Mandatory Sick Pay Provision: A Labor Market Experiment*

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Abstract

The question whether a minimum rate of sick pay should be mandated is much debated. We study the effects of this kind of intervention with student subjects in an experimental laboratory setting rich enough to allow for moral hazard, adverse selection, and crowding out of good intentions. Both wages and replacement rates offered by competing employers are reciprocated by workers. However, replacement rates are only reciprocated as long as no minimum level is mandated. Although we observe adverse selection when workers have different exogenous probabilities for being absent from work, this does not lead to a market breakdown. In our experiment, mandating replacement rates actually leads to a higher voluntary provision of replacement rates by employers.

JEL codes: J3, C7, C9.
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1 Introduction

Given that roughly between 2 and 7 percent of workers on any given day miss work due to illnesses (cf. Barmby et al., 2002), sick pay is quantitatively one of the most relevant aspects in labor contracts.[1] The question whether a minimum rate of sick pay should be mandated is answered very differently around the world. For example, the laws in Sweden, Finland, and Germany stipulate that workers are allowed to stay home sick for roughly 300 days at about 80% replacement rate.[2] On the other side of the spectrum are New Zealand, the UK, and the US. The first two countries have minimal and the US virtually no regulation of sick pay. Thus, while most industrialized countries have opted to mandate a fairly generous level of sick pay, some countries leave the provision of sick pay to the market. The voluntary provision of sick pay may work if firms try to attract good workers by offering sick pay as one additional aspect of the total compensation package.[3]

The discussion on a minimum rate of sick pay parallels to some extent the discussion on minimum wages.[4] But there are some additional aspects due to the adverse selection and moral hazard problems related to any insurance scheme. For example, forcing all employers to offer 100% sick pay can solve the adverse selection problem since no employer would attract workers with a higher probability of getting sick. However, this would come at the cost of greatly increasing the moral hazard problems caused by workers pretending to be sick.

In this paper, we explore the effects of mandating a minimum wage replacement rate in an experimental labor market which uses student subjects in the roles of

[1] Sick pay stipulates a replacement rate, that is, a percentage of the usual wage a worker receives in case of sickness. Sick leave specifies a number of days per year that can be missed without pay reductions. In the following we shall concentrate on sick pay although much of the analysis also applies to sick leave as they are equivalent in a static framework.

[2] The details of these policies vary widely and are typically quite complicated. For further details the reader is referred to Heymann et al. (2009).

[3] In the US, more than 63% of workers earning more than $10 an hour have access to some kind of sick pay benefits (Economic Policy Institute, 2007).

[4] See Card and Krueger (1997) for a summary of the discussion on minimum wages and Brandts and Charness (2004), Falk et al. (2006), Engelmann and Kübler (2007), and Owens and Kagel (2009) for experimental studies.

employers and workers.[5] The innovation of our experimental design is that it allows for moral hazard, adverse selection, and crowding out of good intentions to occur. Four employers compete for four workers by offering contracts in a gift exchange type environment (see e.g. Fehr, Kirchsteiger, and Riedl, 1993; Fehr, Gächter, and Kirchsteiger, 1997; Fehr, Klein, and Schmidt, 2007). Following Duersch et al. (2008), a contract can condition the wage payment on whether the worker has "showed up for work" or "stayed at home". In the latter case, a worker receives a wage replacement which is the product of a replacement rate times the wage. To account for the fact that illnesses are often difficult to verify (e.g. headaches or back pain), employers cannot observe whether a worker deliberately did not show up for work or was unable to work for exogenous reasons. This is meant to reflect the moral hazard problem related to sick pay.

Employers and workers interact in a continuous time posted offer market. Once the market closes, all employed workers make a costly choice ("effort") which benefits the firm only with probability $(1 - p_i)$. With probability p_i, the worker is unable to come to work ("is sick") and his "effort" is automatically set to zero.

Two main features distinguish our design from previous experiments. First we compare a homogenous market, in which a worker's exogenous absence rate p_i equals to 20%,[6] with a heterogenous market, in which a half of the workers are "low–risk," p_i is 10%, and the other half are "high–risk," p_i is 30%. The heterogeneous market is new and resembles an important feature of real labor markets in which riskier workers may be attracted to contracts that offer higher wage replacement rates – thereby causing an adverse selection problem. One question we try to answer is whether this lemon problem could lead to a steady decline of the market which would then justify the need for corrective measures.

The second novel feature of our design is a mandatory minimum replacement

[5] Throughout this paper, we call student subjects in the role of employers simply "employers" or "firms" whereas student subjects in the role of workers are referred to as "workers". As usual, this is just for the sake of brevity and does not suggest that our findings can be directly applied to real world labor markets.

[6] The probability of 0.2 is rather high in comparison to what it would be in real life. In the experiment we need this parameter reasonably high to ensure that absence occurs often enough during the experiment.

rate. The wage is left unrestricted. The associated "crowding–out" hypothesis is that this intervention undermines the kindness of offering wage replacements. Offering a replacement rate is then reciprocated less by workers. As a consequence, employers may find it unprofitable to offer wage replacements.

