Absenteeism and Employment Protection: Three Case Studies[*]

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Summary

We suggest to consider one determinant of absenteeism that so far has not found attention in the vast literature on this phenomenon: employment protection. In a framework where absence behavior affects a worker's risk of being fired, economic theory suggests that absenteeism should increase with the level of employment protection enjoyed by workers.

We describe this conjecture formally in a model and we propose three empirical case studies to investigate the relevance of firing protection for an employee's absence behavior. The first case looks at public sector workers in Germany. Those who accumulated 15 years of tenure and reached age 40 can only be fired in case of severe personal misconduct. Our empirical analysis yields robust and significantly higher absenteeism for those public sector workers who receive this type of employment protection, compared to workers in both the public and the private sector who do not enjoy a similar degree of protection. In our second case study, we analyze the behavior of Italian workers who are subject to different regimes of employment protection depending on the size of the firm in which they are employed. We find significant differences in the level of employee absenteeism connected to the firm size of their employer, even controlling for a large set of observable potential confounding factors. The third case study addresses the problem of confounding factors by looking at how the same set of workers in one single firm reacts to a change of protection against firing. Specifically, we investigate the behavior of newly hired bank employees in Italy who pass a probation period in which they can be fired at will before entering a regime of full employment protection. We show that absenteeism increases as soon as this protection is granted.

Although none of these three case studies would be enough to draw conclusions alone, jointly they suggest that employment protection does play a role in explaining absence behavior. We conclude with a discussion of the policy implications of this finding.

As frequently lamented in the press (e.g. Time Europe Magazine, March 10, 2003) and in official reports (DICE – CESifo report, April 2002), absenteeism rates differ across countries in ways which are not easy to explain and are typically connected to substantial costs for the respective economies. Despite the large literature on the mechanisms driving absence behavior these developments leave room for additional explanations. Our study proposes an explanatory factor which so far has not found attention in existing research but which may contribute to explain some of the variations in absence behavior across and within countries. This previously neglected factor is employment protection regulation. Our hypothesis is that high levels of employment protection may induce workers to be absent more than they would in a situation without employment protection.

In the economic literature, absenteeism plays a dual role and appears in two empirical approaches: First it is an indicator of and proxy for worker effort and productivity and as such it is used as a measure of individual response to numerous incentive schemes at the firm and national level (see e.g. Riphahn and Thalmaier (2001), Flabbi and Ichino (2001), Ichino and Riphahn (2003), or Engellandt and Riphahn (2003)). Second, absenteeism appears as the subject of economic analyses in its own right, with investigations focusing on determinants, patterns, and correlates of workplace absences. Examples are Johannsson and Palme (1996) on the role of public sickness insurance, Barmby et al. (1997) on long run absence trends in Britain, Barmby et al. (1991) on the effect of firm sickpay schemes, Wilson and Peel (1991) on the effect of profit sharing, and Bridges and Mumford (2001) or Vistnes (1997) on gender differences.

To test the conjecture that absenteeism rates depend on employment protection regimes, our study considers both the approaches described above. Specifically, our goal is to provide an answer to two questions: (i) Are there incentive effects of employment protection? and (ii) do we have to consider employment security when attempting to explain absenteeism

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and its variation across different groups of employees?

When comparing individuals with and without employment protection, intuition suggests that those employed in permanent and secure contracts may have less of an incentive to provide high levels of work effort compared to those whose future income is less certain, who may face dismissal or who might be promoted to permanent contracts. Therefore, we expect, for example, that the latter use less sick-leave time for any given physical ailment and spend less time absent from the workplace. This conjecture is tested empirically in the framework of three case studies: We look at three independent situations where we observe the absence behavior of workers with different levels of employment protection and test whether their absence behavior is consistent with our conjecture.

Before doing so, in Section 1 we describe the intuition of a formal model - which is stated more explicitly in the Appendix - on which we base our hypothesis that employment protection yields incentives for higher absenteeism. We then move, in Section 2 to our first case study, which investigates the behavior of German blue and white collar workers. Those who are employed in the public sector enjoy much more job security compared to those working in the private sector. In particular those public sector employees who have accumulated 15 years of tenure and reached age 40 have obtained the same level of employment security as civil servants and can only be dismissed in case of severe individual misconduct. Therefore we expect higher absenteeism among public sector workers in general and in particular among those with high employment protection.

