Sickness absence, performance pay and teams

by

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Preliminary version

Abstract
Norwegian panel register and questionnaire data on private sector workers and workplaces during 2001-2004 are used to study the impact of team organisation and performance pay on workers' physician-certified sickness absences. Causally team-organisation is not associated with lower absence rates. Performance pay reduces workers' absence rates, but diminishes as the pay-performance sensitivity increases. This effect is stronger for individual incentives than for team-based incentives. Wages matter more for workers' absences under team-organisation and under performance pay than under non-team work with fixed pay. The joint introduction of team-organisation and performance pay, however, decreases the sensitiveness of absences to pay.

Key words: Absenteeism, teamwork, performance pay, wages

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1. Introduction

While it is the individual worker that becomes ill and potentially stays home from work, this behaviour is strongly affected by firms' decisions on what can be broadly understood as the work environment. Numerous studies have analysed the importance of classical work environment dimensions such as noise, pollution, risks (Duncan and Holmlund, 1983; Ose, 2005) and downsizing and reorganisations (Ferrie, 2001; Quinlan et al., 2001; Kivimäki et al., 2003; Røed and Fevang, 2007) for worker absence behaviour.

This paper addresses other aspects of the work environment which potentially may affect worker absence behaviour; team organisation and performance pay. While the importance of pay and teams for worker absences have been addressed successfully theoretically and empirically (for example, Barmby et al.,1994; Brown et al., 1999; Heywood and Jirjahn, 2004), we argue that few studies have addressed how the interplay between team organisation and performance pay affects worker sickness behaviour. We want to remedy this with our study. Furthermore, while there exist numerous studies on how performance pay and team organisation affect wages, the number of studies of how worker sickness absence behaviour is affected by these practices is quite limited, thus increasing the value-added of our study.

Firms introduce incentive pay for a number of reasons. The main reason is related to the solving the problem caused by the unverifiable nature of worker's provision of effort. If effort only was verifiable and observable, then it could always be contracted upon. However, in many cases employers face an even larger informational problem since neither effort nor what this effort produce is observed or verified.[1] The literature on performance pay often identifies positive effects on both firm performance (Lazear, 2000; Shearer, 2004; Bandiera et al., 2005) and worker pay (Parent, 1999; Barth et al., 2008b). For example, Lazear (2000) observes a 44 percent

[1] On the other hand, we cannot exclude the possibility that in some cases employer introduce performance pay, not for providing incentives, but as a "good" desired by workers.

increase in the output per worker when performance pay is introduced.[2] On similar Norwegian data, Barth et al. (2008b) identify a 2-4 wage premium associated with performance pay.

A related question is how the provision of incentives affects intrinsic and extrinsic motivation (Deci ,1975; Benabou and Tirole, 2003; Ellemers et al., 2005). A common element in these approaches is the suggestion that incentive schemes may actually reduce workers' intrinsic motivation and thus for our topic – worker absences – actually make sickness absences more likely. This is important, because performance pay is growing in importance. Even in a centralised economy as the Norwegian, the prevalence of performance pay has increased significantly from 1997 to 2003, with an observed "raw" increase in the range of 3.7-18.4 (7-22) percentage points depending on definition (predicted values controlled for size, bargaining regime, union density and industry in parenthesis) (Barth et al., 2008a). Internationally changes in payment methods also occur increasingly (Brown and Heywood, 2002).

When it comes to sickness absence we know that employers set wages while they take into account how costly absence is for them (Barmby et al., 1994; Engström and Holmlund, 2007). In the efficiency model of Barmby et al. (1994) firms pay higher wages to offset costly shirking as the costs of monitoring workers increase. Empirically firm provided labour contracts and financial incentives reduce absences as well (Barmby et al., 1995; Brown et al., 1999; Hassink and Koning, 2009).[3] Brown, Fakhfakh and Sessions studied profit-sharing, employee share ownership and absenteeism based on French Panel data on 127 firms from 1981 to 1991, and found that both profit-sharing and shared ownership significantly reduced the absence rate, but ownership shares more so. Hassink and Koning studied a lottery set up in two plants with capital-intensive production technologies of a large Dutch manufacturer employing 481 workers

[2] We can not exclude the possibility that this positive effect varies depending on the complexity of the job. Some studies argue that there is less of a gain (or no gain) when the job becomes more complex (Kuvaas, 2006).

[3] There is a rich literature showing that public negative financial incentives reduce the amount of sickness absences. Several studies address the issue of publicly financed sick pay. Barmby et al. (1995), Johansson and Palme (1996) and Henrekson and Persson (2004) find that when wages are cut whenever a worker is absent, then the absence rate drop. Johansson and Palme (2002) argue similarly that changes in the tax system over time in a country provide variation in the price of leisure (alternatively interpreted as the return on effort) of the worker, and in a fixed person effect duration approach they find that the cost of absence for the workers clearly affects work absence behaviour. For international comparisons of sickness absence, see Barmby et al. (2002).

using monthly data from the period 2001 to 2003. Participation in the lottery was contingent on not having been on sick leave for the last three months, and seven winners were picked randomly, receiving 75€ each in the form of coupons, and was made publicly known (winners were then excluded from future lotteries). The lottery was found to be highly beneficial for the firm, in that the decrease in sick leave exceed the cost of setting up the lottery. Not only did Hassink and Koning find that the lottery reduces sick leave by 1.6 percentage points, they observed that after winning the lottery, the winners resumed their previous absence behaviour (as expected if it was the prospect of winning the lottery which reduced their absence rate).

In a recent paper, albeit not focussing on the interplay between pay and the organisation of the workforce and related in scope to mine, Pouliakas and Theodoropoulos (2009) observe using UK WERS-data that in 1998 performance related pay was negatively associated with workplace absence rates.

Naturally firms also organise workers in teams for several reasons. Sometimes the firms organise their workforce into teams since the production structure it self directly involve teams, which sometimes increases the importance of the presence of a specific worker (in the O-ring production technology of Kremer (1993)). In other cases the involvement of co-workers makes it impossible to disentangle a specific worker's contribution to production very precisely and only the production of a group of workers can be observed adequately (Alchian and Demsetz, 1972). Under certain assumptions these informational imperfections may be overcome (Holmstrom, 1982). Finally, employers may also organise their workforce into teams as an incentive mechanism, hoping that peer pressure can alleviate the informational problems associated with each single worker's production (Kandel and Lazear, 1992).

Team work and team production do however present challenges for the firm, also when it comes to managing sickness absence. This is demonstrated by Heywood and Jirjahn (2004), which show theoretically that sickness absences could be more costly for firms using team production technology compared to no-team production technology (inspired by Kremer's O-ring technology). Thus team-firms monitor workers more intensively than no-team firms and thus empirically one should observe less sickness absence in team-firms than in no-team-firms. Empirically they find support for this prediction using data from a sample of German Manufacturing establishments.

Similarly, Nicholson et al. (2006) find supportive evidence when studying the effect of work loss on productivity with team production, where the loss increases the more heavily into team production the firm has invested.

Heywood and Jirjahn's analysis did address the issue of performance pay empirically, but found it of no empirical importance. We argue, however, that the presence of performance pay could crucially alter the empirical predictions of their theoretical model. If the presence of performance pay affects or alters firms' monitoring practices, this should also affect the empirical relationship between absence rates and the presence of teams.