Our experimental results paint a rather optimistic picture about wage replacements like sick pay. As is commonly observed in gift exchange experiments, higher wages are strongly reciprocated by workers with higher efforts. We find that the same holds for replacement rates, however only in the treatments without mandatory minimum levels. This does not stop employers from offering voluntary wage replacements in treatments where a certain level of replacement is mandatory. Just the opposite, we find that the voluntary provision of replacements on top of the minimum rate actually increases on average in those treatments.

We also find evidence of adverse selection in the market for wage replacement. High–risk workers indeed choose contracts with higher wage replacement rates and vice versa. However, adverse selection does not lead to a market breakdown. In fact, we find that employers offer on average the same wage replacement rates as in the homogeneous treatments.

Given the importance of sick pay in actual labor markets, it is somewhat surprising that there is not a larger literature on this topic. Some important descriptive and policy oriented papers that provide background information are Barmby et al. (2002); Economic Policy Institute (2007); Henrekson and Persson (2004); Heymann et al. (2009); and Treble (2009).

The primary reason for the absence of a large empirical literature on sick pay is certainly not the lack of interest but rather the poor quality of the available data. In order to study the role of sick pay one needs data on individual worker level and sufficient variation of the sick pay policy. Currently, these type of data are virtually nonexistent. We have therefore chosen an intermediate path – one which allows a detailed analysis of individual choice data via treatment effects in a controlled laboratory environment. Naturally, any policy experiment of this sort could be questioned on the grounds of external validity. However, we feel that we have generated an interesting and useful data set that provides much information on individual decision making in markets with moral hazard and adverse selection. But perhaps the major contribution of this study is that it might suggest new analyses of real-world data on sick pay or inspire field experiments on sick pay to examine further some of the issues raised by this abstract lab study.

To our knowledge, ours is the first experiment that deals with mandatory wage replacement rates or heterogeneous probabilities of being detained from work. The only other experimental paper that we are aware of that studies wage replacements at all is Duersch et al. (2008). There are some experimental papers that deal with the related problem of minimum wages. Brandts and Charness (2004) find that effort levels of workers are lower after the imposition of a minimum wage, which is probably due to a lower frequency of high wage offers in the minimum wage treatment. In contrast, Falk et al. (2006) find that the entire wage distribution is shifted upwards if a minimum wage is imposed – a phenomenon they call "anchoring": the relatively high minimum wage sets a new standard. Employers who want to appear generous have to now offer even higher wages. Owens and Kagel (2009) also find that the introduction of a minimum wage results in higher wages but find essentially no significant effect on effort levels.

Finally, Engelmann and Kübler (2007) consider a setting in which firms have an incentive to pay higher wages because this "ethical" behavior may appeal to consumers. They find that the imposition of a minimum wage actually fastens the observed decline in wages, which provides some evidence for a crowding out of good intentions (see e.g. Frey, 1997).[7]

2 Experimental design and procedures

In our experiment, we implement a modified gift exchange game with subjects in the roles of employers and workers, respectively. In all periods of the experiment, employers choose a contract to offer to the workers and workers choose efforts given those offered contracts. Workers can choose intended efforts, $\tilde{e}$, from the set $\{0, 1, ..., 10\}$. An effort of 0 is interpreted as skipping work. Then, there is a random draw by the

[7]See Andreoni and Payne (2003) for evidence of crowding out of good intentions in the context of fundraising. In their paper a state intervention reduces the effort of fundraisers.

computer, independent across periods and subjects, which with probability p_i sets the effort chosen by worker i to 0. This random draw models the probability that a worker is unable to come to work, i.e., becomes "sick". Thus, with probability $1 - p_i$, *realized effort*, e, equals intended effort, $\tilde{e}$; with probability p_i, realized effort is zero. Note that the employer cannot distinguish the cases when realized effort is zero because the worker chose an intended effort of zero or because of the random draw. Effort costs for the workers are a function of realized effort as shown in Table 1.[8] The effort cost function for $e > 1$ follows the usual convex shape. To model the fact that showing up at the work place takes some extra effort, the marginal cost from zero effort (staying at home) to an effort of 1 (showing up for work) is increased to 3.[9]

Table 1: The worker's effort cost function

e	0	1	2	3	4	5	6	7	8	9	10
$C(e)$	0	3	4	6	8	10	12	14	17	20	24

Employers offer contracts (w, r) which consist of two components, a wage, $w \in W := \{0, 1, ..., 100\}$, and a replacement rate, $r \in R := \{0\%, 1\%, ..., 100\%\}$. The wage, w, is paid whenever the worker shows up for work (i.e. when $e > 0$). Whenever the worker does not show up for work (i.e. when realized effort is zero), he receives a replacement payment, rw. The fact that wage payments can only be contingent on whether realized effort is larger than zero, is based on the assumption that employers can only verify whether workers show up for work or not. As usual, different effort levels $e > 0$ cannot be contracted upon, e.g. because they cannot be verified in court.[10] A lower bound on the replacement rate, $\underline{r}$, is a treatment variable.