Case study 2 in Section 3 takes instead a closer look at private sector employees in Italy, where the level of employment protection depends on the number of employees in the firm: Firms with less then 16 workers are less strictly regulated and workers there enjoy less protection compared to workers in larger firms. Consequently we expect fewer absences in small firms.

Finally, in the third case study presented in Section 4, we look at firm data from a large Italian bank where we observe the same set of workers under two different regimes of employment protection. Specifically, we investigate the absenteeism rate of newly hired bank employees during a probation period when they can be fired at will and after entering a regime of full employment protection. On the basis of our conjecture we therefore expect an increase in absenteeism at the end of the probation period.

All three case studies yield support for the hypothesis that absence behavior is affected by employment security regulations. The conclusion discusses the possibility to draw implications for policy from these findings.

1. The Effect of Employment Protection on Worker Effort

In order to derive the relationship between employment protection and worker absence behavior we assume that absences have two effects: They increase the utility of an employed worker who spends less time working and they increase the probability of being fired. We assume that there are no wage effects of absences such that absence behavior does not affect earnings. If the worker enjoys full employment protection she cannot be fired. If there is no employment protection, we will observe higher firing rates among those who are absent from work more.

When deciding on how much work to miss by being absent the worker considers the current (utility enhancing) and the future consequences of her behavior. The future consequences consist of the probability of being fired combined with the utility-difference between the states of employment and unemployment. The rational worker chooses her level of absence such that the current and future benefits associated with an additional "unit of absence" just balance the current and future costs associated with this additional "unit of absence."

If the firing risk is higher for those without employment protection, we expect them to opt for a lower level of absence compared to their colleagues, who enjoy employment protection. If a worker cannot be fired this worker can afford to incur more absences and thus spends less time working and enjoys a higher utility level. The rest of the paper is aimed at testing the conjecture that higher employment protection is associated with higher absenteeism.

2.   Case 1: Employment Protection and Absenteeism in the German Public Sector

Framework and Hypothesis

Our first case study evaluates the effect of employment protection on absenteeism looking at employees in the private and public sector in Germany. Overall German workers enjoy a relatively high level of employment protection (cf. Grubb and Wells 1993 or OECD 1999) where e.g. notice periods in case of layoff increase rapidly with tenure: Starting out with a notice period of 4 weeks for all permanent employees it increases to 2 months after 5 years of tenure and in steps up to 7 months after 20 years of tenure (for details see BMA 2002). These basic rules can be modified by bilateral agreements between unions and employers. Layoffs are allowed for three general reasons: those related to the individual employee (e.g. ability or health), worker misconduct, or important business requirements (e.g. business cycle related lack of orders or down-sizing).

Within the German institutional framework there are two basic differences in the level of employment protection for employees in the private and the public sector: First, dismissals for important business requirements are almost inconceivable in the public sector, yielding a fundamental difference in employment security between the private and public sector. Second, employees in the public sector enjoy an additional level of job protection: Those employed in the public sector for at least 15 years and of at least 40 years of age cannot be

dismissed except in rare cases of severe misconduct. Thus the degree of employment protection for public sector employees generally exceeds that of those in the private sector and - after 15 years of tenure and age 40 - reaches the almost "un-dismissable" level enjoyed by civil servants.

Based on these institutional rules the theoretical framework described above suggests first that public sector employees should have higher absenteeism than private sector workers and second that even higher absenteeism will be observed among those public sector workers who meet the tenure-age condition. These hypotheses are tested below.

Data and Approach

To compare the absence behavior of public and private sector workers we utilize data taken from the 2001 wave of the German Socioeconomic Panel (GSOEP). The GSOEP is a panel household survey administered annually since 1984. The 2001 survey covered approximately 22,000 individuals in about 14,000 households. We restrict our sample to full-time employed workers between ages 18 and 60. The self-employed and civil servants are dropped from the sample because for both groups employment protection regulations and their implied incentive mechanisms differ from the institutional setting described above. After dropping observations with missing values on key variables our sample contains 6,737 observations of which 1,330 are employed in the public and 5,407 in the private sector. Of those employed in the public sector 362 meet the conditions for extended employment protection.

