



European Economic Association

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Reviewed work(s):

Source: *Journal of the European Economic Association*, Vol. 3, No. 1 (Mar., 2005), pp. 120-143

Published by: [The MIT Press](#) on behalf of [European Economic Association](#)

Stable URL: <http://www.jstor.org/stable/40004945>

Accessed: 16/03/2012 04:55

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THE EFFECT OF EMPLOYMENT PROTECTION ON WORKER EFFORT: ABSENTEEISM DURING AND AFTER PROBATION

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Abstract

Employment protection systems are widely believed to generate distortions in firms' hiring and firing decisions. However, much less is known about the impact of these regulations on workers' behavior. In this paper we provide evidence on the latter question using data from a large Italian bank. Our analysis is based on weekly observations for 545 men and 313 females hired as white-collar workers between January 1993 and February 1995. These workers begin to be protected against firing only after the 12th week of tenure, and we observe them for one year. We show that—particularly for men—the number of days of absence per week increases significantly once employment protection is granted at the end of probation. This suggests that the provision of employment protection causes the increase in absenteeism. Alternative explanations based on career concerns or on learning about social norms would predict a smooth relationship between absenteeism and tenure instead of the observed discrete jump. This consequence of employment protection seems to have been neglected in European policy debates so far. (JEL: J2, D2, D8, M5)

1. Introduction

A large literature has studied the effect of employment protection on the propensity of firms to hire and fire, showing that these effects are important and capable of causing significant inefficiencies.¹ Much less is known about the effects of employment protection on the behavior of workers. The goal of this paper is

Acknowledgments: We received useful comments from Joshua Angrist, Giorgio Brunello, Laszlo Goerke, Pietro Ichino, Klaus Engelmann, Soren Johansen, Gerd Muehlheusser, seminar participants at Berlin, EUI, Princeton, MIT, Munich, Rutgers, UPF, and Zurich and from two anonymous referees. Sascha Becker provided excellent research assistance. Ichino thanks CEPR, CESifo, and IZA for their support; Riphahn thanks IZA and DIW for their support.

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1. See the initial contributions by Lazear (1990), Bentolila and Bertola (1990), and Bertola (1990), and later Hopenhayn and Rogerson (1993), Grubb and Wells (1994), Bertola and Ichino (1995), Saint-Paul (1993), Garibaldi (1998), Kugler (1999), OECD (1999), Kugler and Saint-Paul (2000), Acemoglu and Angrist (2001), and Kugler and Angrist (2002).

to fill this gap and in particular to assess whether the provision of employment protection induces an increase in workers' absenteeism.

To achieve this goal we exploit the evidence offered by personnel data taken from a large Italian bank. In this data set, an exogenous change of job security is generated by the institution of probation, according to which, for a period of three months after hiring, white-collar workers can be fired at will by the employer. If no separation occurs, at the end of the probation period these workers begin to enjoy protection from firing.

As we show in Section 2, Italy offers one of the most stringent employment protection systems among OECD countries. In the financial sector such legislation is complemented by other policies and regulations aimed at shielding firms from shocks due to foreign competition, business cycles, and other market forces. The change of job security implied by the end of probation is equivalent, from the viewpoint of the worker, to the change from a "U.S.-style" weak protection system to the most protective of the "European-style" systems. Therefore, by observing workers before and after probation, we obtain a meaningful indicator of the behavioral effects of employment protection.

Our analysis is based on weekly observations for 545 men and 313 females hired as white-collar workers by a large Italian bank between January 1993 and February 1995. We observe these workers for 52 weeks, of which the first 12 are the probation period. We can therefore compare the weekly absenteeism of each worker with and without job security, and we can measure if and how much absenteeism increases precisely when the employment protection regime changes. After describing the data in Section 3, we show in Section 4 that the average number of days of absence per week more than triples once employment protection is granted to males. For females, who are on average more absent in all periods, the effect of the end of probation is estimated to be similar in absolute terms but smaller in relative terms.

Since the change of job security induced by the end of probation appears to be a possible causal factor of the observed evidence, we present in Section 5 a model that justifies this intuition. However, in the same section we also discuss two alternative interpretations that are compatible with the evidence of Section 4: career concerns and learning about social norms. Both these alternative mechanisms imply that absenteeism of newly hired workers should increase with tenure, but none predicts a significant discontinuity at any given week in the first year after hiring. We then devote Section 6 to the discussion of additional evidence confirming that, for males, the increase in absenteeism observed in the 13th week is too abrupt to be generated by mechanisms that imply a smooth relationship between absenteeism and tenure. The increase is thus a likely consequence of the provision of job security beginning precisely in that week. We cannot reach this conclusion with similar confidence for females, and we discuss possible reasons for this gender difference in our results. Section 7 concludes.

2. Employment Protection and Probationary Periods in Italy

According to several studies,² Italy is one of the OECD countries with the highest degree of employment protection against firing for workers in large firms.³ The main reason of this ranking is that, since the approval of the “Chart of Workers’ Rights” (Law No. 300: *Statuto dei Lavoratori*) in 1970, Italy has been the only country in which, if firing is not sustained by a just cause, the firm is forced to take back the employee on payroll and to pay the full wage lost during litigation plus social insurance contributions. In addition, the firm must pay a fine—of up to 200% of the original amount due—to the social security system for the delayed payment of contributions.⁴

The uncertainty generated by the vagueness of the legislation concerning what constitutes a “just cause” for firing makes it harder for a firm to dismiss a worker. According to the law (No. 604 of 1966), the two admissible motives are: the justified objective motive, that is, “for justified reasons concerning the production activity, the organization of labor in the firm, and its regular functioning”; and the justified subjective motive, that is, “in case of a significantly inadequate fulfillment of the employee’s tasks specified by the contract”. The first motive involves cases in which firing is due to events that are independent of employee behavior, while under the second the dismissal is caused by worker behavior. In both cases the wording is open to a wide range of interpretations. Judges ultimately decide on the validity of the motives given by the firm, which therefore faces the risk of a long and costly trial with uncertain outcomes whenever firing a worker becomes necessary.⁵ Kugler and Pica (2004) and Garibaldi, Pacelli, and Bogarello (2003) show that the Italian employment protection system has important effects on hiring and firing: their results indicate that the change in the strictness of regulations for

2. See, e.g., Grubb and Wells (1994), Demekas (1995), OECD (1999), and Nicoletti et al. (2001).

3. Firms are considered “large” if they employ more than 15 employees, which is the case of the bank considered in this paper. In firms with fewer than 15 employees, firing was possible without costs for the employer until 1990. Law No. 108 of 1990 introduced severance payments, up to a maximum of six months of wages, in case of unfair dismissals.

4. For further details, see Carabelli (1992) and De Roo and Jactenberg (1994). A worker reinstated by the judge in her job has the option to quit and receive a minimum of 15 months of pay. Yet much larger sums of money are typically asked for by the worker in order to accept this option.