The structure of the remainder of the paper is as follows: Section 2 discusses the Heywood and Jirjahn (2004)-model more closely, and derives how the presence of performance pay changes their model's empirical predictions on how teamwork affects workers' sickness absence rate. Section 2 also presents our empirical strategy. Section 3 describes the pay compensation for sickness absence system in Norway. Data is presented in Section 4. The impact of team and performance pay on absences is the topic of Section 5. In Section 6 we study if wages' degree of performance sensitiveness affects the sickness absence rates. Section 7 focuses on how the absence behaviour of workers is affected by pay under different regimes of teamwork and performance pay (and combinations thereof). Section 7 briefly concludes.

2. Team production, performance pay and the importance for sickness absence

2.1 Axiomatic illustration

Heywood and Jirjahn (2004) argue that while teamwork makes monitoring of the individual more difficult, it also becomes more important. In their model they assume that N identical workers maximize expected utility by choosing their absence level, a, while facing imperfect monitoring (each worker faces a probability $0<m<1$ of being monitored). Monitoring of the N workers is costly for the firm, Z(m), where Z'>0 and Z">0. Full sick pay is provided, except if the worker is caught shirking (illegal absence). Each worker maximizes:

$$1) \qquad [1-a+a(1-m)]U(w)+amU(R)-C(1-a),$$

where U expresses a Von Neumann-Morgenstern utility function, w is the current wage, R expresses the workers outside options, and C(.) expresses a convex cost function of providing effort as a function of a (C'>0, C">0).

Maximization of expected utility (w.r.t. a) then give: $m[U(w)-U(R)]=C'(1-a^*)$, i.e., the marginal cost of providing effort equals the marginal gain from the current job. Differentiation of the first-order condition for utility maximization then reveals that increased monitoring reduces absence. Furthermore, we also see that an increase in pay has a stronger negative impact on absence the more intensively the workers are monitored ($da^*/dW=-mU'/C''<0$).

Firm profit varies depending on whether the production technology is characterised by team production or not. Heywood and Jirjahn (2004) focus on the very short-run case where a firm can alter the monitoring intensity but neither employment nor pay.

Under team production, Heywood and Jirjahn assume that at least k workers have to be present for production to take place. Thus the profit may be described as:

$$2) \qquad \Pi^T=Pr(L \geq k;N, a)PQ-wN(1-am)-Z(m)N,$$

where P expresses the final product price, L is the number of present workers (N-L is absent), while assuming $\partial Pr(L \geq k;N, a)/\partial a<0$ and $\partial^2 Pr(L \geq k;N, a)/\partial a^2>0$.

$$3) \qquad \partial\Pi^T/\partial m=0 \rightarrow (\partial Pr(L \geq k;N, a)/\partial a^*)* (\partial a^*/\partial m)PQ-wN(a^*+m\partial a^*/\partial m)=Z'(m)N,$$

i.e., the marginal cost of monitoring should be equal to the marginal gain in expected revenue added the marginal reduction in sick pay.

Under no-team production, Heywood and Jirjahn assume that less than k workers still ensures production, but this then reduces production proportionally to those absent. Then the profit may be described as:

4) $\Pi^{NT}=\Pr(L \geq k;N, a)PQ+\sum^{k-1}\text{Prob}(L = l)Pl(Q/k)-wN(1-am)-Z(m)N$,

where the expression is identical to 2) except that you get an additional revenue term when fewer than k workers are present (l < k). Profix maximization for the non-team firms yields:

5) $\partial\Pi^{NT}/\partial m=0\rightarrow\ (\partial \Pr(L \geq k;N, a)/\partial a^{*})*(\partial a^{*}/\partial m)PQ+$

$$(\partial a^{*}/\partial m)*\sum^{k-1}(\partial \text{Prob}(L = l)/\partial a^{*})Pl(Q/k)- wN(a^{*}+m\partial a^{*}/\partial m)=Z'(m)N,$$

i.e., once again should the marginal cost of monitoring be equal to the marginal gain in expected revenue added the marginal reduction in sick pay.

Heywood and Jirjahn (2004) continue next by showing that under reasonable assumptions regarding the magnitude of sickness absence rates, $\partial \text{Prob}(L = l)/\partial a^{*}>0$ for all l<k, thus the extra revenue term $\{(\partial a^{*}/\partial m)*\sum^{k-1}(\partial \text{Prob}(L = l)/\partial a^{*})Pl(Q/k)\}$ so the marginal gain in revenue is less for the non-team firms compared to the team-production firms. Therefore team-firms monitor workers' absences more intensively than non-team firms do, and consequently team firms do experience lower absence rates than non-team firms.

What happens if one introduces a performance pay mechanism (albeit very simple) into this setting? Assume that both kinds of firms pay a fixed bonus, b, if the number of present workers reaches at least k workers. For the non-team firm a diminishing bonus is also paid when less than k workers show up. In this case the bonus becomes proportional to the number of workers present. For the team-firm no bonus is paid if less than k workers show up (and production commence). All workers, who are not caught shirking, receive the bonus if the bonus is paid.

Consider first the utility of the workers under these two regimes. Each worker maximizes:

6) $[1-a+a(1-m)]U(W)+amU(R)-C(1-a)$,

where $W=[w^{PP}+bP^i(a)]$ and i denotes either T or NT (team or non-team, respectively). Utility is assumed increasing in wages, but at a diminishing rate. EW is equal to w under fixed pay, so the fixed wage element w^{PP} is lower than w under fixed pay. If i=T (team-firm) then $P^T(a)=Pr(L \geq k;N,a)$, and when i=NT then $P^{NT}(a)=Pr(L \geq k;N,a)+\sum^{k-1}Prob(L = l)(1/k)$.[4] If Prob(L = l) can be assumed following a binomial distribution, we know that this density will be increasing monotonically, for then to decrease monotonically. Thus, given Heywood and Jirjahn's assumptions ($\partial Prob(L = l)/\partial a^*>0$) we know that $\partial^2 Prob(L = l)/\partial a^{*2}<0$. This implies that $P^{T\prime}(a)< P^{NT\prime}(a)<0$, $P^{T\prime\prime}(a)>0$ and $P^{T\prime\prime}(a)>P^{NT\prime\prime}(a)$. For simplicity we assume $P^{NT\prime\prime}(a)=0$. Utility maximization then results in:

$$\text{7)} \qquad m[U(W)-U(R)]-(1- a^*m)U'(W)bP^{i\prime}(a)=C'(1-a^*),$$

i.e., the marginal cost of providing effort equals the marginal gain from the current job, where this also includes a term expressing marginal effect of gaining the bonus element for non-shirking workers. Compared to the fixed pay case, absence is lower, since the gain is higher. Furthermore, we see that since $P^{T\prime}(a)<P^{NT\prime}(a)$, the marginal bonus gain from reduced absence is higher under team production than under non-team production, the optimal absence rate will, conditional on equal monitoring, be lower for the team firm than for the non-team firm.

While under fixed pay Heywood and Jirjahn's find that workers' absence rates react negatively when monitoring increases, i.e.,

$$\text{8)} \qquad \partial a^*/\partial m=-[U(w)-U(R)]/C''<0.$$

Qualitatively this will be unchanged under performance pay. However, the sensitiveness changes, since

$$\text{9)} \qquad \frac{\partial a^*}{\partial m} = \frac{[U(W)-U(R)] + aU'bP^{i}{}'(a)}{C''-2mU'bP^{i}{}'(a)+(1-am)b[U''P^{i}{}'(a)+U'P^{i}{}''(a)]}.$$

8) and 9) imply that $\partial a^{*Fixed\text{-}team}/\partial m=\partial a^{*Fixed\text{-}noteam}/\partial m<\partial a^{*PP\text{-}noteam}/\partial m<0$ and that $\partial a^{*Fixed\text{-}team}/\partial m=\partial a^{*Fixed\text{-}noteam}/\partial m<\partial a^{*PP\text{-}team}/\partial m<0$ (where PP denotes performance pay). If the two

[4] The probabilities arise since the expected value of an indicator function for an event is equal to the probability of the event.

kinds of firms monitor equally intensively, then clearly $\partial a^{*PP\text{-}noteam}/\partial m < \partial a^{*PP\text{-}team}/\partial m$, and even when the monitoring change, this may be true.