Our dependent variable describes the absenteeism rate, which is defined as the number of days individuals missed work due to illness in the past calendar year divided by 240 work days for the year. For the full sample we observe a mean value of 10 days (or a rate of 4.3 percent) and a median of 3 days (or a rate of 1.25 percent) indicating the large impact of the

top percentile of the distribution of absence days. 43 percent of all observations had no absence days and another 32 percent did not exceed ten days of absence. In the aggregate absenteeism rates of private and public sector workers differ significantly (at the 2 percent level) with a mean of 4.1 percent for the former and 4.9 percent for the latter. Among public sector workers, those with extended employment protection took significantly more days of absence compared to those without this protection: 16.1 vs. 10.3 days yielding 6.7 vs. 4.3 percent, which is significantly different at the 1 percent level.

Below we describe whether these differences can be confirmed in linear regression analyses which control for potential composition effects.

Results and Interpretation

The results of our empirical analyses are presented in Table 1. The model in column 1 includes merely an indicator of whether the employee is working in the public sector and an indicator of whether the individual is one of those who are working in an "un-dismissable" position in the public sector after having reached 15 years of tenure and age 40. Both indicators yield positive deviations from the private sector absence rate of 4.1 percent, yet only the difference for the high-protection group is statistically significant. Those in highly protected positions on average miss another 2.56 percent of work annually compared to private sector workers. This confirms the hypothesis derived in our theoretical model above. The difference between the average public and private sector employee is surprisingly small and imprecisely estimated.

In column 2 we add control variables for basic demographic indicators such as age, sex, and marital status. With these controls the coefficient of the high protection indicator in row 1 declines in magnitude, now showing a difference of 1.51 percentage points compared to other public sector workers and a total of 1.57 percentage points above the absent rate in the

private sector.

In column 3 we control for health measures, where we use the level of a possible disability (an objective measure in the German disability system) and the subjectively indicated degree of health satisfaction. Both variables yield coefficients that are highly significant and suggest that the healthy have fewer days of absence. The effect of adding these controls for the high-protection indicator is small and the overall public sector indicator stays insignificant.

In columns 4 and 5 additional control variables are considered. First we add a set of human capital indicators for school and vocational degrees in column 4, then we control for measures that describe the employment situation with indicators for blue vs. white collar job, tenure, tenure squared, and four categorical indicators of firm size. All of these controls are highly significant, yet they leave our main indicator of the association between high levels of employment protection and annual absence rates almost unaffected. In column 4 it is somewhat less precisely measured, but the sizeable difference in absence rates is constant across specifications.

We find that workers in secure employment miss on average about 5.8 percent of work, compared to about 4.2 percent for private sector employees. This amounts to a difference of about 38 percent, even when controlling for all other factors.[1] Note that our regression procedure follows the logic of a difference-in-differences analysis and rests on the assumption that the observable difference between absences in the public and the private sector conditional on age and tenure is the result of different employment protection

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[1] One might argue that those working in the public sector are not a random sample out of all possible workers. However, regressions that we do not present to save space indicate that within the group of public sector employees those with secure employment amass significantly more days of absence than the remaining public sector workers. Therefore even when conditioning on the selection into the public sector the relationship between

regulations, as all other mechanisms are controlled for. Therefore this case study corroborates the conjecture we described in Section 1.

3. Case 2: Employment Protection and Absenteeism in the Italian Private Sector

Framework and Hypothesis

Our second case study looks at the private sector in Italy, where, since the approval of the Chart of Workers Rights of 1970 (*Statuto dei Lavoratori),* the degree of employment protection offered to workers varies strongly depending on the firm size. As a result of this law and other related regulations, firms with more than 15 employees can fire an individual worker only if this decision is sustained by "justified reasons concerning the production activity, the organization of labor in the firm and its regular functioning" or "in case of a significantly inadequate fulfillment of the employee's tasks specified by the contract". Given how vague this requirement is for practical purposes, a worker who is fired can file suit against the firm, in which case one judge (or more in case of appeal) decides on whether there exists a justified motive for firing. If the ruling is that such motive does not exist, the firm is forced to take the employee back on payroll and to pay the full wage that the worker has lost during the litigation period (which typically last at least one year and often more) plus social insurance contributions. In addition, the firm has to pay a fine to the social security system for the delayed payment of welfare contributions up to 200 percent of the original amount due. Precisely for this set of regulations Italy is considered by the OECD as one of the countries with the most stringent protection against firing (Grubb and Wells 1993 and OECD 1999).