5. Although regulations are occasionally not enforced in Italy, this does not happen here: immediately after the approval of the Chart of Workers’ Rights of 1970, a special set of judges and an accelerated judicial procedure for labor conflicts were created to ensure that the prescriptions of the Chart were enforced. As a result, it is easy and cheap for a worker to sue the firm in order to protect her rights.

In recent years firms have started to use temporary contracts in order to avoid the employment protection legislation, but during our period of observation this did not happen at this bank. However, while temporary workers may not be affected by probation periods, Engellandt and Riphahn (2005) show that their effort does respond to the possibility of attaining permanent contracts. Ichino, Polo, and Rettore (2003) analyze in detail the behavior of workers, the firm, and the judges involved in firing litigations that occurred at the bank considered here between 1979 and 1995.

firms with more or fewer than 15 employees (see footnote 3) produces significant threshold effects in the transition between firm sizes for Italian businesses.

An indication of the magnitude of these firing costs is also offered by Ichino, Polo, and Rettore (2003), who show that the bank considered in this paper fired only 409 employees (out of a labor force of approximately 26,000) in the 17 years for which information is available. Note also that this low firing rate is not matched by a high quit rate on the part of workers, since the yearly separation rate for all reasons never exceeded 4% and average tenure grew from 12 years in 1979 to 17 years in 1995. As suggested by these numbers, the stereotypical perception of Italy—according to which *il posto in banca* (a bank job) is “for life” no matter what the worker does—seems to reflect reality. It is important to note that this is the case not only because of the legislation on individual firing but also because, until very recently, the Italian financial sector (in which most firms are essentially public) was protected against foreign competition and shielded from the effects of the business cycle. As a result, collective layoffs were almost unheard of in this sector until the end of the 1990s. In the few cases in which one of the rare truly private Italian banks went bankrupt in the postwar period (e.g., the *Sindona* bankruptcy of the 1970s), other banks were forced to hire the displaced workers.⁶

In line with this tendency to provide workers with a property right to their jobs, the Italian legislator set upper limits to the length of probationary periods at the beginning of a labor contract and allowed collective bargaining to establish shorter durations. The combined result of subsequent pieces of legislation⁷ is that in no case can probation—defined as the period during which both parties can split without reason or warning—last for more than six months; for white-collar workers, the limit is set even lower at three months. This is also the length of probation established by collective bargaining at the bank considered here. It is interesting to note that the average length of probation differs considerably across countries.⁸ In Italy, the combination of a short probation period with generous indemnities for unfair dismissals generates a degree of overall employment protection that is unmatched in any other country.⁹

Therefore, a worker who reaches the end of a probationary period in a large Italian firm experiences a sudden change from a “U.S.-style” weak protection

6. Collective layoffs are regulated by a different process of evaluation on the part of judges and other public authorities (see again Carabelli 1992 and De Roo and Jactenberg 1994). This process is typically aimed at exploring all possible avenues to prevent the separation. When this is absolutely unavoidable, the involved authorities implement whatever is necessary to ensure a smooth transition of the displaced workers to other (mostly public) companies.

7. See Law No. 1825 of 1924, Art. No. 2096 of the Civil Code, and Law No. 604 of 1966.

8. For example, it is equal to one month in Austria and Norway, to 6 months in Germany and Sweden, and to 24 months in the United Kingdom—although the Blair government recently reduced it to 12 months.

9. See again, Grubb and Wells (1994), Demekas (1995), OECD (1999), and Nicoletti et al. (2001).

system to the most protective of the “European-style” systems.¹⁰ For this reason, high-frequency data on variables such as absenteeism when observed around the moment of such a change of regime, can inform on the behavioral effect of job security. Our data have these features.

3. The Data

The firm that provides the data for our analysis is a large bank with branches all over the Italian territory and with a century-long tradition in the Italian financial system. At the end of 1992, this bank employed 17,971 workers, of whom 14,266 were white-collar workers. From the bank’s personnel office we received detailed information on the work history of 545 men and 313 females hired in white-collar jobs between 1 January 1993 and 28 February 1995.¹¹ For each hired employee, we constructed a panel of weekly observations covering the first full year of tenure. During the initial three months after hiring, these workers were on probation and could be fired at will; during the remaining nine months of the observation period, they were fully protected against firing according to standard Italian legislation.

There were also 38 other workers hired during the same period who separated from the firm before the end of the first year. Seven of them were fired during probation, while the others officially quit the firm for a variety of reasons (recorded for example as “quit to another firm” or “quit for family reasons”); one died. The number of workers fired during probation is relatively high if one considers that, as mentioned previously there were only 409 firing attempts by the firm during the seventeen years for which information is available, out of a total of approximately 26,000 workers on payroll. Of these 409 attempts, 86 caused a firing litigation which was lost by the firm in 20% of the cases. This evidence suggests that the firm uses the probation period to monitor and fire undesired workers. Since these 38 workers could not be observed for a full year—and in particular for enough time after the end of probation—we were forced to drop them from the analysis.

The 858 workers that we can observe for a full year are a relatively homogeneous group of young individuals at the beginning of their career and with similar

10. Extreme reforms of the employment protection system, implying changes similar to the one that takes place at the end of probation, are not an unconceivable event for Italy. Indeed, this is the change of environment that all Italian workers in firms with fewer than 15 employees might have experienced if a reform proposal had been approved in a referendum in June 2003. Since the reform did not pass, workers in these firms are still only weakly protected against firing; yet, if the proposal had been accepted, they would have become fully protected as all the other Italian workers. In a previous referendum of May 2000, instead the proposal of a change from full protection to no protection for workers in firms with more than 15 employees was voted on, but also this reform was not approved. Had this proposal been accepted, firing regulations in Italy would have become similar to U.S. terms overnight.

11. These personnel data were also used by Ichino and Ichino (1999), Ichino and Maggi (2000), and Ichino, Polo, and Rettore (2003).

educational backgrounds. For both genders the average age is 25, and 95% of them are below age 30. Only 12 of these workers have less than a high-school degree. All others completed at least 13 years of education, with a slightly higher fraction of males entering the bank with a college degree (55% against 41%). Most of these degrees are in banking and economics (70%) with an additional 10% in law. Of all these workers, 98% are hired at the entry level in the bank hierarchy, traditionally with internal labor-market careers ahead of them.

