)
Reform*(Non-base Wage)				-0.061*	-0.077**	-0.061***	-0.050**
				(0.032)	(0.034)	(0.021)	(0.022)
Constant						0.244***	0.324***
						(0.060)	(0.066)
Reform*Female			-0.035				
			(0.027)				
Individual Fixed Effects	NO	NO	NO	NO	NO	YES	YES
Observations	12857	12857	12857	12857	11194	12857	11194
Number of Employees	859	859	859	859	637	859	637
Log-likelihood	-8594.86	-8191.11	-8189.90	-8158.33	-7128.86		
obs. P	0.480	0.480	0.480	0.480	0.492		
Pseudo R-squared	0.034	0.080	0.080	0.083	0.081		
R-squared						0.067	0.074
Sample	Whole	Whole	Whole	Whole	Balanced	Whole	Balanced

Notes: The Table reports Probit estimates of the probability of being absent at least one day in a quarter in columns 1-5. Marginal effects are reported. In columns 6-7 we estimate with a linear probability model controlling for individual fixed effects. Standard errors (corrected for heteroskedasticity and clustered at the individual level) are reported in parentheses. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

6. Contrasting Effects on the Duration of Absence Spells

The analysis we have conducted in the previous sections has shown that the law 133/2008 has produced a very strong impact, significantly reducing the average number of days of absences for quarter and the probability of being absent.

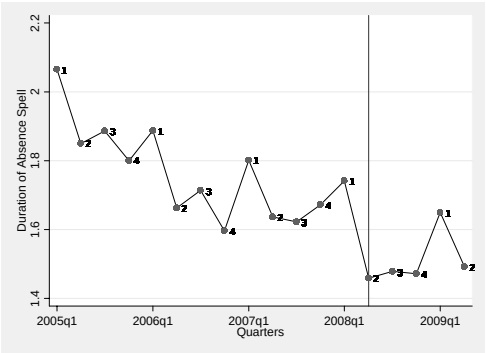
An interesting aspect not yet considered is the effect of the reform on the duration of absence spells. In this section we investigate whether the reform has affected the choice of returning to work for those workers who have started a spell of absence.

In undertaking this type of analysis, it is important to bear in mind that the reform imposes earning losses to absent workers only for the first 10 days of absence in each spell, while workers remain fully ensured for the days of sickness absences exceeding 10 days.

This non-linearity implies that the expected cost of continuing an absence spell depends on how long the work absence period lasts. For absence spells less that 10 days, two countervailing forces come in place: on the one hand, there is the increased direct cost of continuing the spell until the threshold of 10 days is reached, on the other hand, there is an increased cost of returning to work and being exposed to the risk of getting on a new absence spell. For spells longer than 10 days, there is not any direct cost of prolonging the absence period, but there is a possible cost of returning to work if additional days of absence become necessary.[14]

In Figure 3 the patterns followed by the average duration of short (panel a) and long absences spells (panel b) are shown (respectively spells shorter or equal to 10 days and spells longer than 10 days) in the 18 quarters covered by our data. After the reform, denoted by the vertical line, the duration of short absence spells has reduced from 1.74 to 1.52 days, but this reduction might be difficult to disentangle from the declining and smooth pattern taking place from 2005 to 2009.

(a) Short absence spells



(b) Long absence spells

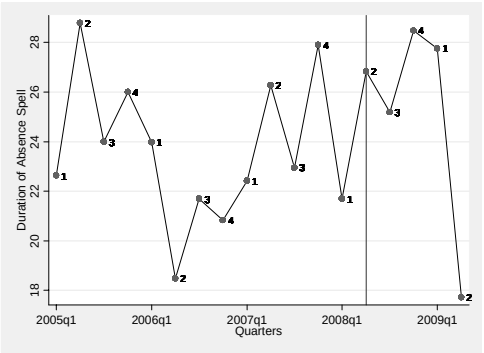


Figure 3. Duration of short and long absence spells

Somewhat different appears the pattern followed by the duration of long absence spells, shown in panel (b). From this figure it does not emerge any clear temporal trend. The duration of long absence spells is higher after the reform, increasing from 24.05 to an average duration of 25.15.