This, however, holds only in large firms: Workers in firms with less than 16 employees can be fired at a cost which cannot be higher than six months of wages even if a judge rules that the firing is not sustained by a justified motive. Interestingly, this difference

employment protection regulations and absence behavior remains robust.

of treatment is the focus of considerable attention in the Italian policy debate, which led to a referendum in June 2003 aiming at extending the extreme protection against firing granted in large firms to all workers. The extension was however not approved mostly because it was clearly felt that it would have significantly damaged small businesses and firms which constitute the driving force of the most competitive part of the Italian economy. The conjecture that excessive employment protection reduces workers' incentive to exert effort, therefore lowering productivity and increasing labor cost per unit of output, has clearly conditioned the debate at the time of the referendum, although typically only anecdotal evidence was used to prove or disprove the opposing claims.

Here we provide some evidence on this issue, based on the comparison of absenteeism rates among workers in small and large firms. Although we cannot claim that the differences we will describe can be solely attributed to different degrees of employment protection, our results suggest that these regulations are likely to play a significant role in raising absenteeism in large firms.

Data and Approach

We use data from the 1995 wave of the *Italian Survey of Household Incomes and Wealth (SHIW)* which collects information on the Italian population once every two years and is administered by the Bank of Italy. In this wave, 8,135 households are interviewed for a total of 23,924 individuals of which 14,699 are income recipients. We restrict the analysis to 3,347 non self-employed full time workers and we calculate their absenteeism rates as the fraction of reported days of absence in a standard 240 workday year.

Our goal is to compare average absenteeism rates of workers subject to different regimes of employment protection as a result of the different size of the firm in which they are employed. Unfortunately, the firm size categories in the *SHIW* do not match those that

determine the two firing cost regimes described above . The distinction offered by the data is between firms with more or less than 20 employees. This distinction is however sufficiently close to the one which is relevant for the employment protection legislation and is therefore informative for the question in which we are interested. Note in particular that if a bias is produced by using the "20 employees" threshold, it goes against showing the existence of a difference, because part of the workers in our "Small firms" category (i.e. less than 20 employees), are actually subject to the same degree of protection offered to workers in "large firms" (i.e. more than 19 employees).

Results and Interpretation

Our results are reported in Table 2 where raw averages are compared in the first two columns. The mean absenteeism rate is 1.6 percent in small firms while it is as high as 2.8 percent in large firms.[2] The table reports in brackets under each estimate its 95 percent confidence interval. It is easy to see that the two confidence intervals do not overlap, which shows that the absenteeism rate is considerably higher in larger firms not only in absolute terms but also in terms of statistical significance.

It should of course be considered that many different mechanisms may cause a correlation of absenteeism and firm size independent of employment protection, including systematic differences in the age and health of employees in small and large firms as well as different distributions of firm size across occupations, sectors and regions (see Barmby and Stephan 2000 and the literature cited there). Ideally one would like to compare identical workers in identical firms with two regimes of employment protection, but this is of course not possible. What we can do is to perform the comparison controlling for the observable

characteristics of the workers and the firms which are offered in the data. This is done in the third and fourth column of the table where the mean absenteeism rates in the two categories are computed on the basis of regressions which include, in addition to the dummy variable for firm size, also the following list of controls: gender, age, 8 education level dummies, 5 qualification dummies, 9 sector dummies, 3 geographic area dummies and 4 self-declared health status dummies. Sample averages of these variable have been used to compute the controlled absenteeism rates.

Even controlling for all these observable characteristics we find that workers in large firms are characterised by an absenteeism rate which is 75 percent higher then the one of workers in small firms, and this difference is statistically significant. This evidence is supportive of the conjecture that different regimes of employment protection might affect the propensity of a worker to be absent. As a minimum, it is difficult to think of other systematic differences between small and large firms, in addition to the ones controlled by the observable variables included in our regression, which might account for such a large difference in absenteeism.

To further reinforce the evidence in favour of our conjecture we now move to the analysis of the behaviour of a group of employees working for one single firm, who were entitled to two different employment protection regimes in subsequent periods.

4.   Case 3: How Workers React to a Change in Employment Protection. Evidence from an Italian Firm.

Framework and Hypothesis

Our third case study is analyzed in Ichino and Riphahn (2003). In this paper, to which

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[2] Note that given how absenteeism rates are computed here, i.e. dividing total number of days of absence by 240 (standard working days in a year), what is informative in these figures is

we refer the reader interested in more details, we test the effect of employment protection on absenteeism in a sample of employees who are observed during their first year of tenure at an Italian bank.