For each worker, we computed the number of days of absence officially classified as “due to illness” in each calendar week of observation. This is the indicator of absenteeism on which we will base our evaluation of the effect of employment protection on worker effort.¹² Since the first calendar week of work is shorter for all workers not hired on a Monday, absenteeism in this week cannot be compared to absenteeism in later weeks. We therefore dropped the first calendar week of observation for all workers.¹³ Another complication is that, since the length of probation is defined in months, the number of calendar weeks of probation may change across workers. However, all workers were on probation for at least 12 weeks, and the corresponding observations are the ones we use to measure employees’ behavior in the absence of employment protection. We consider the 40 weeks of observation after the end of probation as the period in which to evaluate absenteeism in the presence of employment protection. As a result, each worker is observed for 52 calendar weeks. Our sample is therefore composed of 28,340 worker-week observations for males and 16,276 for females.¹⁴

Although the two genders are very similar in terms of age and education, they differ considerably in terms of absenteeism. The average number of days of absence per week is significantly higher for females than for males (0.09 versus 0.05). The gap is due not to the average length of episodes, which is equally 2.4 days for both genders, but to a higher share of employees who are never absent among males (48%) compared to females (31%). Gender differences of this kind are typical in the literature, but their causes are controversial.¹⁵ Although this debate is outside the scope of this paper, it should be noted that 9% of females in our sample are married while the same is true for only 5% of males. This suggests that, despite the young age of our subjects, family considerations might be partially responsible for the observed gender differences in absenteeism.

12. We replicated our analysis using three other indicators of absenteeism (occurrence of an absence episode, occurrence of an episode of delay, and minutes of delay) and found qualitatively similar results, which we do not report to save space.

13. Another adjustment of the duration of probation had to be made for workers who were absent during the initial probation period. Following the probation rules of the bank, we prolonged a worker’s original time of probation by the number of days of absence during probation.

14. Riphahn and Thalmaier (2001) also investigate the effect of probation on absenteeism, but, use less precise data based on workers’ recollections in a household panel survey for Germany.

15. See for example Paringer (1983), Vistnes (1997), Bridges and Mumford (2000), and Barnby, Ercolani, and Treble (2002).

Independent of gender, these descriptive statistics show the existence of a substantial amount of heterogeneity in the absenteeism behavior of workers. On average, 42% of them are never absent and thus are not affected by the change of incentives occurring at the end of probation.¹⁶ At the opposite end of the distribution, 10% are absent at least four times and 1% accumulate more than 30 days of absence over their first year at the bank.

On average, absence episodes are relatively rare: 97% of all worker-week observations are characterized by no absence, and the average number of days of absence per week in the sample is low (0.065). However, this average corresponds to an absenteeism rate of 1.3% of the weekly working time (5 days).¹⁷ Focusing on weeks with an absence episode, the average duration of an absence episode is approximately half of the weekly working time, 2.4 days. So, absence episodes are rare events, but a majority of workers are absent at some point during the year, and on average absenteeism implies a substantial loss of working time and hence of output from these workers.

4. The Evidence

Figures 1 and 2 describe the extent of absenteeism during and after probation for male and female workers. Absenteeism is measured by the average number of days of absence for each of the 52 fully observed weeks of tenure. The vertical line corresponding to Week 12 indicates the end of probation. For males this event appears to be associated with a sharp change of regime: after probation, the average number of days of absence is always higher than during probation and, more importantly, absenteeism increases immediately after full protection is granted. For females, absenteeism is in general higher (note the scale difference on the vertical axis), but the change of regime is less pronounced and does not coincide as clearly with the end of probation. Leaving a discussion of the possible behavioural reasons of this gender difference to Section 5, it should be noted here that, since females are on average more absent even before Week 12, the exact end of probation is measured less precisely for them (see footnote 13). This might explain why the average number of days of absence for females fluctuates widely in Weeks 12, 13, and 14, and only from Week 15 on do we find some evidence of a more stable increase.

16. Nagin et al. (2002) also find a substantial fraction of workers who do not react to an exogenous manipulation of monitoring rates.

17. For comparison, according to the Association of Italian Entrepreneurs (see Confindustria 1996), the average absenteeism rate in the Italian industrial sector in 1995 was 5.16% for blue-collar workers and 2.23% for white-collar workers. Using the Survey of Household Income and Wealth (SHIW) collected by the Bank of Italy, the average absenteeism rate for all non-self-employed workers was 2.50% in that same year.

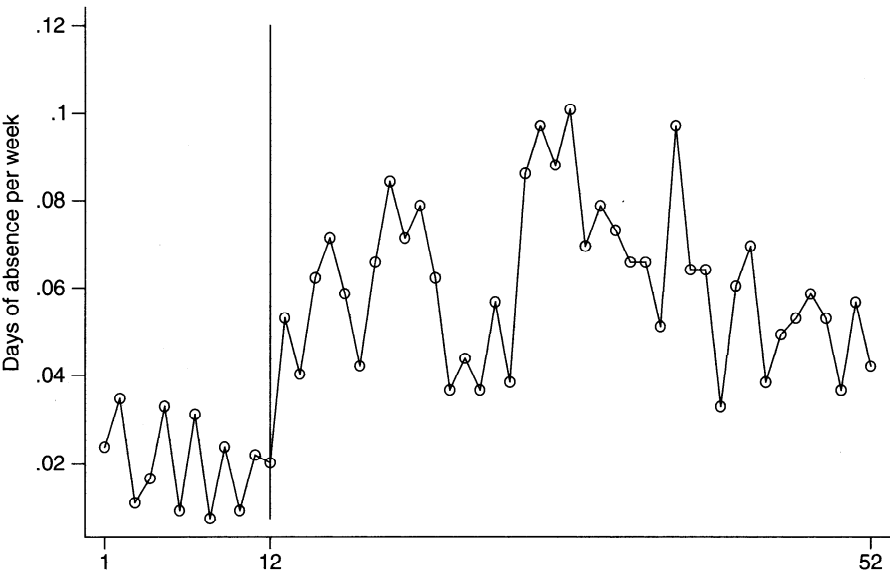


FIGURE 1. Absenteeism during and after probation—Males.

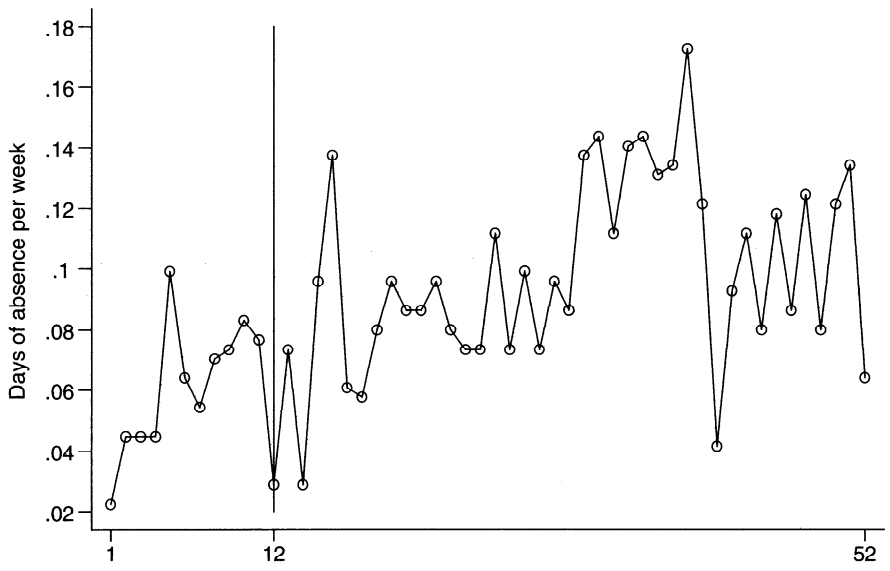


FIGURE 2. Absenteeism during and after probation—Females.