To try to disentangle the effect of the reform on spell duration from temporal trends we have re-organized the data at spell level (each unit of observation is an absence spell, for a total of 18,608 observations) and estimated a model for *Absence Duration* using a negative binomial

[14] Moreover, employees opportunistically planning to take a number of days of absence higher than 10 days may find it convenient to take all the absences together (without incurring earning losses after the first 10 days) rather than split them in shorter spells.

estimator.[15] To take into account that the reform may have affected in a different way the duration of long and short spells, following the approach of Johansson and Palme (2005), we introduce in our model two dummy variables: the first one "*Spell longer than 10 days*" takes value 1 for absence spells longer than 10 days and zero otherwise, the second one "*Spell between 8 and 10 days*" takes value one for absence spells with a duration between 8 and 10 days. We use the latter dummy variable to consider that once the worker is near the threshold value of 10 days the indirect cost of returning to work may be greater than the direct cost of continuing the absence spell.

We are interested in the coefficient of the interaction terms between both these dummies with the *Reform* indicator. In Table 7 are presented our estimates in which the dummy *Reform* shows now the effect of the new regime on absence spells shorter than 8 days. In column (1) it emerges a negative effect of the reform on absence spells shorter than 8 days and a positive effect on the duration of absence spells between 8 and 10 days and spells longer than 10 days. In particular, after the reform the average duration of short absence spells has reduced of about 7%, while the duration of absence spells longer than 10 days has increased of 19%.

In column (2) and (3) we report separate estimates for males and females, respectively. While for men the reform has reduced the duration of short absence spells, the effect is statistically insignificant for women. Males and females react similarly to the increased cost of returning to work after 10 days: the interaction term *Reform*(Spell longer than 10)* is positive and statistically significant for both.

In column (4) we control for individual fixed effects. While the sign of the coefficients or our interest are not changed, the magnitude of the effects turns out to be smaller.

[15] We do not use a duration model since in our sample only few observations are censored at 30 June 2009.

Table 7. Duration of Absence Spells. Negative Binomial Estimates

	(1)	(2)	(3)	(4)
Reform	-0.0651**	-0.1283***	-0.0068	-0.0493*
	(0.0297)	(0.0442)	(0.0393)	(0.0292)
Spell longer than 10	2.6836***	2.7178***	2.6517***	2.5893***
	(0.0293)	(0.0412)	(0.0416)	(0.0288)
Spell between 8 and 10	1.7298***	1.7143***	1.7316***	1.6748***
	(0.0101)	(0.0174)	(0.0134)	(0.0201)
Reform*(Spell between 8 and 10)	0.1346***	0.1578***	0.1260***	0.0519
	(0.0284)	(0.0474)	(0.0408)	(0.0554)
Reform*(Spell longer than 10)	0.1817***	0.1669*	0.1962**	0.1182**
	(0.0678)	(0.0976)	(0.0900)	(0.0595)
First Quarter	0.0972***	0.1295***	0.0687***	0.0911***
	(0.0157)	(0.0231)	(0.0212)	(0.0148)
Third Quarter	0.0156	0.0207	0.0130	0.0196
	(0.0194)	(0.0286)	(0.0266)	(0.0179)
Fourth Quarter	0.0053	0.0457	-0.0334	-0.0006
	(0.0191)	(0.0285)	(0.0253)	(0.0182)
Linear term of the time trend	-0.0823***	-0.1804***	0.0049	0.0496
	(0.0276)	(0.0409)	(0.0373)	(0.0693)
Quadratic term of the time trend	0.0076	0.0278***	-0.0104	0.0025
	(0.0055)	(0.0082)	(0.0074)	(0.0054)
Age	0.0048***	0.0052***	0.0053***	-0.1036*
	(0.0011)	(0.0016)	(0.0014)	(0.0569)
Female	0.0022			-1.2964*
	(0.0124)			(0.6682)
Married	0.0174	-0.0292	0.0518**	1.4064***
	(0.0165)	(0.0296)	(0.0204)	(0.4617)
Children	0.0016	0.0158	-0.0122	-1.4921*
	(0.0065)	(0.0097)	(0.0087)	(0.8313)
Tenure	-0.0053***	-0.0086***	-0.0028**	0.0028
	(0.0010)	(0.0016)	(0.0013)	(0.0079)
Fixed-Term Contract	-0.1192***	-0.0949	-0.1071**	0.0217
	(0.0351)	(0.0611)	(0.0431)	(0.0810)
Living near work	0.0322***	0.0479***	0.0078	-0.3154
	(0.0121)	(0.0185)	(0.0166)	(0.2105)
Part-Time Job	0.0542	-0.0076	0.0603	0.2383**
	(0.0704)	(0.0833)	(0.0972)	(0.1120)
Constant	0.4106***	0.5248***	0.2895***	7.2820*
	(0.0575)	(0.0832)	(0.0712)	(3.7593)
Observations	18608	8577	10031	18608