But firms' monitoring practice is also affected by the introduction of performance pay. To see this, consider Equations 2) and 4). In this case, they change to Equation 10) and 11) for the team firm and the non-team firm respectively:

$$10)\qquad \Pi^{T}=\Pr(L \geq k;N, a)PQ-[w^{PP}+ b\Pr(L \geq k;N, a)]N(1-am)-Z(m)N,$$

$$11)\qquad \Pi^{NT}=\Pr(L \geq k;N, a)PQ+\textstyle\sum^{k-1}\text{Prob}(L = l)Pl(Q/k)-$$
$$[w^{PP}+b\Pr(L \geq k;N, a)+\textstyle\sum^{k-1}\text{Prob}(L = l)(bl/k)]N(1-am)-Z(m)N,$$

where the notation is as previously defined.

Profit-maximization w.r.t. the monitoring level yields for the team-production firm:

$$12)\qquad \partial\Pi^{T}/\partial m=0\rightarrow(\partial\Pr(L \geq k;N, a)/\partial a^{*})*(\partial a^{*}/\partial m)PQ-$$
$$[w^{PP}+b\partial\Pr(L \geq k;N,a)/\partial a^{*})*(\partial a^{*}/\partial m)]N(a^{*}+m\partial a^{*}/\partial m)=Z'(m)N,$$

and similarly for the non-team firm:

$$13)\qquad \partial\Pi^{NT}/\partial m=0\rightarrow (\partial\Pr(L \geq k;N, a)/\partial a^{*})*(\partial a^{*}/\partial m)PQ+$$
$$(\partial a^{*}/\partial m)* \textstyle\sum^{k-1}(\partial\text{Prob}(L = l)/\partial a^{*})Pl(Q/k)-$$
$$[w^{PP}+b\partial\Pr(L \geq k;N, a)/\partial a^{*})*(\partial a^{*}/\partial m)+ (\partial a^{*}/\partial m)* \textstyle\sum^{k-1}(\partial\text{Prob}(L = l)/\partial a^{*})(bl/k)]N(a^{*}+m\partial a^{*}/\partial m)$$
$$=Z'(m)N.$$

Although $\partial a^{*}/\partial m$ change, we see that the introduction of the bonus element may cause monitoring to decrease for the team-firm, while the opposite may be true for the non-team firm. For both kinds of firms the introduction of performance pay partly pass on the cost of absence from the employer to the workers, but more so for the team firm than for the non-team firm.

Thus Heywood and Jirjahns's main empirical prediction – team firm monitor more than non-team firms and thus experience lower absence rates – is still valid, but only when firms are providing fixed pay. Under a performance pay regime, this relationship may change.

Finally, since $da^*/dW=-mU'/C''<0$ in the fixed pay case, increasing the wage reduces the absence rate for both kinds of firms, but due to more intensive monitoring, absence drops more steeply for the team firms than for the non-team firms. Under performance pay this relationship may twist around, since da^*/dW becomes:

$$14) \qquad \frac{da^*}{dW} = -\frac{mU'(W)-(1-am)U''bP^{i}{}'(a)}{C''-2mU'bP^{i}{}'(a)+(1-am)b[U''P^{i}{}'(a)+U'P^{i}{}''(a)]},..$$

2.2 Empirical strategy

The axiomatic illustration provides two hypotheses: i) one regarding the level of absences and how this is related to teams and performance pay, and ii) that wages affect absence probability differently depending on team organization and the provision of performance pay.

My empirical strategy is based on the panel structure of the data (see the data section for more details). Data comprise complete worker information on absences and pay during the period 2000(excluded 1.quarter absences) to 2004. Information on employer pay practices and team organisation is taken from questionnaires conducted winter 1997 and winter 2003. I primarily focus on comparison between workers employed at workplaces paying fixed pay and no team-organising and workers employed at workplaces introducing performance pay and/or term organising between 1997 and 2003.

First, to address the issue of how absences are related to team and performance pay, I run simple Poisson regressions of the number of sick days on dummies for teams and performance pay and other controls using panel data observations during 2001 to 2004. Log number of work days is used as an offset variable.

However, employers introduce teams and performance pay for reasons, whereof one could be the absence behaviour of workers. Furthermore workers sort into and out of these firms depending on pay and organization. Thus potentially the introduction of a pay/organisation practice, the realisation which we measure winter 2003, could be the result of worker absence behaviour 2001-2002 (admittedly the period autumn 1997 to 2000 is longer and thus it is more likely it occurred during this period). Thus these dummies can be interpreted as endogenous variables.

The IV-method is therefore applied and in a first step the probability of introducing performance pay and the probability of introducing teams using ordinary logistic regression are estimated. The instrument vector comprises the average absence rate 1995-96 of workers whom left the workplace before 2000 (from here on called movers), these workers absence rate growth from 1995 to 1996, and these workers average pay 1995-96. I follow a similar approach when analyzing team incentive pay and individual performance pay.

This approach implies that I condition on workplace pre-history when it comes to absences, but only for workers who do not contribute to the absence rates during the period 2001-2004 (the movers). The second step then introduces the predicted probabilities instead of the dummies. To provide information on the strength and appropriateness of my instruments, I conduct the same regressions applying linear panel data regressions with endogenous covariates. For these regressions econometric theory provides over-identification tests and tests for instrument strength (results are presented in the appendix).

As a further test, I also run simple Poisson regression of the number of lost work days on how much of the pay is usually related to the performance (as a rate).

Second, to address the issue of how sensitive workers' absence behaviour is to wages under the different regimes, I utilise the panel structure of the data and run conditional Poisson regressions (fixed job effect) of the number of absence days on daily wages and controls. Log number of work days is either used as an offset variable or as a control variable. The conditional Poisson approach is chosen instead of conditional NB regression, since the latter is less robust. The Poisson fixed effect model is consistent under much weaker distributional assumptions (Cameron and Trivedi, 2005: 806).

3. The Norwegian sick pay system

The Norwegian sick pay system is prototypical of a generous welfare state. Workers are provided complete compensation for 1 year if earnings are less than 6G (G=baseline level public social insurance system, roughly 48 377 Nok in 2000 and increasing to 58 139 Nok in 2004). The employers are free to offer top-up compensation for workers earning more than 6G (40% of the private sector workplaces in our data offer top-up in 2003). In 2004 45 percent of all private sector (excluded public administration, health care and education) workers earned more than 6G. The employer-provision of top-up sick pay compensation is is seen in other welfare countries as well (Barmby et al., 2002).

While one uses the phrase "complete compensation", it is important to note that this necessarily does not mean that all pay is compensated fully. First, for workers operating under a performance pay regime based on individual performance, bonuses will often not be compensated. If the absence is detrimental to team performance, then bonuses can be lost also under a regime with team incentive devices. Thus under performance-pay it is hard to talk about full compensation. Close to 50% of Norwegian private sector workers operate in 2003 under a regime of performance pay (Barth et al., 2008a), thus a substantial proportion of Norwegian workers cannot be said to experience complete compensation. Furthermore, when you are absent from work you loose out on opportunities at work providing other extra pay, for instance overtime payment. Finally, certain non-wage elements are not compensated fully.