This bank is one of the largest in Italy, employing 17,971 workers at the time our data were collected (1993) and with branches all over the Italian territory. As we noted in the previous section, Italy provides a particularly suitable institutional framework for a test of our conjecture as it is one of the countries with the most stringent firing protection among OECD members. Given the size of the bank, all its workers (excluding managers) are fully protected against firing, according to the *Chart of Workers' Rights,* during their entire career except for a probation period of three months at its beginning. During this initial period workers have basically no protection, so that the change of job security implied by the end of probation is equivalent, from the viewpoint of the worker, to the change from a "US style" weak protection system to the most protective of the "European style" systems.

In our data we observe newly hired workers for one year and can compare their individual weekly absenteeism during and after probation, i.e. with and without job security. Based on the prediction of our theoretical model we expect an increase in absenteeism after the end of probation.

Data and Approach

To test this hypothesis we consider the sample of 858 individuals who were newly hired by the bank between January 1, 1993 and February 28, 1995. For each employee we constructed a panel of weekly observations covering the first full year of tenure. During the first three months these workers were on probation and could be fired at will, while during the remaining nine months they enjoyed full firing protection.

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not so much their level but their difference.

Our sample of 545 men and 313 women is a relatively homogeneous group of young individuals at the beginning of their career: Half of them have a college degree and all but 12 have a high school degree. About 70 percent of the degrees are in banking and economics. Also, 98 percent of these workers are hired at the entry level in the bank hierarchy, typically with internal labor market careers ahead of them.

We computed absenteeism rates as the number of days of absence "due to illness" for each calendar week divided by 5 (days in a week). Each worker is observed for 52 weeks of which the first 12 are during and the latter 40 are after the probation period. So the sample consists of 44,616 worker-week observations with an average of 0.065 days of absence per week or an absenteeism rate of 1.3 percent of working time. To investigate whether absence days are more likely during or after probation we apply a linear estimator. However the results do not change when a non-linear model such as a Poisson estimator is applied.

Results and Interpretation

The empirical results are summarized in Table 3. The first column indicates the results obtained when we consider a model which contains only an indicator of whether the worker is observed after the end of probation and a constant. They yield that while during probation the predicted absenteeism rate is as low as 0.68 percent, after the end of probation it increases to 1.50 percent indicating that absenteeism more than doubles when full firing protection is granted. The estimates are very precisely measured, and the difference is statistically significant at the 1 percent level.

As absenteeism is a highly seasonal phenomenon the result in the first column could be an artifact simply deriving from an unequal hiring pattern of the firm over the course of the calendar year: If e.g. illness is high in February and the firm hires predominantly in November, then after the first 12 weeks of tenure absenteeism might have increased not

because of the end of probation but due to the general onset of illness episodes. In column 2 we take account of potential seasonal effects. However, the results are almost unaffected. After probation the absenteeism rate is still predicted to be more than twice as large as during probation.

To test whether this result may be due to simple composition effects, we next add control variables for some basic demographic indicators such as age, sex, marital status, and education. As could be expected from the fact that these measures are mostly time invariant for a given individual and orthogonal to the probation indicator, the main result of a doubling of the absenteeism rate after probation remains robust and statistically significant with these controls.

The fact that absenteeism increases over the first tenure months may be due to a number of mechanisms different from employment protection which might be related e.g. to the branch where the individual is employed or to the simple passage of time. To investigate whether the effect of the end of probation as described above may be explained by such mechanisms, we included a time trend and a wide set of time varying branch characteristics to the specification. The time trend should capture any tenure related development that is not due to the end of the probation period. The results in column 4 of Table 3 show that the effect of probation remains statistically significant and robust with respect to the inclusion of these controls. Moreover, the time trend is insignificant.

Across all four of our specifications we thus find highly significant and robust effects of the end of probation suggesting that newly hired workers are significantly more absent after the end of probation. The change of behavior appears to be solely induced by the firing protection that individual workers receive at the end of probation.