Notes: The Table reports negative binomial regressions. The dependent variable is the duration of absence spells in days. Standard errors (corrected for heteroskedasticity and clustered at the individual level) are reported in parentheses. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

7. Concluding Remarks

In the attempt to discourage absenteeism of Italian public employees, the law 133/2008 has reduced sick leave compensation of about 10 percentage points and has increased monitoring. Theoretical models analyzing individual moral hazard in insurance contracts predict a reduction of absences following a cut in the degree of insurance coverage.

Thanks to the availability of a rich dataset offering detailed information on the absence behaviour of the employees of an Italian public administration from years going from 2005 to 2009 we have analyzed the effects of this policy intervention.

Firstly, we have focused our attention on the effects of the reform on the average number of days of absence and on the probability of being absent. Once we control for

individual characteristics, seasonal effects and time trends it emerges that the reform has determined a reduction of absences of about 49%. A slightly higher effect emerges when we control for individual fixed effects. A sharp reduction is observed also on the worker probability of taking days off work. In this case the estimated effect is of 50%. The effect is statistically significant both for males and females, but it is larger for females.

Since earning losses for each day of absence are related to the worker non-base wage, we have investigated whether the effects of the reform are related to the size of earning losses suffered. In line with predictions of agency models, it emerges that employees who incur higher costs for being absent have reduced their absences much more: employees with a daily cost of € 6.2 (corresponding to the median non-base wage of € 2,230) have reduced their absences of 2.28 days per quarter, while employees with a daily cost of € 3.40 (corresponding to a non-base wage of € 1,230) have reduced their absences of 1.54 days.

In the final part of our analysis we have turned our attention to the duration of absence spells. In relation to the fact that the reform imposes earning losses to absent workers only for the first 10 days of absence, workers on long absence spells may be induced to postponing their return to work to avoid the risk of starting a new absence spell and suffering again a wage reduction. In line with this hypothesis, from our analysis it emerges that the duration of short absence spells has been negatively affected by the reform, but the duration of absence spells exceeding 10 days has increased as a consequence of the new regime.

Our data allows us to be confident that the uncovered effect is causal. First, we observe the same employees before and after the change of the regulation and, therefore, the observed differences in behavior do not reflect self-selection and unobserved heterogeneity. Second, by exploiting the fact that the reform has affected employees in a non uniform way and showing that absenteeism has reduced much more for employees whose cost of being absent increased more, we are able to discard the influence of other possible factors simultaneously affecting employees' absence behavior.

Our analysis clearly shows that incentives matter a lot, confirming the main theoretical predictions of the literature on contracts in asymmetric information contexts. Employees have strongly reacted to the new regime that has changed the terms of their sickness insurance contract and, once faced with a less comprehensive coverage, they have drastically reduced their absences.

References

Arai M. and Thoursie P. (2005), "Incentives and selection in cyclical absenteeism", *Labour Economics*, 12, pp. 269-280.