TABLE 1. Weekly days of absence during and after probation—Males.

	1	2	3	4	5
Effect of the end of probation	0.041 (0.006)	0.040 (0.006)	0.040 (0.006)	0.040 (0.006)	0.040 (0.006)
Age			0.0001 (0.002)	0.0001 (0.002)	
Years of schooling			−0.004 (0.002)	−0.004 (0.002)	
Married			0.000 (0.022)	0.001 (0.022)	
Branch located in the south				−0.010 (0.011)	0.069 (0.065)
Size of the branch				0.000 (0.000)	0.001 (0.001)
% of managers in the branch				−0.036 (0.025)	0.010 (0.052)
% of females in the branch				−0.010 (0.065)	−0.085 (0.095)
Average age in the branch				−0.001 (0.001)	−0.006 (0.003)
Branch weekly absenteeism				0.003 (0.006)	0.010 (0.013)
Intercept	0.020 (0.003)	0.042 (0.015)	0.106 (0.053)	0.147 (0.095)	
Seasonal controls	no	yes	yes	yes	yes
Individual fixed effects	no	no	no	no	yes

Notes: The table reports linear regression results for the dependent variable: number of days of absence per week of male workers. The number of observations is 28,340 in all columns. All time-varying branch characteristics are measured in the month before the worker is hired. Fixed effects in column 5 are estimated to be significant with a *p*-value smaller than 0.0001. Standard errors are reported in parentheses (Huber–White robust in the first four columns).

If all workers were hired in the same period of the year, in (say) July, then probation would take place during the summer and the arrival of the fall would coincide with receiving full protection. In this case an increase of absenteeism observed after the end of probation could simply be due to seasonal effects. This is, however, not the case. Figures 1 and 2 do not change after removing the effect of calendar months, nor do the other results presented herein. Seasonality does not affect our results, as hiring is uniformly distributed over the entire calendar year.

We use regression to test for a change in absence behavior at the beginning of Week 13. As suggested by Angrist (1999), even if an outcome measure is a limited dependent variable (specifically a count variable), a simple difference between the mean days of absence during and after probation measures the effect of the change of regime. These results are presented for males and females (respectively) in Tables 1 and 2.¹⁸

18. Results do not change if a nonlinear model, such as a Poisson, is computed.

TABLE 2. Weekly days of absence during and after probation—Females.

	1	2	3	4	5
Effect of the end of probation	0.040 (0.019)	0.039 (0.020)	0.039 (0.020)	0.040 (0.020)	0.040 (0.010)
Age			0.003 (0.003)	0.003 (0.003)	
Years of schooling			−0.005 (0.004)	−0.005 (0.004)	
Married			0.025 (0.028)	0.017 (0.028)	
Branch located in the south				−0.042 (0.019)	−0.018 (0.144)
Size of the branch				−0.001 (0.000)	0.001 (0.001)
% of managers in the branch				0.150 (0.075)	0.051 (0.092)
% of females in the branch				0.119 (0.082)	0.082 (0.124)
Average age in the branch				0.003 (0.002)	0.008 (0.004)
Branch weekly absenteeism				−0.019 (0.010)	−0.017 (0.020)
Intercept	0.059 (0.017)	0.078 (0.025)	0.069 (0.096)	−0.059 (0.132)	
Seasonal controls	no	yes	yes	yes	yes
Individual fixed effects	no	no	no	no	yes

Notes: The table reports linear regression results for the dependent variable: number of days of absence per week of female workers. The number of observations is 16,276 in all columns. All time-varying branch characteristics are measured in the month before the worker is hired. Fixed effects in column 5 are estimated to be significant with a *p*-value smaller than 0.0001. Standard errors are reported in parentheses (Huber–White robust in the first four columns).

For males, column 1 of Table 1 shows that while during probation workers are on average absent for 0.020 days per week (see the intercept), at the end of probation absenteeism increases by 0.041 days. Thus, average absenteeism more than triples when full protection against firing is granted. The next two columns of Table 1 confirm that, since the probation indicator is uncorrelated with time-invariant controls (age, education, and marital status) and seasonal controls (12 monthly dummies), their inclusion in the regression does not change the probation effect. In column 4, we add a wide set of time-varying characteristics of the workers’ branch in the month before hiring—for example, location and size, the fraction of managers and of females, average age, and average number of days of absence per week. In column 5 the specification of the previous column is complemented by the consideration of individual fixed effects, exploiting the panel structure of the data. However, these additional controls and individual specific intercepts leave the effect of the end of probation unchanged. Huber–White robust standard errors are computed to control for within-individual correlation of the error terms in the first four columns. In the last column, within-individual correlation is taken care of by individual specific intercepts. In all these cases, the

standard errors show that the effect of probation is estimated with high levels of statistical significance.

The intercept in column 1 of Table 2 shows that absenteeism is three times higher for females than for males (0.059 days against 0.020) during probation, but the absolute effect of probation does not display any gender difference and is equal to 0.040 days for all workers. Thus, interestingly, the provision of job security at the end of probation appears to increase absenteeism by a factor that is independent of the starting level, and this may contribute to blurring the visual evidence of a change of regime for females in Figure 2. The remaining columns of Table 2 show that, for females as well, the inclusion of controls and individual specific intercepts do not change the size and statistical significance of the estimated effect of the end of probation.

In sum, Tables 1 and 2 suggest that, independent of gender, newly hired workers are significantly more absent after the end of probation. The most compelling suspicion is that the change of job security at the end of probation is responsible for this evidence. Next, we present a model supporting this intuition and discuss alternative interpretations that are compatible with the results displayed so far. Section 6 will then present additional evidence confirming the conclusion that provision of employment protection is the main cause of the increase in absenteeism observed at the beginning of the 13th week of tenure.

5. Interpretations of the Evidence

The model presented next provides a framework for interpreting the change in absenteeism observed at the end of probation. An institution like probation makes sense only in a world of heterogeneous workers and asymmetric information, where the firm is interested in identifying “bad types” and in firing them as soon as possible. This is relevant in most European countries and particularly in Italy (see Section 2), where a firm’s desire to monitor workers and fire the “bad types” is severely limited by employment protection regulations setting in after short probation periods. In order to capture the screening function of an institution like probation, the model emphasizes the role of heterogeneity in workers’ propensity to exert effort. Therefore, our results are complementary to other strands of literature that focus on the effect of employment protection on worker effort with homogeneous agents—for example, the efficiency wage theory proposed by Shapiro and Stiglitz (1984) and tested by Cappelli and Chauvin (1991).