5.   **Discussion and Conclusions**

The evidence presented in this paper clearly supports the conjecture outlined in our theoretical model that more employment protection induces workers to exert less effort and therefore may reduce labor productivity. The first two case studies show that controlling for a wide set of observable characteristics, workers who are better protected are significantly more absent than similar workers who are less well protected. Since unobservable characteristics might in principle explain the different mean absenteeism rates of the various groups of workers which are compared in the first two case studies, the third one looks instead at how a given worker reacts when the regime of employment protection changes suddenly. Once again our conjecture is confirmed: As soon as workers are protected against firing their weekly absenteeism rate more than doubles.

Should we therefore conclude that the degree of employment protection offered by many European countries must be reduced in order to curb absenteeism? Our paper cannot and does not want to recommend this conclusion at this stage. To do so we would need first to perform a welfare analysis capable of telling us whether the possible loss of output caused by employment protection via the effect on absenteeism is compensated by the utility which we all gain by staying at home when we are not "so sick" that working would be impossible. In the absence of such welfare analysis, we have no criterion to establish whether the effect on worker effort that we have estimated is large or small, nor to venture into an evaluation of whether it is socially optimal to offer employment protection when this causes a loss of output.

Moreover, even before calling welfare into question, we should not discard the possibility that inducing employees to work when they are mildly sick may have a negative effect on their own future productivity, if illnesses not cured properly get worse. Similarly, employees showing up sick at the work place may cause large negative externalities for their coworkers' productivity due to possible contagion effects. More data, in particular

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longitudinal data on absenteeism, are needed to answer these questions.

A third important caveat reflects the fact that our evidence does not consider general equilibrium effects. Consider for example our third case study in which the outside option of the workers in case of firing can be considered constant during and after probation. In contrast, a general reform of employment protection regulation would probably change the entire labor market in ways that are not easily predictable. If, for example, a reduction of firing costs increased the firms' propensity to hire, the outside option for workers in case of firing would improve. So the effect of a higher firing probability would, at least partially, be balanced by the effect of a better outside option. Moreover, reducing absenteeism for a (probation) period of just three months is likely to be easier than reducing absenteeism for the longer period which would follow a hypothetical elimination of employment protection.

Yet despite these caveats it is clear that employment protection is likely to have a cost in terms of absenteeism which is neglected in both the literatures on absenteeism and on employment protection. [3] It is a cost that we may or may not want to incur depending on its size and welfare implications. We hope that our analysis provides a useful starting point to evaluate what appears to be an important determinant of absenteeism, so far surprisingly neglected in the economic literature and in policy debates.

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[3] As an influential example of the discussion of employment protection reform which surprisingly disregards the effect of employment protection on worker effort, see Blanchard Tirole (2003).

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Table 1: Absenteeism rates in the German public and private sectors

	1	2	3	4	5
Difference: High employment protection vs. all public sector (in percentage points)	2.41***	1.51*	1.40*	1.17	1.57**
Difference: Public vs. Private sector worker (in percentage points)	0.15	0.06	-0.01	0.21	0.05
Predicted absenteeism rate: Private sector (in percent)	4.14	4.21	4.25	4.20	4.21
Accounting for:					
demographic effects		yes	yes	yes	yes
health effects			yes	yes	yes
human capital effects				yes	yes
effects of the employment situation					yes

Note: ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level of the difference in absenteeism rates across groups. The linear regressions use 6737 observations. The control groups are defined as follows: Demographic effects: age, male sex, living with a partner; health effects: degree of disability, subjective health satisfaction; human capital effects: 4 indicators of schooling degree, 3 indicators of vocational degree, effects of the employment situation: indicator for blue collar status, tenure, tenure squared, 4 indicators of firm size. Standard errors are reported in parentheses (Huber-White robust).

Table 2: Absenteeism rate in small and large Italian firms (in percent)

Not controlled		Controlled	
Small firms	Large firms	Small firms	Large firms
1.6	2.8	1.6	2.7
[1.3 - 1.8]	[2.4 - 3.0]	[1.3 - 1.9]	[2.4 - 2.9]

Note: The table reports mean absenteeism rates in percentage terms, with 95 percent confidence interval in brackets. Absenteeism rates are calculated as the fraction of days of absence in a standard 240 workday year. Controlled means are computed at sample averages using regressions which include, in addition to the dummy variable for firm size, also the following list of controls: gender, age, 8 education level dummies, 5 qualification dummies, 10 sector dummies, 3 geographic area dummies and 4 self-declared health dummies. These regressions use data on 3347 non self-employed full time Italian workers interviewed in the 1995 *Survey of Household Income and Wealth (SHIW)* collected by the Bank of Italy. Firms are defined as "Small'' if they have less than 20 employees. Within this group, firms with less than 16 employees face significantly lower firing costs.