Usually each worker have up to 4 periods of 3 absence days based on own declaration of illness. After that all absences regardless of longevity have to be physician-certified. The firms are free to extend the number of absence periods and/or absence lengths (in our data 26% of the workplaces provide such extensions in 2003). As is described in the data section, our data comprise information on physician-certified absences only, so workers' short-term self-certified absence behaviour is not analysed empirically.

Increasingly Norwegian workplaces have been joining or signing the Treaty for an inclusive work life. This is a treaty between employers, trade unions and the public authorities, which purpose is to curb sickness absence, and ensure work participation of elderly and disabled worker (workers with reduced work capacity).

The first 16 days of the absence spell are covered or paid by the employer. The remaining spell is covered by the public authorities.

4. Data

My analyses are based on the linking of two kinds of data sets. The *first* two data sets comprise questionnaires, the Norwegian Workplace and Employment Relationship Survey 1997 and 2003 (NWERS1997, NWERS2003), answered early winter 1997/2003 by the daily manager or personnel manager of roughly 2300 Norwegian establishments from both public and private sectors. These establishments are sampled from establishments with more than 10 employees. Furthermore, the sample is constructed so that large establishments are over-sampled (for example, all establishments with more than 300 employees are included in the sample). The NWERS-establishments employ over 350 000 workers, i.e., nearly a fifth of the Norwegian workforce. The sampling procedure and the questionnaire (NWERS2003) are described in Holth (2003). The questionnaire covers topics such as compensation, work practices and organisation issues. It is quite similar to questionnaires found in many countries, for example, in the United Kingdom (work and employment relation surveys (WERS)) and in France (Reponse).

For my purpose, the questions regarding team organisation, worker pay determination and pay compensation related to absences are particularly interesting. Thus the questionnaire provides information on whether workers' wages are performance related (surplus or profit sharing regime, individual- and group piece-rate, commissions, group bonuses, individual bonuses) or if they are fixed. It also provides information on whether top-up compensation is provided to absent workers (ensuring full pay compensation for absent workers). We also know whether the workforce (main occupational group) was organised in teams or not.

The *second* data set, or more precisely, data system, is based on public administrative register data. It comprises *all* firms, workplaces and employees (incl. executives) in Norway 1995–2004 (roughly 140000 firms, 180000 workplaces and 2000000 employees each year) employed May 15th each year. This linked employer-employee data set provide information on workers (incl. executives) (sickness absence spells (from April 1., 2000 and onwards) and sick pay spells[5], physician-certified illness diagnosis, gender, educational qualifications, income, occupation (2003)), jobs (for example spell length in days and thus seniority, spell-specific earnings and thus combined with spell length daily wage, weekly working hours (intervals, exact hours 2002-2004), hourly wage (only 2002-2004, calculated from earnings, spell length and exact weekly working hours), and firm-and establishment identifying numbers, industry (5-digit NACE), sector and municipality.

In the Norwegian public administrative registers each individual, each establishment and each firm are identified by unique identifying codes (separate number series). In our data, these original numbers are replaced by encrypted numbers.

When we link the questionnaires and the register data, and focus on the private sector questionnaire panel workplaces (those existing in both 1997 and 2003) we end up with 820 private sector workplaces and 167 168 workers, 171 136 jobs and 496 006 observations covering the period 2000-2004. To highlight a causal impact of performance pay and team organisation I discard observations of workplaces providing performance pay and team organisation both in 1997 and in 2003 (according to the questionnaire). Furthermore, since the Norwegian sickness absence register was established April 1, 2000, in the econometric analyses of sickness absence rates I discard observations from 2000. Thus the econometric analyses rest on roughly 45 000 observations of 10 000 workers and 170 workplaces during the period 2001-2004.

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[5] I know the start and stop date of an absence spell. Similarly, we know the start and stop date of a job spell. Thus when we later measure absence days relative to the number of work days this implies a certain degree of measurement errors. Both job spells and absence spells contain weekends and public holidays. I have chosen this approach since we do not know if a worker really works on weekends and public holidays, or if he or she is off work.

5. Workers' sickness absences, team organisation and performance pay

We start our analyses by providing simple descriptive statistics as a background for the econometric analyses which follow. Table 1 describes key variable worker averages over our period of observation (2000-2004) for all workers, and for four different categories of workplaces depending on team organisation.[6]

We see that a strong majority of the workers (over 61 percent) is employed under team organisation both in 1997 and 2003. Only 8.6 percent of the workers are employed at workplaces where team organisation does not occur during our period of observation. Roughly 18 percent of the workers are employed at workplaces introducing team organisation between 1997 and 2003. When it comes to performance pay this is more equally distributed, but a majority of the workers are employed under performance pay regimes. Still, over 28 percent of the workers are employed under fixed pay only. When team organisation is attempted the sickness absences rate more than 10 percent lower than otherwise (0.06 vs. 0.069).

[Insert Table 1 around here]

But Table 1 also reveals that the workplaces differ depending on team organisation. Workplaces organised in teams both 1997 and 2003 are on average larger, they pay higher wages, they provide performance pay more often, have a higher educated workforce, less involved in trade ,but more involved in services and construction. They also experienced stronger positive growth in the sick pay rates of their moving employees during 1995 to 1996.

Workplaces introducing team organisation before 2003 have roughly average size and average educated workforce, they provide fixed pay less often, more involved in trade, and less involved in business services. They also experienced higher average sick pay rate of their moving employees during 1995 to 1996.

[6] The four categories are: 1) teams are deployed neither in 1997 nor in 2003, 2) teams are introduced in during the period 1997 to 2003, 3) teams are deployed both in 1997 and in 2003, and 4) team production is stopped/dismantled during the period 1997 to 2003.

Workplaces not employing team organisation in 1997 or 2003 are smaller than average size, they provide fixed pay more often, sickness absence rates are higher, their workforce is less educated, they are more involved in communication, and less involved in manufacturing. The growth in the sick pay rate of moving employees from 1995 to 1996 was also higher.

In the econometric analyses I focus on a limited sample of these workplaces and their workers. As the reference group I chose workplaces where neither team organisation nor performance pay is provided during our period of observation. To lend support to a causal interpretation of the impact of team and performance pay in my analyses, I then focus on workplaces either introducing performance pay or team organisation or both during the period 1997 to 2003. Thus I discard the majority of my observations, and limit the econometric analyses to roughly 45 000 observations on 160 workplaces only. This is clearly a highly selected sample.

In the next regressions I study using Poisson regressions how the absence rates of workers (the number of absence days for a worker relative to the number of work days) is affect-ted by the introduction of team organisation and performance pay. Since team organisation and performance pay obviously can be interpreted as endogenous variables in these absence regres-sions and thus causing biased estimates, I use an IV-approach to control for this potential bias.

In first-step regressions the probabilities of introducing teams and introducing performance pay are estimated on the second steps controls and three instruments (which are excluded in the second step regressions). The three instruments are i) the workplace average sick pay rate 1995-1996 for movers (employees which left the workplace no later than 1999), ii) the growth in workplace sick pay rate from 1995 to 1996 for movers, and iii) average daily wage 1995-1996 for movers. I would argue that these variables may potentially affect or be related to whether or not an employer chooses to introduce team organisation or performance pay during 1997 to 2003. At the same time, since these workers (the movers) have left the workplaces, it is hard to see that their absences in 1995-1996 can affect the absence probabilities of workers from 2001 and onwards.