5.1. *A Model of Absenteeism During and After Probation*

Consider a worker in a given period. During this period the worker can be in one of three possible situations denoted by the random variable U , which the worker

observes but cannot control: $U = S$, in which case he¹⁹ is “sick” with probability σ ; $U = L$, in which case he is “lazy” with probability λ ; or $U = H$, in which case he is “healthy and willing to work” with probability $1 - \sigma - \lambda$.²⁰ If the worker is sick or lazy then he must decide on whether to be absent from work or not.

If the worker decides not to be absent ($A = 0$), he is not fired and continues to work in the following period. The expected payoff of this decision is given by the continuation value W minus the disutility of work, which may in principle differ between the situation of sickness and the situation of laziness. In case of laziness the payoff of going to work is

$$\Pi(A = 0 \mid U = L) = W - V_L \quad (1)$$

while in case of sickness it is

$$\Pi(A = 0 \mid U = S) = W - V_S. \quad (2)$$

If instead the worker decides to be absent ($A = 1$), the firm, which otherwise does not observe U , may monitor his absence and verify if it is due to laziness or to a real health problem. Only by monitoring an absence episode can the firm discover the value of U for a worker in a given period.²¹ If the absence is monitored and the worker is found to be lazy then he is fired, in which case his payoff is 0. If the absence is not monitored then he is not fired and gains the continuation value W without suffering any disutility of work. Denoting by q the probability of monitoring, which will be determined shortly, the expected payoff of deciding to be absent in case of laziness is

$$\Pi(A = 1 \mid U = L) = W(1 - q). \quad (3)$$

In case of real sickness, monitoring never causes firing and so we have instead

$$\Pi(A = 1 \mid U = S) = W. \quad (4)$$

Using (1) and (3) and assuming that the disutility of work V_L has a cumulative distribution F_L with nonnegative support, the probability of absenteeism in case of laziness is

$$\theta_L = \Pr(A = 1 \mid U = L) = 1 - F_L(qW). \quad (5)$$

19. We flipped a coin to select the gender of the representative worker in the model.

20. For example, a flu epidemic may cause the worker to be sick, or it could be a nice windy day in which sailing is very attractive, or it could be a normal day in which the worker is happy to work. For simplicity we exclude the possibility of simultaneous laziness and sickness shocks. The residual case in which $U = H$ is needed because otherwise, as will be clear in the sequel, no one would show up for work when full protection is granted.

21. Italian firms like the one considered here are allowed to send inspectors to the home of an absent worker to verify the existence of a health problem. Albeit regulated in a restrictive fashion under the pressure of unions, this procedure allows firms to detect shirking behavior.

It is intuitive and easy to verify that this expression is inversely related to q . Similarly, using (2) and (4) and denoting by F_S the cumulative distribution of V_S with nonnegative support, the probability of absenteeism in case of sickness is

$$\theta_S = \Pr(A = 1 \mid U = S) = 1 - F_S(0) = 1. \quad (6)$$

We therefore have all the elements to compute the overall probability that a given worker is absent in a given period

$$\theta = \Pr(A = 1 \mid q) = \lambda \theta_L(q) + \sigma. \quad (7)$$

This expression says that the probability of being absent is the sum of two components. The first is attributable to laziness and is sensitive to the probability q of being monitored and fired. The second component is independent of q and is determined only by the occurrence of real health problems. The presence of the first component means that the overall probability of an absence episode decreases when q increases, but this overall probability cannot be smaller than the sickness component σ .

Let's now consider a firm that hires N workers who are on probation for one period after hiring. During this probation period, the firm is free to monitor an absence episode and to fire the worker if he is found to be lazy. After the end of probation, full firing protection is granted and we assume for simplicity that firing is no longer possible.

In order to capture the screening function of probation, we assume that a fraction $1 - \tau$ of the N workers are never lazy ($\lambda = 0$), while the remaining τ are lazy with probability $\lambda = \bar{\lambda} > 0$.²² For brevity we will call these two types "hard" workers and "lazy" workers, respectively. The probability of sickness is identical for all workers. The firm would like to identify and fire all the lazy workers but can only exploit the probation period to do so.²³ Therefore, the problem of the firm is to determine the monitoring probability q that allows it to identify the maximum number of lazy workers during probation—taking into account how workers react to the determination of q .

22. This assumption finds support in the evidence of Nagin et al. (2002). See also the evidence on heterogeneity in our data in Section 3.

23. Note that the firm faces a double problem of asymmetric information: it does not know workers' types before hiring them and it does not observe their effort afterwards. One may think that in reality firms have a wider set of instruments at their disposal to solve these problems, e.g., menus of contracts to screen workers and incentive schemes to elicit effort from "lazy" workers. However, these additional instruments are typically costly to implement and cannot solve the asymmetric information problem completely. To put it differently, it is intuitive that, even when these instruments are available, the firm would still prefer to hire only "hard" workers if possible. After all, the fact that probation periods exist in long-term relationships of different natures indicates that these instruments, if available, do not solve all problems.

Given the behavior of workers just described and fixing the monitoring probability q , the number of absence episodes in a period is

$$K = N\theta = N\tau\bar{\lambda}\theta_L(q) + N\sigma \quad (8)$$

where

$$\frac{dK}{dq} = N\tau\bar{\lambda}\frac{d\theta_L}{dq} = -N\tau\bar{\lambda}f_L(qW)W < 0; \quad (9)$$

this indicates that the number of absence episodes is a decreasing function of the monitoring (and firing) probability. The number of inspected absence episodes is qK , but since monitoring is perfect (which is a fairly reasonable assumption in this setting) the number of identified lazy workers is

$$B = qN\tau\bar{\lambda}\theta_L(q). \quad (10)$$

This is the quantity that the firm would like to maximize with respect to q . Note that even if monitoring is costless, there is an implicit cost of monitoring. When $q = 0$ no absence episode is monitored and no worker is identified. When q is set high enough to make $\theta_L = 0$, then only sickness-related episodes take place and so monitoring becomes useless as a tool for identifying lazy workers. As a result, it is convenient for the firm not to monitor all absence episodes and so induce the lazy workers to take a chance and “come out of cover”. The first-order condition

$$-\frac{q}{\theta_L}\frac{d\theta_L}{dq} = 1 \quad (11)$$

determines the optimal level q^* at which the number of identified lazy workers is maximized.

After probation firing becomes impossible, which is equivalent to saying that $q = 0$. Using (8) and denoting the periods during and after probation with 0 and 1 (respectively), since $q^* > 0$ we have the following result:

PROPOSITION 1. *The number of absence episodes per period during probation is lower than the number of absence episodes per period after probation:*

$$K_0 = E(K \mid q = q^*) < E(K \mid q = 0) = K_1. \quad (12)$$

This proposition is consistent with the evidence presented in Section 4. It predicts that absenteeism should increase as soon as job security is granted to workers. Moreover, given equations (7) and (8), if females are characterized by a higher component σ of unavoidable sickness episodes,²⁴ then this model explains

24. See again Paringer (1983), Vistnes (1997), Bridges and Mumford (2000), and Barmby, Ercolani, and Treble (2002) for a discussion of possible reasons such as family duties, health, and opportunity costs.

why the absolute increase of absenteeism at the end of probation may be the same for both genders even if females are on average absent more frequently independent of employment protection.