Table 3: Absenteeism rates during and after probation in an Italian Bank (in percent)

	1	2	3	4
Absenteeism rate after probation	1.50***	1.48***	1.48***	1.52***
Absenteeism rate during probation	0.68	0.67	0.67	0.68
Accounting for:				
seasonal effects	no	yes	yes	yes
personal characteristics			yes	yes
branch characteristics				yes

Note: *** indicates statistical significance at the 1 percent level of the difference between the absenteeism rates before and after probation. The rates are computed as predicted number of days of absence per week divided by 5 (days in a week) using OLS regressions which, depending on columns, include controls defined as follows. Seasonal controls: dummies for month of hiring. Personal characteristics: age, sex, years of schooling, marital status. Branch characteristics measure whether the branch is located in the south, the size of the branch, the percentage of managers and females in the branch, the average age of branch workers, average branch weekly absenteeism, and a linear time trend.

Appendix: Theoretical Model

Consider the intertemporal decision problem of a worker i who has to decide how much effort to exert on a job where absenteeism may be connected to a higher probability of being fired. The instantaneous utility of being employed is given by

$$U_i = U(w, a_i) = w + a_i, \qquad (1)$$

where w is the wage and a is absenteeism. For simplicity we assume that wages are not adjusted based on prior absence behavior, which is not crucial for our results. The worker derives utility from a higher wage and from more absenteeism because the latter implies lower effort. If $e_i = -a_i$ where e is effort, this utility function takes the more familiar form $U_i = w - e_i$. Given this instantaneous utility and the discount rate r, the value of being employed V_i^E is characterized by the following arbitrage equation:

$$rV_i^E = w + a_i + (1-p)C(a_i)(V^U - V_i^E). \qquad (2)$$

The left hand side is the annuity value of the utility of being employed which in equilibrium is equal to the instantaneous utility of employment plus the expected loss of utility in case of firing. The latter is equal to the product of $V^U - V_i^E$, which is the difference between the value of being unemployed and the value of being employed, and the instantaneous probability of firing $(1-p)C(a_i)$. The parameter $p \in [0,1]$ measures the degree of legal employment protection. If $p = 1$ firing is never possible and therefore the firing probability is zero. If $p = 0$ no protection against firing is offered to workers. In this case the probability of firing is $C(a_i)$ which is assumed to be a positive and convex function of absenteeism $(C' > 0$ and $C'' > 0)$. The higher is the value of p in the $[0,1]$ interval the higher is the degree of employment protection and the lower is the probability of firing for a given level of absenteeism.

If the worker is fired she becomes unemployed. The value of being unemployed is defined by the following arbitrage equation:

$$rV^U = b + \phi(V_i^E - V^U), \tag{3}$$

where b is income during unemployment and ϕ is the exogenous instantaneous probability of finding a new job in which case the worker gains $(V_i^E - V^U)$.

The employed worker chooses absence to maximize rV_i^E, which yields as a first order condition (subscripts dropped as the condition holds for all workers):

$$\psi \equiv 1 - (1 - p)C'(a)(V^E - V^U) = 0 \tag{4}$$

This implies that the worker adjusts her absence behavior until the marginal benefit of the absence equals the marginal cost, i.e. the modified firing rate times the capital loss associated with becoming unemployed.

Solving this system of arbitrage equations (2) and (3) for $V_i^E - V^U$ we obtain:

$$V^E - V^U = \frac{w + a - b}{r + \phi + (1 - p)C(a)} \tag{5}$$

Combining (4) and (5) we obtain the condition:

$$X \equiv r + \phi + (1 - p)C(a_i) - (1 - p)C'(a_i)(w + a_i - b) = 0 \tag{6}$$

If the participation constraint $V^E > V^U$ is satisfied, this implies that $(w + a - b) > 0$ and implicit differentiation gives the effect of employment protection on the optimal level of absenteeism:

$$\frac{da}{dp} = -\frac{X_p}{X_a} = \frac{r + \phi}{(1 - p)^2 C''(a)(w + a - b)} > 0$$

Thus workers are induced to be more absent when employment protection increases. This hypothesis is tested in the paper.