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 in an experimental labor market that is rich enough to allow for moral hazard, adverse selection, and crowding out of good intentions to occur. We find that higher sick pay is reciprocated by workers through higher effort but only if sick pay is not mandated. We also study adverse selection effects when workers have different probabilities of getting sick and can reject the hypothesis that this leads to market breakdown. Overall, we find that mandating sick pay actually leads to a higher voluntary provision of sick pay by firms.

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,[1] sick pay is quantitatively one of the most relevant aspects in labor contracts.[2] The question whether a minimum rate of sick pay should be mandated is answered very differently around the world. For example, the law in Sweden, Finland, and Germany stipulates that workers are allowed to stay home sick for roughly 300 days at about 80% replacement rate.[3] 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.[4]

The discussion on a minimum rate of sick pay parallels to some extent the discussion on minimum wages.[5] 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 mandatory sick pay in an experimental labor market that is rich enough to allow for moral hazard, ad-

[1] See e.g. Barmby et al. (2002).

[2] 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.

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

[4] 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).

[5] 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.

verse selection, and crowding out of good intentions to occur. Four firms compete for four workers by offering contracts in a gift exchange type environment (see e.g. Fehr, Kirchsteiger, and Riedl 1993, 1998; 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, workers receive sick payment which is the product of the sick pay 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 is actually sick or just pretends to be. This reflects 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 choose a costly effort which creates a positive profit on the side of the firm only with probability $(1-p_i)$. With probability p_i the worker is “sick” and then his effort is automatically set to zero.

Two main features distinguish our design from previous experiments. First, we enrich the labor market by introducing two types of workers. In the homogeneous condition, all workers have the same probability of getting sick, where p_i is set to 20%. In the heterogeneous condition, one half of the workers in each market is considered “high–risk” (more likely to be sick) with p_i equal to 30% and the other half is considered “low–risk” with p_i being set to 10%. The homogeneous condition has already been considered by Duersch et al. (2008). The heterogeneous condition is new and resembles an important feature of real labor markets in which riskier workers may be attracted to contracts that offer higher sick pay – thereby causing an adverse selection problem. One question this paper is trying to answer is whether this lemon problem is so severe as to lead to a collapse of the market for sick pay. In such cases, a government intervention of mandating sick pay might come as a necessary fix for the adverse selection problem.

The second novel feature of our design is thus a mandatory minimum rate of sick pay. The wage is left unrestricted. We expect that the mandatory floor on sick pay will primarily effect the “kind” intentions associated with the gift–value of the sick pay. It is conceivable that mandating sick pay crowds out so much of employers' kind intentions that the market for sick pay simply collapses around the mandatory minimum.[6] Consequently, mandating sick pay may actually reduce the voluntary provision of sick pay. Furthermore, a failed sick pay market may trigger a chain reaction where the relatively high sick pay requirements may force firms to lower wages. Lower wages may induce lower efforts which in turn again leads to lower wages etc.. One can imagine that after a series of negative adjustments the whole labor market degenerates.

In contrast, our results paint a rather optimistic picture about sick pay. As is standard in gift exchange experiments, higher wages are strongly reciprocated by workers with higher efforts. We find that the same holds for sick pay, however only in the treatments without mandated sick pay. This does not stop employers from offering sick pay in treatments with mandatory sick pay. Just the opposite, we find that the voluntary provision of sick pay on top of the minimum rate actually increases on average in those treatments.

We also find evidence of adverse selection in the market for sick pay. Workers with higher probability of being sick do indeed choose contracts with higher sick pay and vice versa. However, we can clearly reject the hypothesis that adverse selection leads to a collapse of the market. To the contrary, employers do not offer less sick pay than 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. There are important descriptive and policy oriented papers that provide background information (see e.g. Barmby et al. 2002; Economic Policy Institute, 2007; Henrekson and Persson, 2004; Heymann et al. 2009; and Treble, 2002, 2007).

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 and understand the underlying incentives, one needs to obtain data on the individual worker level. But the data of this kind are sparse and in most cases not available at

[6] See e.g. Frey and Jegen (2001) for a survey of evidence on motivational croding out.

all. When they do exist, they usually come form a single firm using a single sick pay policy. This lack of variation on the policy level makes difficult a careful analysis of the relationship between sick pay and the variables of interest such as absenteeism or efforts. It may still be long before sufficiently good field data become available. We have therefore chosen an intermediate path – one which allows a detailed analysis of individual choice data in a controlled laboratory environment. Although the external validity in terms of absolute levels (wages, efforts, and profits) is certainly an issue, we have focused on conjectures that can be examined via treatment effect by varying two carefully chosen market parameters, the composition of the worker–population in terms of the propensity of getting sick (or not to work) and the imposition of a mandatory minimum on sick pay.