5.2. *Alternative Explanations of the Evidence*

There do exist other reasons why absenteeism of newly hired workers might increase with tenure irrespective of job security. One is the “career concern” mechanism pointed out by Holmstrom (1982): If a worker’s ability is unobservable and if individual output is used by supervisors to learn about ability, then workers have an incentive to exert more effort in order to bias the process of inference in their favor. The returns to exerting effort depend on the supervisors’ uncertainty about worker ability: Early in the process, when there is little information, supervisors put more weight on individual output when revising their beliefs. As uncertainty decreases, individual output becomes less relevant for inferences on ability. Hence, the incentive to exert effort is high at the beginning of a career and declines with tenure. Inasmuch as absenteeism measures lack of effort, one would then observe absenteeism growing with tenure independent of probation.

An alternative argument is that absenteeism increases over the first tenure months because the worker has to learn about the social norms in the newly joined branch of the firm. If a worker derives disutility from work but needs a job to maintain her monthly income, the conflict is apparent: The individual will resolve the countervailing interests—of working as little as possible and ensuring not to be laid off—by shirking as much as local employment conditions allow. If these conditions or social norms are unknown when the contract commences, the risk-averse worker will initially prefer to supply too much rather than too little work. Over time the individual learns about the norms and shirking increases to maximize utility subject to the perceived norm, or “no firing” condition. This is a second mechanism that might yield increasing absenteeism during early tenure months.

Both these alternative mechanisms could be captured by the model of Section 5.1 if we assume that the continuation value W depends on time, and specifically that it is high at hiring and decreases with tenure. There is, however, one crucial and testable difference between the prediction of our model and the prediction of these alternative theories concerning how absenteeism should change with tenure for newly hired workers. Career concerns and learning about social norms each predict a smooth relationship between time and absenteeism. More specifically, there is no reason why these two mechanisms should induce a jump in the number of weekly days of absence during the 13th week of tenure. The model of Section 5.1 predicts instead that the increase of absenteeism should take place in a discontinuous way as soon as employment protection is granted to workers, which in the case of our bank happens at the beginning of the 13th week.

In the next section we test whether the effect of the end of probation found in Tables 1 and 2 is just an artifact of fitting a time dummy on a smooth time trend or if it represents, instead, a genuine discontinuity generated precisely by the sudden provision of employment protection.

6. Robustness Checks to Discriminate Between Alternative Explanations of the Evidence

If the provision of job security at the end of probation affects worker behavior, then the end of the 12th week of tenure must be the most likely and significant break point in the temporal evolution of weekly days of absence. If, however, the evidence of Section 4 originated in a smooth increase in absenteeism due to career concerns or to learning about social norms, there should be no reason to consider Week 12 as a more likely break point than any other.

Using the methodology proposed by Andrews (1993) to detect structural changes with unknown break point, we can show that, at least for males, the end of probation is indeed the most likely and statistically significant moment in which a regime change occurs if there is a regime change at all. Leaving a formal description of this method to the Appendix, we describe its results with the help of Figures 3 and 4. They display, separately for males and females, the value of the likelihood ratio test statistic (LR) for all potential break points within a central

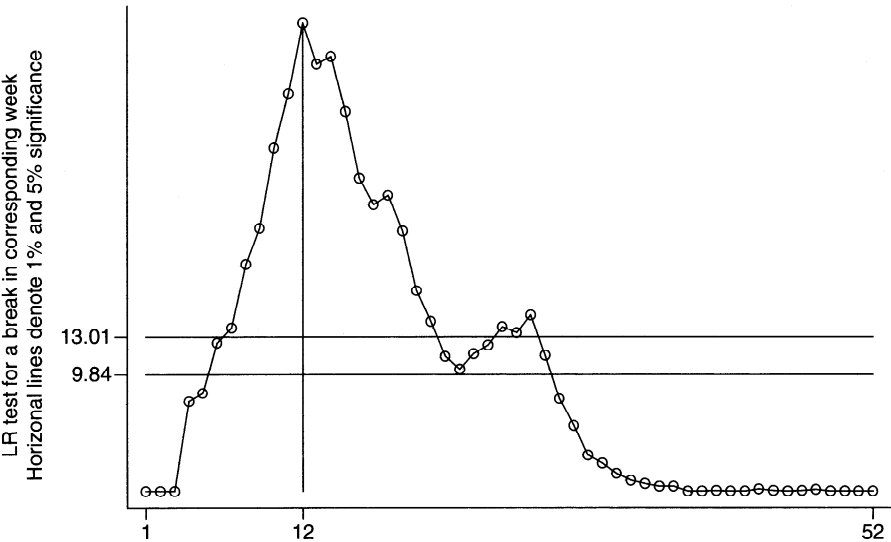


FIGURE 3. Test for the most likely break point in absenteeism—Males.

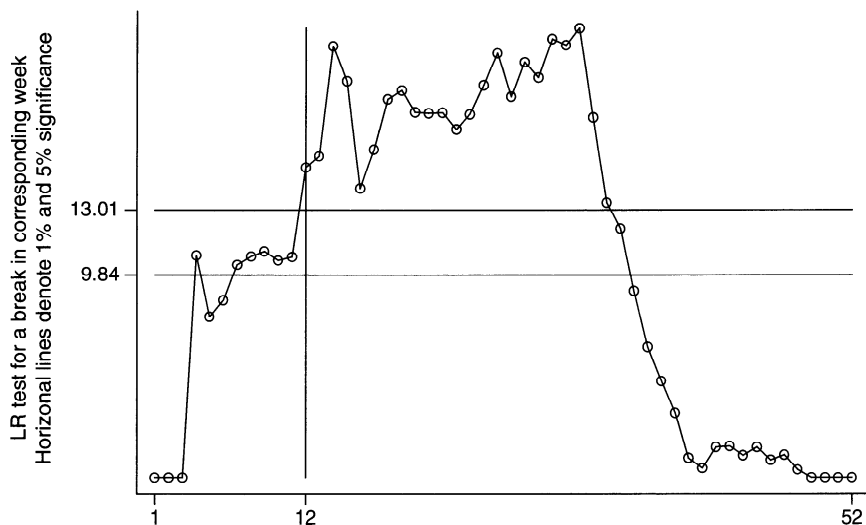


FIGURE 4. Test for the most likely break point in absenteeism—Females.

interval of the time series of weekly absenteeism (i.e., trimming a fraction of the observations at both ends of the series).²⁵ The horizontal lines are the 5% and 1% critical values of the Andrews' test statistics.²⁶

For the case of males (Figure 3), the spike at Week 12 indicates that the end of probation is the most likely break point in the series. For females, the evidence is less clear, a result that could be expected from Figure 2. As we mentioned before, this may result in part from the less precise identification of the end of probation for females, given their higher absenteeism during probation (see again footnote 13). However, this cannot be the only reason because in this case the most likely break point should still be located in the neighborhood of Week 12, but Figure 4 suggests that the methodology proposed by Andrews cannot identify a unique, most likely break point for female employees.