Tables A1-A3 present the first-step regressions. We estimate and predict the probability of introducing team or performance pay based on logistic regressions. However, since there is no well-established practice of presenting information on instruments in non-linear regressions, Table A1 presents such figures if linear IV-regressions (linear probability models) were used instead (see discussion in Dagenais (1999)). Table A1 presents the estimates associated with the instruments, as well as the F-value of a test for the strength of the instruments and the P-values of Hansen over-identification test. Table A1 shows that the over-identification test is satisfied (on a 10-percent level), and that in this linearly case, the instruments perform satisfying in case of introduction of teams. For performance pay, the instruments should ideally be stronger (a F-value over 10 is a rule of thumb), particularly when we add controls for industry and wages.

Table A2 then presents the corresponding logistic regressions which are used for predicting the probabilities, while Table A3 presents logistic regressions of the probabilities of introducing different kinds of performance pay. I am able to differentiate between individual incentive schemes and team-based incentive schemes. The same set of instruments as before is used, and this works as expected for team-based incentives. However, for individual incentive scheme the sick pay rate instruments did not have any explanatory power and thus is dropped. Instead I introduce a cross-term expressing the ratio of movers times mover's average daily wage, which strongly affects the probability of introducing individual-based incentive pay.

Finally, note that albeit it would be nice that the instruments have a causal impact on the variables that are instrumented, this is not necessary. The important trait is that these are strongly correlated with the variables that are instrumented and that they are uncorrelated with the absences rates in the second step. This I argue is satisfied.

Table 2 presents the results of the Poisson regressions of absence rates on team and performance pay indicators and controls. In all regressions I control for year dummies, woman, years of education, fulltime worker, experience (and squared), seniority (and squared), workforce size and an intercept, and log total number of work days is used as offset in all regressions. Since information on teams and performance can be considered workplace-specific, all standard errors are adjusted for clustering at the workplace level.

[Insert Table 2 around here]

In Model 1 only the dummy for introduced team is introduced. This reveals a strong negative correlation with absences. Then in Model 2 I add performance pay, and we see that team and performance pay are strongly associated with lower absence rates.

In Model 3 I repeat the analysis of Model 2, but enter the predicted probabilities instead. This causes qualitatively important changes. If the predicted probability of introducing teams increases, we no longer observe any significant impact on the absence rates, and the point estimate is even positive. For performance pay we still observe a strong and highly significant negative impact on the absence rates. In Model 4 I add rough controls for industry (basically 4 dummies), and this only enforce the results of Model 3. Model 5 then explores the possibility that what matters is the provision of both performance and team organisation, but no empirical evidence is found suggesting that such a cross-effect is of any importance.

In Model 6 I finally add control for workers wages, and any significant impact associated with performance pay disappears. Thus performance pay only works through the provision of wages, and when the importance of wages is controlled, performance pay has no additional effect. However, what is striking, is that conditioned on wages, we observe a positive and significant impact on the absence rate of introducing team organisation.

In a survey on the literature of productivity and firm based incentives, Prendergast (1999:41) argues that team incentives reduce the effort of the most able and possibly increase the effort provision of the least able, or alternatively, that the most able workers leave the firm providing team incentives on behalf of getting jobs in firms providing individual performance pay. This, however, contrast team- versus individual-incentives, and does not reveal worker preferences for teamwork and not teamwork. On the other hand, Barton et al.(2003) show that high productivity workers prefer team-work, while the opposite is true for low-productivity workers. The results of Table 2 can be interpreted as if the introduction of team production affects the workforce composition w.r.t. health and ability. When team organisation is introduced only healthier workers or more able workers stay (on the margin). Since we are not able to control health/ability in the regressions, the parameter associated with the team dummy becomes strongly negative. However, this is really caused by an omitted variable bias, following the omission of health/ability. When we instrument or add daily wage as a control, particularly since wages can be assumed to be strongly correlated with ability, we eliminates the bias caused by this omission, and find that given control for ability (wages) the free-riding possibilities provided by team work actually increases absences.

In these analyses we did not take into account that the way performance pay is implemented, can be of importance for worker absence behaviour. We know from the literature on wages and the provision of incentives, that individual and team-incentive mechanisms affect workers differently. Is this the case for worker absences as well? To address this issue we repeat several of Table 2's regressions, but differentiate between team incentives and personal incentive schemes. The results are presented in Table 3.

[Insert Table 3 around here]

In Model 1 we add dummies for the introduction of team incentive pay or individual performance pay and the dummy for introduction of team organisation. While the point estimate is negative, individual performance pay does not correlate significantly with workers' absence rates. Both team organisation and team-based incentive pay, however, are clearly associated with lower absence rates. Next in Model 2 we add controls for industry, and team organisation becomes insignificant (albeit a negative point estimate). Thus the lower absence rates associated with team organisation is related how team organisation and absences vary between industries.

In Model 3 I instrument team and the performance pay measures. Once again we see that increased predicted probability of introducing team organisation has little impact on workers' absence behaviour. However, both the predicted probabilities of introducing team-incentives or personal incentives are strongly associated with reduced absence rates. Finally, by controlling away the importance of wages in Model 4, we show that the different performance pay mechanisms have no additional impact on absences in excess of wages.

6. How is the workers' sickness absences affected by how sensitive pay is to performance?

Does it matter for workers' sickness behaviour if pay is highly sensitive to performance or not? For our different categories of performance pay (profit sharing, individual bonus, group bonus, piece rate and so on) we know the average rate of the pay that is sensitive to performance, thus we can derive three measures capturing how sensitive wages are to performance: i) average rate, ii) average rate for individual incentive pay, iii) average rate for team-based incentive pay. If we focus on the workplaces providing performance pay, we see that in most workplaces the bonus elements (regardless whether they are individual- or team-related) comprise less than 30 percent of total pay, and that in most workplaces the performance pay elements only constitute a small part of total pay. Figure 1 shows the kernel density estimates of the distribution of workplace pay-performance rates (i.e., the usual rate of performance pay relative to total pay).

[Insert Figure 1 around here]

Then we run Poisson-regressions of the number of lost work days on these pay-performance sensitiveness measures. Table 4 presents the results.

[Insert Table 4 around here]

In Model 1 we only incorporate the workplace average pay-performance rate, which measures zero if performance pay is not in use. This reveals no significant impact on the absence rate. A squared term is incorporated into Model 2. This reveals that the pay-performance rate reduces the sickness absence rate for small pay-performance values, but this negative impact diminishes, and for values above 40 percent appears to increases the absence rates. However, we know that the number of workplaces relying heavily on performance pay is few, and this positive "effect" really follows from our modelling approach.

Models 3 and 4 study team-incentives and individual incentives similarly to models 1 and 2. For individual incentives we observe the same diminishing impact as reported under Model 2. For team-based incentives we find no significant impact, although the point estimates indicate a diminishing impact. In Model 5 we replace the team-incentive rates with a dummy for the provision of team incentives, and this reduces absence rates significantly. Finally, in Model 6 we add controls for 2-digit industry and wages, and this completely removes any impact from individual-incentives and teams, and we are left with the result that the provision of team-based incentives reduces the sickness absence rate of workplaces.