The payoffs resulting from contract and effort choices are as follows. Each unit of effort yields a gross profit of 20 to the employer. Deducting wage payments we

[8] That is, when workers are absent, they have effort costs of 0.

[9] In the instructions we used an employer–worker frame since this seems to be the natural setting. Note, however, that according to results by Fehr et al. (2007), the employer–worker frame and a seller–buyer frame yield essentially identical results.

[10] If they were, there would be, of course, no interesting incentive problem.

obtain

$$\pi^E = \begin{cases} -rw & \text{if } \ e = 0 \\ 20e - w & \text{if } e > 0 \end{cases} .$$

The worker's payoff is given as

$$\pi^W = \begin{cases} rw & \text{if } \ e = 0 \\ w - c(e) & \text{if } e > 0 \end{cases} .$$

In the labor market, firms compete for workers and workers compete for jobs. Throughout the experiment, a group of 4 workers interacts with a group of 4 employers in a series of repetitions, which we call periods. All subjects are informed that the experiment consists of 20 periods. Each period is split into two stages: (i) the job market stage and (ii) the production stage. The job market stage runs as a continuous time posted offer market and lasts 60 seconds. Employers make publicly observable offers to workers. Each employer is allowed to post only one offer at a time; however, this offer can be withdrawn or changed anytime. Workers can accept any or none of the outstanding offers. They cannot observe whether a firm has already hired other workers. Once an offer is accepted by a single worker, it disappears from the screen, and the employer can post another (possibly equal) offer. This way, a single employer can end up with any number of workers ranging from 0 to 4. Equally well, a worker who is hesitant may end up with no job at all. One restriction imposed by the design, and which we feel is a realistic feature of labor markets, is that, while firms can employ several workers at the same time, a single worker cannot hold multiple jobs. Neither workers nor firms are informed about the number of workers already employed by (other) firms. However, both can infer that a contract was possibly accepted from its disappearance from the screen. After the 60 seconds are over, workers still have time to accept any outstanding offers. The job market stage ends when either all 4 workers have accepted an offer or indicated that they are not interested in accepting one.

In the production stage, each worker submits his intended effort. Then, a random draw by the computer determines whether a worker is absent or not. To minimize reputation and/or possible group effects, we limit the information displayed between periods to the outcome of the individual match. Workers observe their wage offers, intended and realized efforts as well as the resulting payoffs of the respective period.

Employers are reminded how many workers they could attract, which contracts were accepted and whether the realized effort for the respective contracts was equal to zero or greater than zero. Additionally, they learn their own payoff. Subjects are neither allowed to observe their partners' identities nor their past behavior.

Our experiment has a 2×2 design (see Table 2) with treatment variables: (i) voluntary versus minimum mandatory replacement and (ii) homogenous versus heterogenous probability p_i of setting the effort chosen by the worker to zero. Our first treatment "HomFree" imposes no restriction on the replacement rate, and all workers have the same probability of being unable to work, $p_i = 0.2$. With the second treatment, "HomMan," we isolate the effect of a mandatory replacement rate by setting a minimum rate, $\underline{r}$, at 40%.[11]

In the remaining two heterogenous treatments ("HetFree" and "HetMan"), we allow for the possibility of adverse selection by inducing heterogenous probabilities of being unable to work. Out of 4 workers in each group, 2 workers are "low–risk" workers with $p_i = 0.1$ and 2 workers are "high–risk" workers with $p_i = 0.3$. Every worker is informed at the beginning of the experiment about his type. HetFree imposes no minimum replacement rate, while HetMan imposes a minimum rate of 40%.

Table 2: Treatments

Minimum wage replacement rate	Prob. of being unable to work	
	Homogeneous 0.2	Heterogenous 0.1/0.3
0%	HomFree	HetFree
40%	HomMan	HetMan

At the end of the market experiment there is a questionnaire that elicits risk preferences following the method introduced by Holt and Laury (2002). This questionnaire is incentivized in the usual way by randomly selecting one pair of lotteries

[11]We conducted treatment HomFree first and set the minimum replacement rate in the Het treatments such that it roughly corresponded to the median rate offered in the HomFree treatment. This way, we made sure that about half of our employers were affected by the intervention.

by the throw of a 10–sided die. The chosen lottery is then resolved by throwing the die again.

In total, 192 subjects participated in our experiment. They were mostly undergraduate students from the University of Jena.[12] In each of the 8 sessions, we had 3 groups of 4 workers and 4 employers; no subject participated in more than one session. The experiments were conducted in the computer lab of the Max–Planck Institute in Jena. For the experiment, we used the z–Tree software package provided by Fischbacher (2007).

After reading the instructions, subjects had to answer a series of detailed questions in order to make sure that they understood the experimental instructions and were able to do all necessary calculations. The experiments started after all subjects were able to answer all test questions correctly.

To avoid wealth effects, workers were paid their earnings from one randomly selected period from the gift exchange experiment. One subject threw a die to determine which period's payoff was being paid. Payoffs from this period were paid out with an exchange rate of 10 points = 1 euro. Since employers were acting as insurers, we wanted to make them as risk–neutral as possible. This is best achieved by paying the average payoff from all rounds, again with an exchange rate of 10 points = 1 euro.