Banerjee, A., Duflo, E, (2006), "Addressing Absences", *Journal of Economic Perspectives*, 20, 1, pp. 117-32.

Barmby T., (2002), "Worker Absenteeism: a Discrete Hazard Model with Bivariate Heterogeneity", *Labour Economics*, 9, 4, pp. 469-476.

Barmby T., Ercolani G., Treble J.G., (2002), "Sickness Absence: an International Comparison", *Economic Journal*, 112(480), F315-F331.

Barmby, T., Sessions, J. and Treble, J.G. (1994), "Absenteeism, Efficiency Wages, and Shirking", *Scandinavian Journal of Economics*, Vol. 96, No. 4, pp. 561-566.

Bradley S., Green C., Leeves G., (2007), "Employment Contracts and Effort: Why Do Temporary Workers Take less Absence?", *Lancaster University Management School Working Paper*, n. 26, Lancaster, UK.

Curington, W. P. (1994), "Compensation for Permanent Impairment and the Duration of Work Absence: Evidence from four natural experiments", *Journal of Human Resources* 29 (3), 888-910.

Dionne, G. and B. Dostie (2007), "New evidence on the determinants of absenteeism using linked employer-employee data", *Industrial & Labor Relations Review* 61 (1), 108-120.

Frick, B. and Malo, M. (2008), "Labor Market Institutions and Individual Absenteeism in the European Union: The Relative Importance of Sickness Benefit Systems and Employment Protection Legislation", *Industrial Relations*, 47, 4.

Henrekson, M. and M. Persson (2004), "The effects on sick leave of changes in the sickness insurance system", *Journal of Labor Economics* 22 (1), 87_113.

Hesselius, P. (2007), "Does Sickness Absence Increase the Risk of Unemployment?", *Journal of Socio-Economics*, 36, 288–310

Ichino, A., Riphahn, R., (2005), "The Effect of Employment Protection on Worker Effort: Absenteeism during and after Probation", *Journal of the European Economic Association*, 1, pp. 120–143.

Johannson P., Palme M., (1996), "Do Economic Incentives Affect Work Absence? Empirical Evidence Using Swedish Micro Data", *Journal of Public Economics*, 59, 2, pp. 195-218

Johansson, P.; Palme, M., (2002), "Assessing the Effect of Public Policy on Worker Absenteeism", *Journal of Human Resources*, 37, 2, pp. 381-409.

Johansson, P.; Palme, M., (2005), Moral Hazard and Sickness Insurance, *Journal of Public Economics*, 89, 2, pp. 1879-90.

Leigh, J., (1985), "The effects of unemployment and the business cycle on absenteeism", *Journal of Economics and Business*, pp. 159-170.

Meyer, B. D., W. K. Viscusi, and D. L. Durbin (1995), "Workers' compensation and injury duration: Evidence from a natural experiment", *American Economic Review* 85 (3), 322-340.

Moulton, B., 1986, "Random group Effects and the Precision of Regression Estimates", *Journal of Econometrics*, 32, 385-97.

Pettersson-Lidbom, P. and P. Skogman Thoursie (2008), "Temporary disability insurance and labor supply: evidence from a natural experiment" Working paper, Stockholm University, Department of Economics.

Riphahn R., Thalmaier A., (2001), "Behavioural Effects of Probation Periods: an Analysis of Worker Absenteeism", *Journal of Economics and Statistics*, 221, 2, pp.179-201.

Riphahn, R., (2004), "Employment Protection and Effort among German Employees", *Economics Letters*, 85, pp. 353–357

Scoppa, V., (2009), "Shirking and Employment Protection Legislation: Evidence from a Natural Experiment", MPRA Paper 16694, University Library of Munich, Germany.

Winkelmann, R. (1999), "Wages, Firm Size and Absenteeism", *Applied Economics Letters*, 6, 337– 341.

Ziebarth, N., (2009), "Long-Term Absenteeism and Moral Hazard: Evidence from a Natural Experiment", DIW Berlin.