7. How is the workers' sickness absences affected by pay under team organisation and performance pay?

In this section we address how sensitive workers absence behaviour is to pay under different pay and work organisation regimes. The empirical prediction from Section 2 implied that $da^{*Fixed\text{-}team}/dW < da^{*Fixed\text{-}non\text{-}team}/dW<0$ but that $da^{*PP\text{-}non\text{-}team}/dW<> da^{*PP\text{-}team}/dW$. The empirical approach is simple, we run conditional Poisson regressions controlling away fixed job effects and time-varying controls as seniority squared, experience squared, being a fulltime worker, and even years of education (which may vary if workers change their educational qualification). The key variables are the job-specific daily wage, and this crossed with different dummies for team and pay schemes. The reference case is neither introduction of teams nor performance pay, and this is captured by the parameter associated with the daily wage only. In one of the regressions we keep log total number of work days as an offset variable (Model 1), but in most cases we estimate this impact as well. This is done so we are able to correct the standard errors for clustering at the workplace level (but not in Model 1). What do we find? Table 5 presents the results.

[Insert Table 5 around here]

Model 1 reveals strongly negative relationship between wages and absence under fixed pay and no team organisation. However, absences are even more sensitive to wages if team organisation is introduced (and not performance pay) or if performance pay is introduced (but not teams). Only in the case of introducing both performance pay and teams do we find a weaker relationship between wages and absences than the reference case. In Model 2 we repeat the analysis, but estimate the parameter associated with log number of work day, and adjust the standard errors for workplace level clustering. As is seen in Table 4, this caused negligible differences compared to the estimates of Model 1. Thus our results largely confirm our expectations, at least with one exception. Given the results of Section 2, we expected that absences should be less sensitive to wages under performance pay with non-team production than our reference.

In models 3 and 4 these analyses are repeated, while we differentiate between team-and personal-incentive pay. This highlights once again important differences between team organisation and incentives. For the reference case and for team organisation but not performance pay we observe small changes. However, absences become less sensitive than the reference case if both team organisation and team incentives are introduced. The same is true for team organisation and personal incentives. On the other hand, introducing team-incentive pay does not only alter absences sensitiveness to wages compared to the reference case. Introducing individual but not team incentives, strongly increases the negative relationship between absences and wages.

7. Conclusion

Performance pay is on the rise in Norway, while changes in payment methods occur increasingly internationally. Team organising is equally prevalent in most modern economies. At the same time we know that the costs of sickness absences constitute a heavy burden on private businesses and public-finances alike, and that these costs have not diminished over time. This begs the question how performance pay and team-work organising affect workers' sickness absences.

Could it be that the flip-side of the productivity- and wage-enhancing effects of performance pay and team-work organising, is increased sickness absence?

In this study we have looked more closely on the implications of performance pay incorporated into Heywood and Jirjahn's model of team-production vs. non-team production. The original model predicted that higher monitoring among team-production firms should cause lower absence rates among team-production firms than among non-team production firms, this may not be true under performance pay. Empirically we identified no significant causal impact of team work on workers' absence behaviour, but strong sickness absence seems to reduce the impact of introducing performance pay. Thus, while Heywood and Jirjahn (2004) observed a negative correlation between absences and team work, no attempt was made to causally identify the impact of team work on absences.

Our findings, with similar "raw" correlation, imply that healthier and more able-bodied individuals prefer team work, thus causing a negative correlation. When one controls for this selection, this negative correlation disappears and even becomes positive. Finally, we have seen that wages affect absences differently depending on team organisation and performance pay. As indicated by Heywood and Jirjahn (2004), higher wages reduce the absence rates more strongly under team work than under non-team work conditioned on fixed pay. Empirically we find that performance pay in non-team work organisations yields similar negative relationship between absences and wages as team work with fixed pay. However, the joint introduction of performance pay and team work causes this negative relationship to weaken, since there is a diminishing worker utility of wages, and a higher wage implicitly implies that workers are more likely to have received the bonus and enough workers are present so production commenced.

Do our results imply that team work and performance pay qualitatively change workers' sickness absence behaviour? The average sickness absence rate for non-team workplaces providing fixed pay is 8.1 percent. The similar rate for workplaces providing performance pay or team work is 6.4. The difference implies a 20 percent drop in sickness absence rates. A reduction in absence rates of this magnitude has to be defined as considerable. The predicted impact of performance pay is even stronger. 1 percentage point increase in the predicted probability of introducing performance pay decreases the absence rate by close to 1 percent. If all workers were employed under performance pay, our estimates would imply a drop in the absence rate of 65 percent. This reduction in the absence rate is not the result of workers becoming healthier, but occurs because under performance pay workers and firms share the costs of sickness absence. If rising public costs associated with sickness absence is an issue, a lesson or a policy implication to be drawn from this study would be that public authorities should endorse the introduction of performance pay.

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Table 1 Descriptive statistics – NWERS panel workplaces and their jobs from 2000 to 2004.

	All	No teams	Introduce teams	Teams	Dismantle teams
No teams	8.6	1	0	0	0
Introduce teams	18.1	0	1	0	0
Teams	61.8	0	0	1	0
Dismantle teams	11.5	0	0	0	1
No performance pay	28.5	46.0	26.8	24.9	37.4
Introduce performance pay	17.8	12.3	19.2	17.9	19.3
Performance pay	31.5	17.2	30.4	35.4	20.4
Drop performance pay	21.8	20.3	23.6	21.8	22.9
Sickness absence days/work days	0.060	0.069	0.059	0.059	0.061
Sickness absence days/work days-Intro.PP	0.054	0.076	0.053	0.053	0.049
Sickness absence days/work days-Fixed pay	0.066	0.081	0.070	0.061	0.069
Daily wage	918.0	690.4	885.3	982.2	795.1
Years of education	3.2	2.7	3.1	3.4	2.9
Workplace size	448.4	236.4	309.8	544.7	307.0
Workplace sick pay rate 1995-96-Movers	7.1	6.3	7.0	6.3	12.1
Workplace sick pay rate 1995-96-Stayers	2.9	3.0	2.9	2.8	3.2
Workplace growth sick pay rate 1995-96-Movers	-0.3	0.8	0.3	1.0	-8.8
Workplace growth sick pay rate 1995-96-Stayers	0.2	0.9	0.3	0.0	0.3
Workplace daily wage-Movers	621.1	433.9	592.7	675.5	519.8
Workplace daily wage-Stayers	697.8	560.2	676.7	740.7	606.4
Manufacturing	51.0	21.1	53.3	53.0	58.6
Power	0.7	0	1.5	0.7	0
Trade	11.8	25.5	20.1	7.0	14.3
Communication	6.7	28.2	5.0	4.7	4.1
Construction	4.4	2.4	2.1	5.7	2.8
Service	11.0	7.2	5.3	14.3	5.0
Business	14.5	15.5	12.6	14.7	15.3
The number of workplaces	820	142	183	372	123
The number of workers	152406	15591	26821	92528	19446
The number of observations	450852	38879	81459	278709	51805

Note: All rates are measured in percent. Movers denotes workers leaving the workplace before 2000, while Stayers denotes workers employed by the workplace at least year 2000 but also possibly later. Population: workers between 20 and 60 years of age (during our observation period) earning an hourly wage of at least 30 Nok and less than 3000 Nok.

Table 2 The impact of teams and performance pay on the number of lost work days due to sickness absence.2001-2004.