To further probe the robustness of our results, we re-estimated the regressions of column 5 of Tables 1 and 2 including a linear and a quadratic time trend in addition to the individual fixed effects and the time-varying control variables. The results are reported in Table 3, omitting the estimated effects of the control variables. The first column copies for the reader's convenience the effect of the

25. It is not possible to search for a break from the very beginning of the period or until the very end, because there must be a sufficient number of observations on each side of the potential break to establish a difference between the "before" and "after" periods. For further details see the Appendix.

26. These critical values are computed for a trimming parameter of 0.25. See the Appendix and Table 1 in Andrews (1993).

TABLE 3. Effect of the end of probation on weekly days of absence, controlling for time trends.

	Males			Females		
	1	2	3	4	5	6
Effect of the end of probation	0.040 (0.006)	0.051 (0.009)	0.031 (0.013)	0.040 (0.010)	0.027 (0.015)	−0.005 (0.021)
Linear term of the time trend		−0.002 (0.001)	0.008 (0.005)		0.002 (0.002)	0.018 (0.008)
Quadratic term of the time trend			−0.001 (0.000)			−0.001 (0.000)
Number of observations	28,340	28,340	28,340	16,276	16,276	16,276

Notes: The table reports, respectively for males and females, the coefficients of the dummy for the postprobation period and the coefficients of a linear and a quadratic time trend estimated using a regression that includes the following control variables (omitted to save space): individual fixed effects, southern location of the branch, size of the branch, % of managers in the branch, % of females in the branch, average age in the branch, and branch weekly absenteeism. All time-varying branch characteristics are measured in the month before the worker is hired. The dependent variable is the number of days of absence per week. Standard errors are reported in parentheses. (Observe that columns 1 and 4 report, respectively for the convenience of the reader, the same estimates presented in column 5 of Tables 1 and 2.)

end of probation from column 5 of Table 1. Adding a linear time trend in column 2, the increase in absenteeism induced by the provision of job security is estimated to be even larger in size and significance. Column 3 adds instead a quadratic time trend, which reduces the size of the effect but does not render it statistically insignificant. Again the evidence for males suggests that, even if mechanisms like career concerns and learning about social norms caused a smooth trend in absenteeism behaviour, such a smooth trend undergoes a sharp break precisely at the end of probation. It is difficult to think of reasons for such a break other than the effect of the sudden provision of job security. However, we cannot reach the same conclusion for females because, as shown in the last three columns of Table 3, the inclusion of time trends (particularly in a quadratic form) eliminates the estimated effect of the end of probation.

Additional robustness checks are provided in Tables 4 and 5, where sets of quarterly or monthly dummies are included in the most complete specification of Tables 1 and 2, so that we may model in a flexible way the relationship between tenure and absenteeism. Again we omit the estimated coefficients of the control variables to save space. Table 4 takes the first quarter of tenure as the reference period and reports in column 1, for males, the estimated coefficients for subsequent quarters. Column 2 reports the *p*-value of the test that the dummy of a given quarter is equal to the dummy of the previous quarter. Note that the first quarter, defined as the first 12 weeks of tenure, corresponds exactly to the probation period.²⁷ Once again the results show that for males the break at the end of probation

27. Since we observe workers for 52 weeks, we define each quarter to last for 12 weeks—except for the last “quarter”, which has 16 weeks.

TABLE 4. Increase of weekly days of absence with respect to the first “quarter” after hiring.

	Males		Females	
	1	2	3	4
Second quarter	0.043** (0.007)	0.000	0.031* (0.012)	0.011
Third quarter	0.049** (0.007)	0.3786	0.044** (0.012)	0.2792
Fourth quarter	0.030** (0.007)	0.0062	0.045** (0.012)	0.9665
Number of observations	28,340		16,276	

Notes: In columns 1 and 3 the table reports, respectively for males and females, the coefficients of dummies for the second, third, and fourth quarters after hiring estimated using a regression that includes the following control variables: individual fixed effects, southern location of the branch, size of the branch, % of managers in the branch, % of females in the branch, average age in the branch, and branch weekly absenteeism. All time-varying branch characteristics are measured in the month before the worker is hired. The dependent variable is the number of days of absence per week. Standard errors are reported in parentheses with $p < 0.05 = *$ and $p < 0.01 = **$ for the test that the coefficient of the quarter dummy is equal to zero. Note that the first quarter, which is the reference dummy, corresponds exactly to the probation period. In columns 2 and 4, the table reports the p -values of the test that the corresponding coefficient for each quarter is equal to the coefficient of the previous quarter. Each “quarter” has 12 weeks except for the fourth, which has 16 weeks.

(i.e., between the first and the second quarter) is large in size and highly significant. The differences between subsequent quarters are not equally significant. Interestingly, this robustness check suggests that also for females the difference between the first and the second quarter is larger and more significant than the differences between subsequent quarters.

Similar conclusions are suggested by the evidence displayed in Table 5, where further flexibility is added through the specification of the effect of time in terms of monthly dummies.²⁸ For males, it is exactly in the fourth month that absenteeism becomes significantly different with respect to the first month (the omitted reference dummy). As shown in column 2, the p -value of the test for the difference between two consecutive months indicates a significant difference precisely between Month 3 and 4.²⁹ Column 4 shows that for females the corresponding difference is not significant, although Month 4 is the first month in which the difference with respect to the first period is significantly larger than zero.

The combined evidence of these robustness checks suggests that—at least for males—the jump in absenteeism observed in the thirteenth week of tenure cannot be an effect of career concerns or of learning about social norms, because these mechanisms would generate smooth time trends in absenteeism. To put it differently, they cannot explain a break point in any specific week of the first year

28. In this case months are defined as periods of 4 weeks; hence there are 13 such “months”.

29. A second significant break occurs between Month 7 and 8, but since we lost our contacts at the bank we cannot ask for possible reasons for this break; one possibility could be a round of supervisor evaluations or a change of assignments after an initial period of training. This break is also signalled by the Andrews (1993) method (see Figure 3), but it is not the most likely break.

TABLE 5. Increase of weekly days of absence with respect to the first month after hiring.