Additionally, subjects received their outcome from the Holt–Laury questionnaire plus a show–up fee of 5.00 euro. The average payoff was about 14.32 euro (about US $19 at the time of the experiment). Experiments lasted about 120 minutes including instruction time and payment of subjects.

3 Behavioral hypotheses

The standard prediction based on rational self–interested and risk neutral individuals can be obtained as follows. Given that contracts can only condition on whether $e \geq 1$ or $e = 0$, self–interested workers will never choose an effort level above 1. Workers are second movers and therefore choose an effort of 1 if $(1 - p_i)\,[w - c(1)] + p_i rw \geq rw$,

[12] Subjects in Germany are obviously familiar with high mandated levels of sick pay. In the future it might be interesting to run a similar experiment in a country with unregulated sick pay.

which yields the incentive constraint

$$r \leq (w-3)/w, \tag{IC}$$

and 0 otherwise. Therefore, if employers want to induce an effort of 1, they have to offer a wage of at least 3. In HomMan and HetMan, where $r \geq 0.4$, the lowest equilibrium wage compatible with (IC) is 5.

Employers will only offer a contract if they make no losses given the worker they attract with this contract chooses an intended effort of 1. This yields the participation constraint for employers

$$(1-p_i)(20-w) - p_i w r \geq 0. \tag{PC}$$

Obviously, given (PC), employers will never offer wages above 20. In HomMan and HetMan the highest equilibrium wage compatible with (PC) is 18.

Together, the two constraints yield the following predictions.

Hypothesis (self–interested): If individuals are rational and self–interested, then

1. In treatment HomFree and HetFree, workers choose an intended effort level of 1. Employers offer wages between 3 and 20.
2. In treatments HomMan and HetMan, workers choose an intended effort level of 1. Employers offer wages between 5 and 18.

A counterpart to the preceding hypothesis is the reciprocity hypothesis below which is based on the wealth of evidence from gift exchange experiments. The hypothesis is well established in the literature with respect to wages.[13] Apart from Duersch et al. (2008), it has not been tested with respect to wage replacement rates so far.

Hypothesis (reciprocity): Higher wages (and wage replacement rates) will be met with higher effort.

[13]However, there are also studies that find relatively weak response to gift exchange (e.g. Hannan et al., 2002, Charness et al., 2004, and Engelmann and Ortmann, 2008). In response to some of these studies we made sure that our subjects understood their payoff functions by providing payoff tables and through control questions before starting the experiment.

With respect to the introduction of a required minimum rate of wage replacement (in treatments HomMan and HetMan) there are again two different hypotheses. Both are based on the well established idea that *intentions matter* (see e.g. McCabe et al. 2003, Dufwenberg and Kirchsteiger 2004, or Falk et al. 2008). That is, it matters for the outcome of a game not only what players consider to be fair outcomes but also what they consider to be fair intentions of their opponents. The idea that mandating minimum standards could lead to a crowding out of good intentions seems plausible from this perspective.

Hypothesis (crowding out): The voluntary provision of wage replacements is reduced by the introduction of a mandatory minimum level of replacement rates (i.e. there are fewer replacement rates with $r > 40\%$ in HomMan and HetMan than in HomFree and HetFree).

The argument would be that the intervention undermines the kindness of offering wage replacements, which is therefore reciprocated less. As a consequence, employers find it unprofitable to offer wage replacement payments.[14] Or, more directly, employers who would have offered wage replacement rates above 40% consider the mandated level as a signal for what one should offer and then offer exactly 40%.

As an alternative to the crowding out hypothesis, based on findings of Falk et al. (2006), one can expect to observe the "anchoring effect." A minimum replacement rate establishes a new standard for the appropriate replacement rate and thus affects subjects' perceptions of fairness. Hence, employers who want to appear generous now have to offer even higher wage replacement rates.

Hypothesis (anchoring): In the mandatory treatments, the wage replacement rate is not just raised to the mandated level of 40% but its entire distribution is shifted upwards.

Finally, as explained above, in our Het treatments, in which there are workers with different exogenous probabilities of being unable to work, one could expect that adverse selection reduces the provision of wage replacements.

[14] For a similar effect with respect to minimum wages see Brandts and Charness (2004) and Engelmann and Kübler (2007).

Hypothesis (adverse selection): In treatments HetFree and HetMan there is adverse selection of high–risk workers into contracts that offer high wage replacement rates. As a consequence, employers offer less or even no wage replacement.

4 Results

We begin by presenting summary statistics of the main variables of interest. Table 3 lists average wages, wage replacement rates, and efforts for all *accepted* contracts, separately for our four treatments. Unless otherwise stated, effort always refers to *intended* effort, that is, the effort chosen by subjects before the computer reduces effort to zero with some probability. Also shown in Table 3 are the average profits[15] of workers and employers per period. As intended, competition by employers for workers is so strong that essentially all the surplus goes to workers.