	Poisson		IV-Poisson		IV-Poisson		Poisson
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Introduced teams	-0.168*	-0.142*					-0.084
	(0.067)	(0.063)					(0.061)
Introduced performance pay (PP)		-0.166**					-0.127**
		(0.061)					(0.049)
Pred. prob. intro teams			0.126	0.239	0.225	0.625**	
			(0.118)	(0.139)	(0.235)	(0.171)	
Pred. prob. intro PP			-0.746**	-0.936**	-1.347*	-0.883	
			(0.241)	(0.261)	(0.612)	(0.510)	
Pred. prob. intro teams and PP					0.398	0.747	
					(0.638)	(0.438)	
Workplace workforce size/100	0.042**	0.041**	0.048**	0.042**	0.039**	0.051**	0.039**
	(0.009)	(0.007)	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)
Daily wage/100						-0.239**	-0.245**
						(0.026)	(0.100)
+ log total work days as offset	Yes	Yes	Yes	Yes	Yes	Yes	Yes
+ controls for industry (4 dummies)				Yes	Yes	Yes	
+ controls for industry (2-digit SIC)							Yes
+ controls for year dummies, women, years of education, fulltime worker, experience (and squared), seniority (and squared) and an intercept in all regressions.							
Pseudo R2	0.062	0.064	0.067	0.070	0.065	0.145	0.135

Note: 45416 observations of workers employed at workplaces neither employing teams nor performance pay, or of workers employed at workplaces introducing teams or performance pay during the period 1997 to 2003. Dependent value is the number of physician certified sick-leaves for a worker during an employment spell within a year. In models 3-6 the probabilities of introducing teams and performance pay have been estimated in a first step (see tables A1-A2. Robust standard errors presented in parentheses are adjusted for clustering at the workplace level. ** and * denote 1 and 5 percent level of significance, respectively. Full regression results available from the author upon request.

Table 3 The impact of teams, team incentives and personal performance pay on the number of lost work days due to sickness absence.2001-2004. Poisson.

	Poisson		IV-Poisson		Poisson
	Model 1	Model 2	Model 3	Model4	Model5
Introduced teams	-0.138*	-0.092			-0.081
	(0.061)	(0.063)			(0.059)
Introduced team performance pay	-0.184**	-0.166**			-0.166**
	(0.067)	(0.062)			(0.059)
Introduced personal performance pay	-0.134*	-0.107			-0.084
	(0.078)	(0.077)			(0.060)
Pred. Prob. Introduced teams			0.007	0.022	
			(0.126)	(0.052)	
Pred. Prob. Introduced team performance pay			-0.407**	-0.015	
			(0.204)	(0.063)	
Pred. Prob. Introduced personal performance pay			-0.610**	-0.014	
			(0.229)	(0.071)	
Workplace workforce size/100	0.042**	0.034**	0.035**	0.042**	0.039**
	(0.006)	(0.009)	(0.010)	(0.009)	(0.008)
Daily wage/100				-0.231**	-0.225**
				(0.023)	(0.023)
+ log total number of work days as offset	Yes	Yes	Yes	Yes	Yes
+ controls for industry (4 dummies)		Yes		Yes	
+ control for industry (2-digit SIC)					Yes
+ controls for year dummies, women, years of education, fulltime worker, experience (and squared), seniority (and squared) and an intercept in all regressions.					
Pseudo R2	0.064	0.065	0.066	0.070	0.135

Note: 45416 observations of workers employed at workplaces neither employing teams nor performance pay, or of workers employed at workplaces introducing teams or performance pay during the period 1997 to 2003. Dependent value is the number of physician certified sick-leaves for a worker during an employment spell within a year. In models 3-4 the probabilities of introducing teams and performance pay have been estimated in a first step (see tables A1-A3. Robust standard errors presented in parentheses are adjusted for clustering at the workplace level. ** and * denote 1 and 5 percent level of significance, respectively. Full regression results available from the author upon request.

Table 4 The impact of teams and average pay-performance rates on the number of lost work days due to sickness absence.2001-2004. Poisson regressons

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Introduced teams	-0.172*	-0.158*	-0.173*	-0.155*	-0.125*	-0.069
	(0.069)	(0.067)	(0.070)	(0.068)	(0.062)	(0.059)
Average pay-performance rate	-0.096	-1.952**				
	(0.222)	(0.724)				
Average pay-performance rate^2		0.023**				
		(0.008)				
Average individual pay-performance rate			-0.073	-1.929**	-2.341**	-0.710
			(0.549)	(0.623)	(0.585)	(2.125)
Average individual pay-performance rate^2				0.021**	0.029**	0.007
				(0.007)	(0.008)	(0.146)
Average team pay-performance rate			0.069	-1.711		
			(0.149)	(1.045)		
Average team pay-performance rate^2				0.021		
				(0.012)		
Introduced team incentives					-0.195**	-0.158**
					(0.071)	(0.059)
Workplace workforce size/100	0.041**	0.041**	0.042**	0.041**	0.043**	0.039**
	(0.009)	(0.007)	(0.008)	(0.009)	(0.007)	(0.008)
Daily wage/100						-0.227**
						(0.023)
+ log total number of work days as offset	Yes	Yes	Yes	Yes	Yes	Yes
+ controls for industry (2-digit SIC)						Yes
+ controls for year dummies, women, years of education, fulltime worker, experience (and squared), seniority (and squared) and an intercept in all regressions.						
Pseudo R2	0.063	0.065	0.063	0.065	0.066	0.135

Note: 45416 observations of workers employed at workplaces neither employing teams nor performance pay, or of workers employed at workplaces introducing teams or performance pay during the period 1997 to 2003. Dependent value is the number of physician certified sick-leaves for a worker during an employment spell within a year. Robust standard errors presented in parentheses are adjusted for clustering at the workplace level. ** and * denote 1 and 5 percent level of significance, respectively. Full regression results available from the author upon request.

Table 5 The impact of pay on the number of lost work days due to sickness absence under team production, team incentive- and personal performance pay-regimes.2001-2004. Conditional Poisson (fixed job effect).

	Model 1	Model 2	Model 3	Model 4
Daily wage/100	-0.220**	-0.223**	-0.224**	-0.223**
	(0.001)	(0.016)	(0.016)	(0.016)
Daily wage/100 X Introduced teams, not performance pay	-0.062**	-0.060**	-0.059**	-0.060**
	(0.019)	(0.023)	(0.023)	(0.023)
Daily wage/100 X Introduced performance pay, not teams	-0.052**	-0.048**		
	(0.003)	(0.004)		
Daily wage /100X Introduced performance pay and teams	0.129**	0.123**		
	(0.002)	(0.026)		
Daily wage/100 X Introduced team-related performance pay, not teams			0.031	0.029
			(0.052)	(0.055)
Daily wage /100X Introduced individual-related performance pay, not teams			-0.118*	-0.120*
			(0.057)	(0.060)
Daily wage/100 X Introduced team-related performance pay and teams			0.129**	0.126**
			(0.027)	(0.028)
Daily wage /100X Introduced individual-related performance pay and teams			0.106*	0.100*
			(0.041)	(0.043)
Daily wage/100 X Introduced individual and team-related performance pay, not teams				0.025
				(0.119)
Daily wage/100 X Introduced individual-and team related performance pay, and teams				0.054
				(0.142)
Log total number of work days	Offset	0.155**	0.160**	0.161
		(0.083)	(0.082)	(0.083)
+ controls for year dummies, years of education, fulltime worker, experience (and squared), seniority (and squared), workforce size, and an intercept in all regressions.				
Log likelihood	-641309	-637577	-637157	-637143

Note: 40490 observations of workers employed at workplaces neither employing teams nor performance pay, or of workers employed at workplaces introducing teams or performance pay during the period 1997 to 2003. Dependent value is the number of physician certified sick-leaves for a worker during an employment spell within a year. Robust (not Model 1) standard errors are presented in parentheses. ** and * denote 1 and 5 percent level of significance, respectively. Full regression results available from the author upon request.