To our knowledge, ours is the first experiment that deals with mandatory sick pay or heterogeneous sickness probabilities. The only other experimental paper that we are aware of that studies sick pay 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 and Frey and Jegen, 2001).

The rest of the paper is organized as follows. In the next section we describe the experimental design and procedures. In Section 3 we derive various theoretical hypotheses. Results are analyzed and discussed in Section 4. Finally, we close with a brief summary of our findings in Section 5.

2 Experimental design and procedures

In our experiment, we implement a modified gift exchange game between employers and workers. In all periods of the experiment, employers choose a contract to offer to their employees 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 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 workers become sick and cannot appear at the workplace. 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 the worker became sick. Effort costs for the workers are a function of realized effort as shown in Table 1.[7] 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.[8]

Employers offer contracts (w, r) which consist of two components, a wage, $w \in W := \{0, 1, ..., 100\}$, and a sick pay (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

[7] That is, when agents are sick, they have effort costs of 0.

[8] In the instructions we used neutral language like "the computer set efforts to zero" rather than term "illness" or being "sick". However, Duersch et al. (2008) show that this frame does not affect results in a similar experiment. In all treatments, 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.

Table 1: The agent'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

work (i.e. when realized effort is zero), he receives sick payment, which is the product of the wage and the replacement rate, 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.[9] A lower bound on the replacement rate, $\underline{r}$, is a treatment variable which reflects a minimum mandatory sick pay.

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 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. The experiment is repeated for 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 and/or changed anytime. Workers can accept any or none of the outstanding offers. Once an offer is accepted by a single worker, it disappears from the

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

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. 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 "sick" or not. To minimize reputation and/or possible group effects, we limit the information displayed between periods to the outcome of the individual match. The worker observes wage offer, intended and realized effort as well as the resulting payoff 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 sick pay versus minimum mandatory sick pay and (ii) homogenous versus heterogenous likelihood of getting sick. Our first treatment "HomFree" imposes no restriction on the replacement rate, and all workers have the same probability of getting sick, $p_i = 0.2$. With the second treatment, "HomMan," we isolate the effect of mandatory sick pay by setting a minimum replacement rate of 40%.[10]

In the remaining two heterogenous treatments ("HetFree" and "HetMan"), we allow for the possibility of adverse selection by inducing heterogenous probabilities of getting sick. Out of 4 workers in each group, 2 workers are "low–risk" workers with $p_i = 0.1$ and 2 workers are "high–risk"

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

workers with $p_i = 0.3$. HetFree imposes no minimum replacement rate, while HetMan imposes a minimum rate of 40%.

Table 2: Treatments

minimum sick pay rate	prob. of being sick homogeneous 0.2	heterogenous 0.1/0.3
0%	HomFree	HetFree
40%	HomMan	HetMan

At the end of the gift exchange 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 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. There were 8 sessions and no subject participated in more than one session. The experiments were conducted in the computer lab of the Max–Planck Institute in Jena. Subjects were recruited via the ORSEE online recruiting system (Greiner, 2004). For the experiment, we used the z–tree software package provided by Fischbacher (2007).

After reading the instructions (see Appendix), 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 7.50 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 $(1 - p_i)\,[w - c(1)] + p_i rw \geq rw$, 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

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

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.

In fact, the predictions cannot be sharpened as there are subgame perfect equilibria in HomFree and HetFree in which all the surplus goes to workers and others in which all the surplus goes to employers. Recall that workers have time to accept any outstanding offers after the posted offer period of 60 seconds has ended. In this subgame, workers will accept the best available offer. Thus, if there are still four workers available in $t = 60$, employers offer contracts $(3, 0\%)$ or $(3, 1\%)$ in equilibrium. Hence, the following two subgame perfect equilibria are the equilibria with the lowest and with the highest possible wages, respectively, in HomFree and HetFree.

Equilibrium (20,0%) Employers offer $(20, 0\%)$ in all $t < 60$. If four workers are still available in $t = 60$, employers offer $(3, 0\%)$. If less than four workers are available, employers offer $(20, 0\%)$ in $t = 60$. Workers accept only offers of $(20, 0\%)$ in all $t \leq 60$ and accept the best available offer thereafter.

Equilibrium (3,0%) Employers post no contract as long as $t < 60$ and no contract offer has been posted. If any employer posts a contract in $t < 60$, each employer immediately offers $(20, 0\%)$ in all $t < 60$ afterwards. If 4 workers are available in $t = 60$, employers offer $(3, 0\%)$. If less than four workers are available, employers offer $(20, 0\%)$ in $t = 60$. Workers accept the best available offer that is at least as good as $(3, 0\%)$ in all $t \leq 60$ and accept the best available offer thereafter.