Table 3: Average wages, replacement rates, efforts, and profits

	Wage	Replacement rate	Effort	Profit worker	Profit employer
HomFree	67.89	37.98%	3.31	54.73	−7.06
	(24.59)	(31.22)	(2.69)	(26.82)	(46.01)
HomMan	63.23	56.84%	3.34	50.96	−4.93
	(23.38)	(21.52)	(2.63)	(24.18)	(44.64)
HetFree	70.48	39.01%	3.97	55.78	2.01
	(21.69)	(23.33)	(2.90)	(22.71)	(49.51)
HetMan	67.05	56.22%	3.50	53.81	−3.78
	(31.92)	(20.81)	(3.33)	(31.73)	(49.52)

Note: Standard deviations are in parentheses.

[15] The average loss employers make amounts to 34 euro cent. Low employers' profits are not uncommon in gift exchange experiments, e.g., Fehr, et al. (2007) and Maximiano et al. (2007) both report negative profits. The profit levels depend mainly on the parameterization of the payoff functions. In our experiment, firms compete for workers before knowing the effort choice of workers. This can lead to a "winners curse": firms with high expectations of workers' effort choices may end up with workers for a wage that is too high to make profits. Of course, none of our subjects earned a negative payoff overall due to the sufficiently high show–up fee.

4.1 Gift exchange with respect to wage replacements

With respect to wages, the data are consistent with the patterns found in most previous gift exchange experiments. Wages are far higher than would be compatible with any equilibrium for selfish and rational agents. Average wages are between 60 and 70 whereas the selfish prediction is between 0 and 20. Workers reciprocate those wages with efforts that are substantially above the predicted selfish level of 1. Those results hold uniformly for all of our four treatments. In fact, MWU–tests, taking each group of 8 subjects as one observation, show no significant difference for wages, efforts, and profits. Only wage replacement rates in the Man treatments are significantly higher than those in the Free treatments ($p = 0.01$, two–sided MWU–test with 12 groups from Free against 12 groups from Man).

The interesting question is whether the well–known gift exchange effect for wages also works with respect to wage replacement rates. To test this, we run fixed effect regressions (to control for group effects) of effort choice on wage, replacement rate, and period.[16] We use the wage replacement rate (r) rather than the replacement payment (rw) because we want to isolate the effect of replacement rates on top of the effect of wages. Table 4 shows the results of the regressions for our different treatments. As expected from many previous gift exchange experiments, wages have a highly significant and positive effect on efforts in all treatments. The replacement rate also has a significant and positive effect on effort but only in the Free treatments. It is not significantly different from zero in the Man treatments. Finally, there is a significant negative time trend in all regressions.[17]

From the viewpoint of employers, raising the wage and raising wage replacement are about equally cost effective despite the larger wage coefficients in Table 4. This is because each unit increase in wage costs in expectation $0.8 + 0.2r$. Evaluated at the mean of r this is about 0.88. Raising the wage replacement rate by one percentage point costs only $0.2 \times w \times 0.01$, which is about 0.136 at the mean of w. As the wage coefficients in HomFree (HetFree) are about 4.6 (7.36) times as large as the wage

[16] For all fixed effects estimations presented in this paper, we also ran random effects specifications, which are available in the online appendix. The results are almost identical.

[17] Including the Holt/Laury switching point as a measure of risk aversion into the regressions never had a significant effect.

Table 4: Fixed effect regressions of contracts on efforts

	Treatments			
	HomFree	HetFree	HomMan	HetMan
wage	$.045^{***}$	$.061^{***}$	$.052^{***}$	$.026^{***}$
	(.007)	(.007)	(.007)	(.010)
replacement rate	$.010^{**}$	$.008^{*}$	$-.007$	$-.006$
	(.004)	(.005)	(.007)	(.008)
period	$-.069^{***}$	$-.105^{***}$	$-.069^{***}$	$-.047^{**}$
	(.019)	(.020)	(.018)	(.024)
constant	.641	.445	1.15^{**}	2.58^{***}
	(.494)	(.507)	(.559)	(.783)

Note: ***, **, * denotes significance on 1, 5, and 10% level respectively. Standard errors are in parentheses.

replacement coefficients, raising effort through wages in the Free treatments is about as expensive as raising effort through wage replacement.

Result 1 (reciprocity to wages and replacement rates): Higher wages are strongly reciprocated by workers with higher efforts. Higher wage replacement offers are reciprocated by workers in the Free treatments. However, this gift exchange effect becomes insignificant if a minimum level of replacement rates is mandated.

Most subjects in our experiment reciprocate wage replacement. But some of them also exploit the embedded moral hazard problem and "pretend" to be unable to work in order to claim the high insurance benefits. Their proportions are relatively small but they do respond to incentives. As pointed out above, skipping work (i.e. choosing an intended effort of 0) is rational only when the incentive constraint (IC) is violated. The frequency of such violations among accepted contracts is 14% in the Man treatments and 6% in the Free treatments. And indeed, the proportion of workers who skip work in the Man treatments is 8.3% whereas it is 2.4% in the Free treatments. The difference is significant by a two–sided MWU–test ($p = 0.013$, taking average frequency of skipping work in each of the 24 groups as one observation).[18]

[18] A more detailed summary of the frequencies can be found in the online appendix.