Figure 1 The pay-performance sensitiveness of performance pay provided under performance pay. Kernel density.

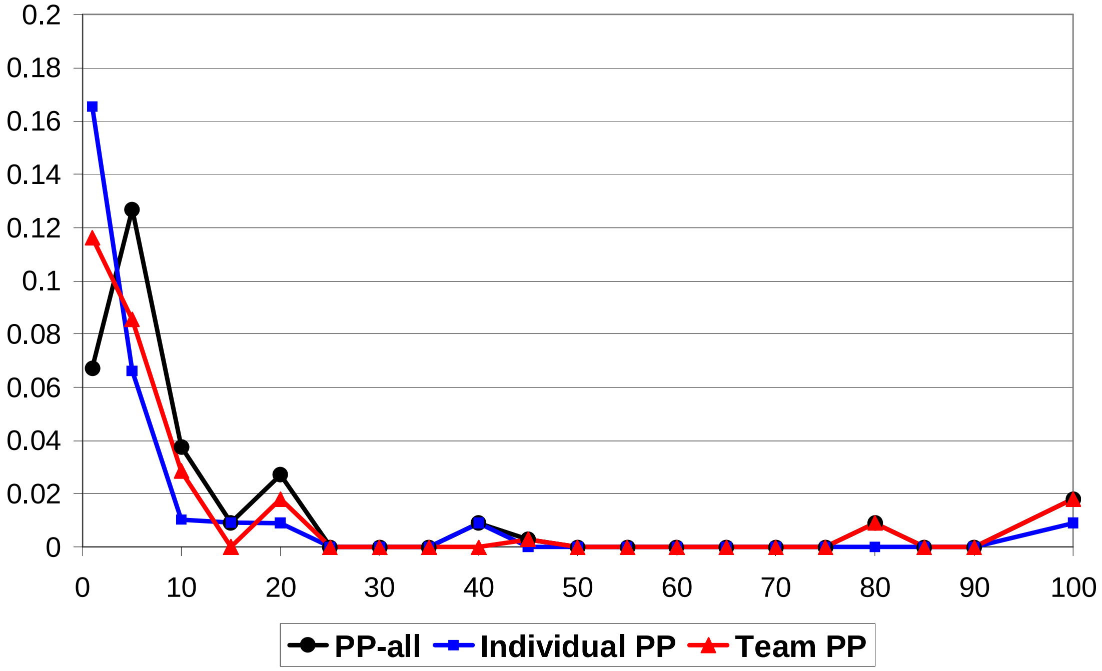

Table A1 Linear first step IV-regressions and 2 step over-identification tests. 2001-2004

	Model 1		Model 2		Model 3	
	PP-in	Team-in	PP-in	Team-in	PP-in	Team-in
Workp. sick pay rate 1995-96-Movers	-0.006	-0.027**	-0.008	-0.025**	-0.007	-0.025**
	(0.008)	(0.009)	(0.005)	(0.009)	(0.008)	(0.009)
Workp. growth sick pay rate 1995-96-Movers	-0.013**	0.005	-0.011*	0.007	-0.011*	0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Workplace daily wage-Movers	0.001**	0.001**	0.001*	0.001**	0.001*	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Controls:						
Daily wage					0.000	-0.000
					(0.000)	(0.000)
+ controls for industry (4 dummies)			Yes	Yes	Yes	Yes
+ controls for year dummies, women, years of education, fulltime worker, experience (and squared), seniority (and squared) and workplace workforce size and an intercept in all regressions.						
Test of excluded instruments F-value	7.58	21.78	4.1	10.7	4.1	11.8
Overid.-test Hansen P-value	0.13		0.15		0.18	

Note: 45416 observations of workers employed at workplaces neither employing teams nor performance pay, or of workers employed at workplaces introducing teams or performance pay during the period 1997 to 2003. Dependent value is a dummy taking the value of 1 if activity denoted by column head occurs, otherwise zero. The regressions can thus be interpreted as linear probability models. Robust standard errors are adjusted for clustering at the workplace level. ** and * denote 1 and 5 percent level of significance, respectively.

Table A2 Logistic regressions. 2001-2004. The probability of introducing team and/or performance pay

	PP-in	PP-in	PP-in	Team-in	Team-in	Team-in	Team-and PP-in	Team-and PP-in
Workp. sick pay rate 1995-96-Movers	-0.040	-0.068	-0.066	0.154**	0.154**	0.154**	-0.020	-0.017
	(0.051)	(0.067)	(0.063)	(0.056)	(0.056)	(0.056)	(0.067)	(0.068)
Workp. growth sick pay rate 1995-96-Movers	-0.072*	-0.069*	-0.068*	0.000	0.000	0.000	-0.091*	-0.091*
	(0.033)	(0.034)	(0.034)	(0.037)	(0.037)	(0.037)	(0.046)	(0.046)
Workplace daily wage-Movers	0.003**	0.002	0.002	0.007**	0.007**	0.007**	0.005*	0.004*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Controls:								
+ control for daily wage			Yes			Yes		Yes
+ controls for industry (4 dummies)		Yes	Yes		Yes	Yes	Yes	Yes
+ controls for year dummies, women, years of education, fulltime worker, experience (and squared), seniority (and squared) and workplace workforce size and an intercept in all regressions.								
Pseudo R2	0.152	0.210	0.210	0.273	0.372	0.373	0.361	0.363

Note: 45416 observations of workers employed at workplaces neither employing teams nor performance pay, or of workers employed at workplaces introducing teams or performance pay during the period 1997 to 2003. Dependent value is a dummy taking the value of 1 if activity denoted by column head occurs, otherwise zero. The regressions can thus be interpreted as linear probability models. Robust standard errors are adjusted for clustering at the workplace level. ** and * denote 1 and 5 percent level of significance, respectively.

Table A3 Logistic regressions. 2001-2004. The probability of introducing team-based performance pay and/or personal incentive pay

	Team-PP	Personal-PP	Team-PP	Personal-PP
Workp. sick pay rate 1995-96-Movers	-0.212*		-0.212*	
	(0.081)		(0.087)	
Workp. growth sick pay rate 1995-96-Movers	-0.192**		-0.192*	
	(0.056)		(0.056)	
Workplace daily wage-Movers	0.001	-0.002	0.001	-0.002
	(0.001)	(0.002)	(0.001)	(0.002)
Ratio of moversX Workplace daily wage-Movers		0.967**		0.962**
		(0.179)		(0.179)
Controls:				
+ control for daily wage			Yes	Yes
+ controls for industry (4 dummies)			Yes	Yes
+ controls for year dummies, women, years of education, fulltime worker, experience (and squared), seniority (and squared) and workplace workforce size and an intercept in all regressions.				
Pseudo R2	0.348	0.196	0.348	0.197

Note: 45416 observations of workers employed at workplaces neither employing teams nor performance pay, or of workers employed at workplaces introducing teams or performance pay during the period 1997 to 2003. Dependent value is a dummy taking the value of 1 if activity denoted by column head occurs, otherwise zero. The regressions can thus be interpreted as linear probability models. Robust standard errors are adjusted for clustering at the workplace level. ** and * denote 1 and 5 percent level of significance, respectively.