	Males		Females	
	1	2	3	4
Month 2	0.003 (0.012)	0.8000	0.037 (0.021)	0.0750
Month 3	0.002 (0.012)	0.9278	0.034 (0.021)	0.8697
Month 4	0.039** (0.012)	0.0025	0.057** (0.021)	0.2759
Month 5	0.047** (0.012)	0.5641	0.047* (0.021)	0.6557
Month 6	0.047** (0.012)	0.9527	0.061** (0.021)	0.5012
Month 7	0.028* (0.013)	0.1151	0.057** (0.021)	0.8486
Month 8	0.075** (0.013)	0.0001	0.057** (0.021)	0.9869
Month 9	0.050** (0.013)	0.0463	0.091** (0.021)	0.1029
Month 10	0.045** (0.013)	0.6913	0.103** (0.021)	0.5868
Month 11	0.033** (0.013)	0.3179	0.048* (0.021)	0.0092
Month 12	0.027* (0.013)	0.6230	0.063** (0.021)	0.4880
Month 13	0.024 (0.012)	0.8148	0.062** (0.021)	0.9716
Number of observations	28,340		16,276	

Notes: In columns 1 and 3 the table reports, respectively for males and females, the coefficients of dummies for the months after hiring estimated using a regression that includes the following control variables: individual fixed effects, southern location of the branch, size of the branch, % of managers in the branch, % of females in the branch, average age in the branch, and branch weekly absenteeism. All time-varying branch characteristics are measured in the month before the worker is hired. The dependent variable is the number of days of absence per week. Standard errors are reported in parentheses with $p < 0.05 = *$ and $p < 0.01 = **$ for the test that the coefficient of the month dummy is equal to zero. In columns 2 and 4, the table reports the p -values of the test that the coefficient for each month is equal to the coefficient of the previous month. Each “month” has 4 weeks and for this reason there are 13 “months”.

of tenure. It is instead more likely that the provision of job security occurring precisely at the beginning of the 13th week of tenure is the cause of the observed behavioral change in absenteeism.

We cannot draw this conclusion with equal confidence for females. This may be due to several reasons among which we cannot discriminate given the available evidence. It may be because females are intrinsically less sensitive to the incentives generated by the provision of job security³⁰ or because the incentives inherent

30. A number of studies have attempted to explain gender differences in competitive behaviours. Most recently Gneezy, Niederle, and Rustichini (2003) investigated gender differences in competitiveness to explain gender inequality at high-ranking jobs. They concluded on the basis of puzzle-solving efforts that women are less competitive than men unless they are in single-sex environments.

in the internal labor market are weaker for females. Alternatively, the fact that female absenteeism exceeds that of males may blur the effect of job security, which we estimate to be equal across genders in absolute terms.

7. Conclusions

Employment protection legislation restricts the ability of firms to dissolve labor contracts. Most of the literature on the economic effects of this institutional phenomenon has focused on the adjustments of firms' hiring and firing behavior. Using the evidence generated by the institution of probation periods, we investigate instead whether workers change their behavior and reduce work effort when their contract begins to provide firing protection at the end of probation.

Our sample considers 545 men and 313 females hired as white-collar workers at an Italian bank during their first 52 weeks of tenure, of which the initial 12 are weeks of probation. The end of probation implies an increase of job security comparable to a change from a "U.S.-style" weak protection system to the most protective of the "European-style" systems. Our evidence indicates that the average number of days of absence per week more than triples once employment protection is granted to males. For females, who are on average more absent in all periods, the effect of the end of probation is estimated to be similar in absolute terms but smaller in relative terms.

These results complement the results obtained by Cappelli and Chauvin (1991). Using micro data from different U.S. plants, they show that workers shirk less where wage premia are high and local labor market conditions unfavorable. Assuming a similar probability of shirking detection and of firing across plants, their evidence supports the Shapiro–Stiglitz (1984) version of the efficiency wage theory. In our paper, the focus is instead on the effect of a change in the probability of firing given a constant wage premium and a constant outside option.

Although our study focuses on the effect of employment protection on absenteeism, it supports implicitly the "rational cheater" model of employee behavior tested by Nagin et al. (2002). They present field experimental evidence showing that a substantial fraction of workers will change behavior when monitoring rates are exogenously manipulated. Interestingly, they find that the fraction of workers who do not react to this manipulation of incentives is also significant, a fact that can also be found in our data. The existence of this kind of heterogeneity motivates the existence of an institution like probation, as highlighted by our theoretical model.

The European debate on the reform of employment protection is mainly focused on net employment effects, but our results suggest that a proper evaluation of this regulation requires considering such factors as the effect on worker behaviour. Because of general equilibrium effects, our evidence from a single firm

does not allow an easy extrapolation regarding how absenteeism would decrease if employment protection were reduced for all workers. For the workers in our firm, the outside option in case of firing can be considered constant during and after probation, whereas a reform of employment protection regulations would affect the entire labor market in ways that are hard to predict. If, for example, a reduction of firing costs increased the firms' propensity to hire, then 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 better outside options. Moreover, reducing absenteeism for a (probation) period of just three months is likely to be easier than reducing absenteeism for the longer period that would follow a hypothetical elimination of employment protection. Finally, our sample of newly hired young workers is certainly not representative of the population of workers affected by a general reform, and absenteeism is just one dimension of employee behavior affected by the incentives deriving from employment protection.

Nevertheless, the quality of our data and the clear evidence they provide on the effect of employment protection on absenteeism suggest that our analysis provides a useful starting point in the evaluation of one consequence of firing costs that has been neglected so far in policy debates.

Appendix: The Andrews Test for a Break, with Unknown Break Point

Consider a stationary outcome y_t . Let β_t be the parameters of the model that explains the outcome:

$$H_0 : \beta_t = \beta_0 \quad \forall t;$$

$$H_A(\pi) : \beta_t = \begin{cases} \beta_1 & \text{for } t = 1, 2, \dots, \pi T, \\ \beta_2 & \text{for } t = \pi T + 1, \dots, T. \end{cases} \quad (13)$$

The test statistic is constructed as follows.

- i. Calculate the restricted log likelihood under H_0 :

$$l_R(\beta_0).$$

- ii. Calculate the log likelihood under the hypothesis of a break at the earliest possible breakpoint, that is, when $\pi = \pi_{\min}$:

$$l_{\pi_{\min}}(\beta_1, \beta_2).$$

- iii. Calculate the corresponding likelihood ratio test statistic:

$$\lambda_{\pi_{\min}} = -2(l_R(\beta_0) - l_{\pi_{\min}}(\beta_1, \beta_2)).$$

- iv. Repeat for each possible break point and calculate the test statistic for each $\pi \in (\pi_{\min}, \pi_{\max})$.
- v. Compute

$$\lambda_{\pi^*} = \sup_{\pi \in (\pi_{\min}, \pi_{\max})} \lambda_{\pi}.$$

- vi. Compare with critical values.

Note that, since it is not possible to search for a break from the very beginning of the sample or at the very end, the trimming parameters π_{\min} and π_{\max} specify how far into the sample one starts looking for a break and how early one stops. Andrews (1993) tabulates critical values for this test statistic. Note also that, instead of imposing when a structural break occurs, the procedure allows one to determine the most likely period in which it happens. \square

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