4.2 The consequences of mandating replacement rates

As we have discussed above, there are competing hypotheses with respect to the effects of mandating wage replacement. The crowding out hypothesis would predict that employers who would have liked to offer replacement rates below 40%, would now opt for the required minimum of 40%. And employers who without regulation would have offered replacement rates above 40%, would now also just offer 40%. The alternative anchoring hypothesis would predict that the entire distribution of replacement rates shifts upwards as the minimum rate sets a new, higher anchor.

Figure 1 shows that there is very little crowding out. The distribution function for the two Man treatments is everywhere to the right of the one for the Free treatments, indicating that the anchoring hypothesis is supported by our data. Note, in particular, the pronounced increase in contracts that offer a 100% replacement rate. The graph is generated by using all offered replacement rates. A Kolmogorov–Smirnov test on this exact data set rejects the hypothesis that the distributions are the same ($p < 0.001$, two–sided). However, these data points are clearly not independent. Therefore, we repeat the test, using the average offer per employer in the first round only. Again, we can reject the hypothesis that the distributions are the same ($p = 0.036$, two–sided).[19]

Result 2 (crowding out vs. anchoring): The imposition of a mandatory wage replacement rate shifts the entire replacement rate distribution upwards. This is consistent with the anchoring hypothesis.

Falk et al. (2006) observe similar effects of minimum wages in a simple gift exchange market. Results 1 and 2 can be viewed as an extension and generalization of this pattern to markets with two–dimensional prices. The higher wage replacement rates in the Man treatments, however, are not reciprocated by workers through an increase in efforts. As shown in Table 3, efforts are not significantly different under the two regimes. Since also employers' profits are about the same, employers must be

[19] To conduct these tests we shift all mass below 40 in the Free treatments to 40, the imposed minimum in the Mandatory treatments.

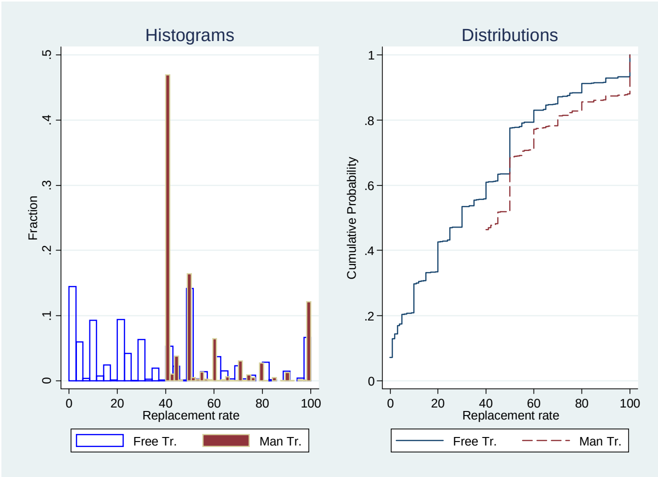

Figure 1: Histograms (left panel) and cumulative distribution functions (right panel) of offered replacement rates for the Free and the Mandatory treatments.
Note: Pooled over Hom and Het treatments.

compensated for higher replacement rates by lower wages. And this in turn explains why workers do not exert higher efforts.

The last two columns in Table 4 show that in contrast to the Free treatments, in the Man treatments there is no significant effect of replacement rates on efforts. This seems compatible with the findings of Brandts and Charness (2004) who find that the kindness implied by higher wages is less salient if there is a mandated minimum level. In contrast to their findings, however, employers in our experiment do not react by offering less generous replacement rates, presumably because they have an alternative way (lowering wages) of keeping the total expected wage bill constant.

4.3 Does adverse selection reduce the voluntary provision of wage replacement rates?

As in any insurance market, there is potential for adverse selection in the presence of sick pay. Firms offering generous wage replacements may end up with a higher percentage of high–risk workers which would harm their profits. Thus, we ask two questions in this section: (1) Do firms attract more high–risk workers when offering generous wage replacements? And (2), does this potential adverse selection problem become so severe that it leads to a market breakdown, i.e. to the elimination of wage replacements on a voluntary basis?

Table 5 sheds light on the first question. High–risk workers tend to accept contracts with an average wage replacement rate which is 3 percentage points higher than those of low–risk workers. Taking the average replacement rate of low–risk workers in a group as one observation and the corresponding replacement rate of the high–risk workers in the same group as the other observation, we conduct a Wilcoxon–test for related samples with 12 groups (pooling HetFree and HetMan). According to the Wilcoxon test, replacement rates of high–risk workers are different from those for low–risk workers at a p–value of 0.019 (two–sided test).

On the other hand, wages of high–risk workers are significantly lower ($p = 0.010$, two–sided test) than those accepted by low–risk workers. Thus, high–risk workers, in their attempt to obtain higher wage replacement *rates*, apparently need to accept lower wages as predicted by screening contracts. However, wage replacement *payment*, the amount paid out when absent from work, is the product of wage and replacement rate. The third column in Table 5 shows that high–risk workers actually get a bad deal as their average wage replacement payments are no different from those of low–risk workers.

The forth column of Table 5 shows that high–risk workers do not seem to feel obliged to reciprocate higher replacement rates through higher effort (efforts of high–risk and low–risk workers are not significantly different). And in fact, the previous paragraph shows that they should not feel obliged as they receive the same replacement payment as low–risk workers. Just to the contrary, high–risk workers may feel entitled to slack somewhat as a compensation for the bad luck they had in drawing their type. In fact, when we run the regression in Table 4 separately for low and high–risk types, we find that high–risk types in both Het treatments do not reciprocate higher wage replacement rates with higher effort. In HetMan, high–risk types do not even reciprocate higher wages with higher efforts (see the online appendix for the regression results).

On average, low–risk workers obtain a significantly higher payoff than high–risk workers ($p = 0.023$). However, this difference essentially vanishes when a minimum level of wage replacement rates is mandated. Low–risk workers are particularly harmed by the introduction of a mandated minimum replacement rate.

Table 5: Average wages, wage replacements, efforts, and profits of high- and low–risk workers

	Wage	Replacement rate	Replacement payment	Effort	Worker's payoff
HetFree low–risk	73.47	37.12%	27.32	4.08	61.10
	(21.04)	(22.96)	(19.59)	(2.77)	(21.32)
HetFree high–risk	67.50	40.90%	26.59	3.86	50.45
	(21.97)	(23.6)	(17.42)	(3.01)	(22.86)
HetMan low–risk	69.08	54.63%	39.93	3.80	54.83
	(30.84)	(20.37)	(28.08)	(3.35)	(31.43)
HetMan high–risk	65.14	57.73%	40.26	3.21	52.80
	(32.87)	(21.16)	(29.93)	(3.28)	(32.06)

Notes: Averages calculated for accepted contracts. Standard deviations are in parentheses.

Already in Table 3, we saw that the lemon problem in the market for wage replacements is not very severe. In fact, employers offer about the same replacement rates in Hom treatments as in Het treatments. Although they make lower profits with high–risk workers, they manage to offer the same average rate of wage replacement. Profits of employers are even slightly higher in Het treatments as compared to Hom treatments although the difference is not significant (see Table 3).

These findings do not change when we look at individual groups. As Figure 2 shows, in all treatments there are groups in which mean (accepted) replacement rates seem to converge to the minimum (0% in Free and 40% in Man treatments). However, this market breakdown in replacement rates does not seem to be caused by adverse selection as it is just as prevalent in our Hom treatments as in our Het treatments.

Result 3 (Adverse Selection): We find evidence of adverse selection: high–risk workers choose contracts with higher wage replacement rates and vice versa.

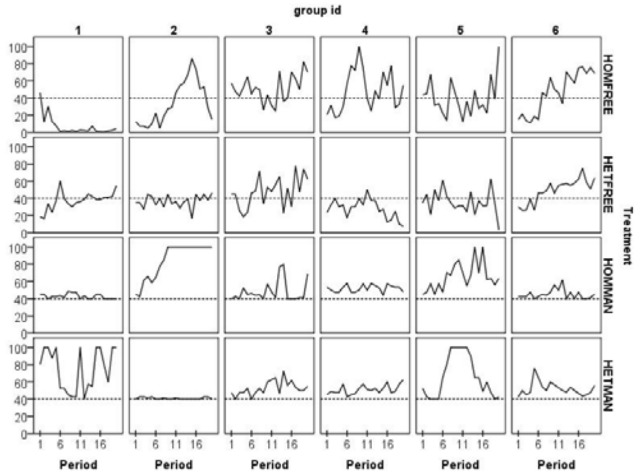

Figure 2: Development of mean replacement rates in percent over time for the different groups in the four treatments.

> However, we can reject the hypothesis that adverse selection leads to employers offering lower replacement rates.

Although we do not find a negative impact of adverse selection on replacement rate provision we would like to raise a word of caution. Notice that whether the lemon problem is costly to the employer depends on the random event that the "high-risk" worker actually is unable to work, i.e., "is sick". If this does not happen sufficiently often, the firm may not notice this. Therefore, the 20 periods of our experiment may not be long enough for learning about this adverse selection problem to take its course.

4.4 Competition in the labor market and wage replacement rates

The provision of sick pay in labor markets is likely to depend in an important way on the type of competition in this market. This is already shown in Duersch et al. (2008) where markets in which employers compete for workers are compared to markets in which they do not. In markets with one–to–one matching of firms and workers, firms offer wage replacements only very rarely. Competition on the other hand evidently forces them to offer wage replacements. Thus, our paper mainly applies to labor markets for qualified labor in which there is strong competition for employees.[20] Our finding that wage replacements are provided voluntarily agrees with empirical stylized facts (see Economic Policy Institute, 2007) that highly qualified workers are much more likely to obtain sick pay than low qualified ones.[21]

The strong competition on the employer side in our setting stems from the fact that employers can employ more than one worker while workers can only work for one employer. In fact, workers end up with a contract in more than 99% of cases in HomFree and HomMan and in more than 97% of cases in HetFree and HetMan. On the other hand, employers can in many cases attract no worker (between 33% (HetFree) and 41% (HetMan) of cases), while in about 26% of cases, employers attract 2 or more workers.[22]

To assess the question whether competition is strong enough to force employers to offer wage replacements, we run a fixed effect linear probability regression to obtain the probability that a proposed contract is being accepted by workers. The explanatory variables are the wage and the wage replacement rate. Table 6 shows results of separate regressions for HomFree and HomMan and for the different worker types in the Het treatments. In all cases, higher wages significantly increase the probability of a contract being accepted by a worker. This also holds with respect to replacement rates in treatment HomFree and for high–risk workers in the Het treatments. The effect is much weaker or insignificant in HomMan and for low–risk workers in the Het treatments. It seems that low–risk workers are much less impressed by high replacement rates.

[20]Industries we have in mind would typically rely on skilled labor that is scarce in the upper echelon of quality. Examples would be IT, electronics, construction design, and medical professions as well as the market for academics.

[21]For example, the chances of having access to sick pay are five–times lower for the workers in the low wage category (earning less than $7.38 per hour) than for the workers in the high wage category (earning more than 29.47 per hour) (see Economic Policy Institute, 2007).

[22]A few employers stopped hiring at the end of the experiment. Out of 96 employers, 4 posted no wage offers in the last 2 rounds and an additional 4 posted wage offers below 10 in the last few rounds. In the light of low profits, this could be due to learning by employers.

Table 6: Linear probability fixed–effect regression: acceptance probabilities of workers

	Wage			Replacement rate		
	Coeff.	Std. err.	P	Coeff.	Std. err.	P
HomFree	.580	.049	.000	.104	.036	.004
HomMan	.980	.072	.000	.004	.075	.962
HetFree low-risk	.606	.050	.000	.067	.040	.094
HetFree high-risk	.354	.052	.000	.131	.041	.002
HetMan low-risk	.386	.037	.000	.099	.046	.030
HetMan high-risk	.357	.038	.000	.252	.047	.000

Note: For ease of exposition, coefficients and standard errors are multiplied by 100. Includes period as control variable.

Furthermore, it turns out that risk–aversion plays no role for the contract choice of workers. The correlation coefficient between the average wage replacement rate accepted by workers and their switching point according to the Holt and Laury (2002) procedure is very close to zero and far from significant.[23]

5 Conclusion

Sick pay is intensely debated amongst policy makers but surprisingly little is known about its incentive effects. Our experiment was intended to shed light on two important questions related to the endogenous provision of sick pay. How does a mandatory minimum rate of sick pay influence the endogenous provision of sick pay? And how is it affected by the presence of adverse selection when there are workers with different sickness probabilities?

Our experimental labor market was based on a typical gift exchange environment (Fehr et al., 1993) modified by an exogenous probability by which the computer set effort to zero. We replicated the general features of the gift exchange with respect to wage. Employers offered substantial wages and workers rewarded them with corresponding efforts. Previously unexplored was the relationship between offered

[23] For this analysis we included the 88 workers (of 96) who had an unambiguous switching point.

wage replacement rates and efforts. We do find evidence for reciprocity of wage replacements but only in treatments without a minimum replacement rate. One interpretation of this finding is that the mandatory minimum reduced the gift–value of the replacement rate in the eyes of workers and thus the implied kind intentions. A severe reduction could have easily lead to a market collapse but interestingly this is not what happened in our experiment. On the contrary, the whole distribution of replacement rate offers by employers shifted upwards. This is in line with Falk et al. (2006) who found a similar "anchoring" effect in the context of minimum wages.

A second objective of this study was to explore the potential detrimental effects of adverse selection. To create a market with adverse selection, we ran a labor market in which half of the workers had low and the other half high exogenous probabilities of being unable to work. The high–risk workers ended up choosing significantly higher replacement rates than the low–risk ones but we found no evidence that adverse selection had a negative impact on contract offers or efforts.

Overall, our study paints a rather optimistic picture about the cost and benefits of sick pay regulation (at least in experimental labor markets). Although regulation does to some extent diminish the reciprocity of workers, firms still offer higher replacement rates than without regulation. One has to be careful, however, when relating our laboratory results to real labor markets. A number of realistic features of real labor markets are missing in the laboratory. One example is wage rigidity for which there is ample empirical evidence. There are a number of industries that face strong unions or severe legal constraints and cannot promptly adjust wages in response to policies such as mandatory sick pay. This lack of flexibility could result in unemployment.

Finally, we would like to emphasize again that our setting mainly applies to markets for qualified labor where employers need to attract workers by offering appealing contracts. In markets in which there is no competition by employers for workers (e.g. when there is much unemployment), the voluntary provision of wage replacements seems to be minimal (see Duersch et al. 2008). Clearly, this study is only a first approach to this topic and many more details need to be looked at. In particular, we hope that our experimental study could inspire analyses of real-world data and field experiments in this research field.

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