An alternative hypothesis to Hypothesis (self–interested) based on a large number of gift exchange experiments is the following. The hypothesis is well established in the literature with respect to wages. Apart from Duersch et al. (2008) it has not been tested with respect to sick pay so far.

Hypothesis (reciprocity) Higher wage and sick pay offers are reciprocated by workers with higher efforts. Consequently, higher efforts, wages, and sick pay can be expected.

With respect to the introduction of a required minimum rate of sick pay (in treatments HomMan and HetMan) there are again two different hypotheses. Both are based on the well established idea (see e.g. Falk et al. 2008) that *intentions matter*. 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 sick pay is reduced by the introduction of a mandatory minimum level of sick pay (i.e. there are fewer sick pay 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 sick pay, which is therefore reciprocated less. As a consequence, employers find it unprofitable to offer sick pay.[11] Or more directly, employers who would have offered sick pay above 40% consider the mandated level as a signal for what one should offer and offer then exactly 40%.

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

Hypothesis (anchoring) In the presence of a mandatory minimum level of sick pay, sick pay is not just raised to the mandated level of 40% but shifts the entire distribution of sick pay upwards.

Finally, as explained above, in our Het treatments, in which there are workers with different probabilities of becoming sick, one could expect that adverse selection adversely influences the provision of sick pay.

[11] 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 workers with a high probability of becoming sick into contracts that offer high sick pay rates. As a consequence, employers offer less or even no sick pay.

4 Results

We begin by presenting some summary statistics of the main variables of interest. Table 3 lists average wages, sick pay 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 can reduce effort to zero with some probability. Also shown in Table 3 are the average profits 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, sick pay, efforts, and profits in the various treatments

	Wage	Sick pay	Effort	Profit worker	Profit employer
HomFree	67.89	37.98%	3.31	54.73	−7.06
HomMan	63.23	56.84%	3.34	50.96	−4.93
HetFree	70.48	39.01%	3.97	55.78	2.01
HetMan	67.05	56.22%	3.50	53.81	−3.78

Figures 1 through 3 show how the same variables vary over the 20 periods of our experiment. While there seems to be a slight upwards trend in wages and sick pay, there seems to be a downward trend in efforts (see below for a formal confirmation of this through a regression).

4.1 Gift exchange with respect to sick pay

With respect to wages, the data are consistent with the patterns found in most previous gift exchange experiments. Wages are far higher than would

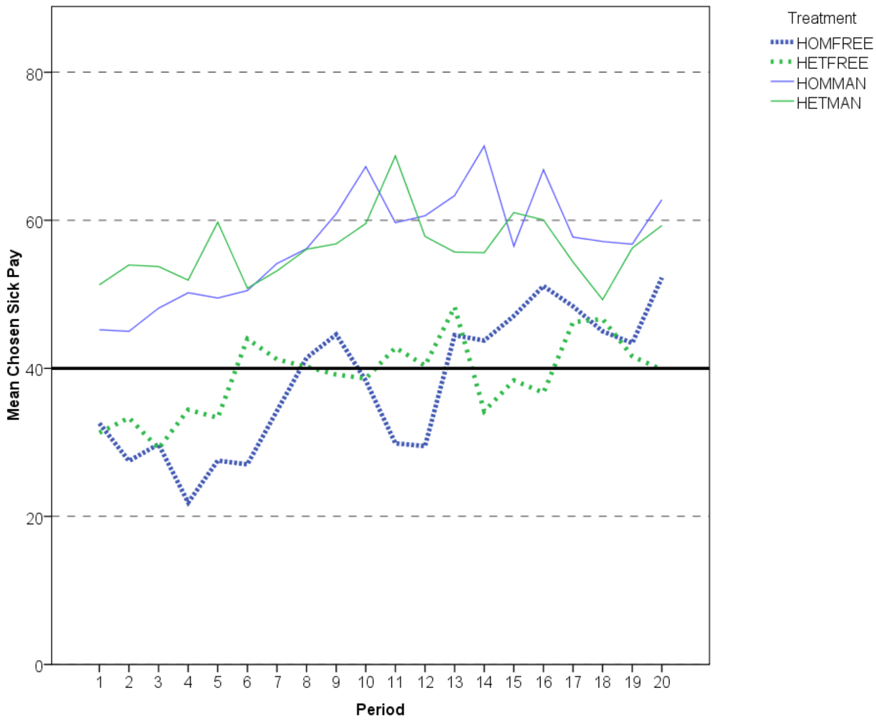

Figure 1: Time series of mean sick pay chosen by workers.

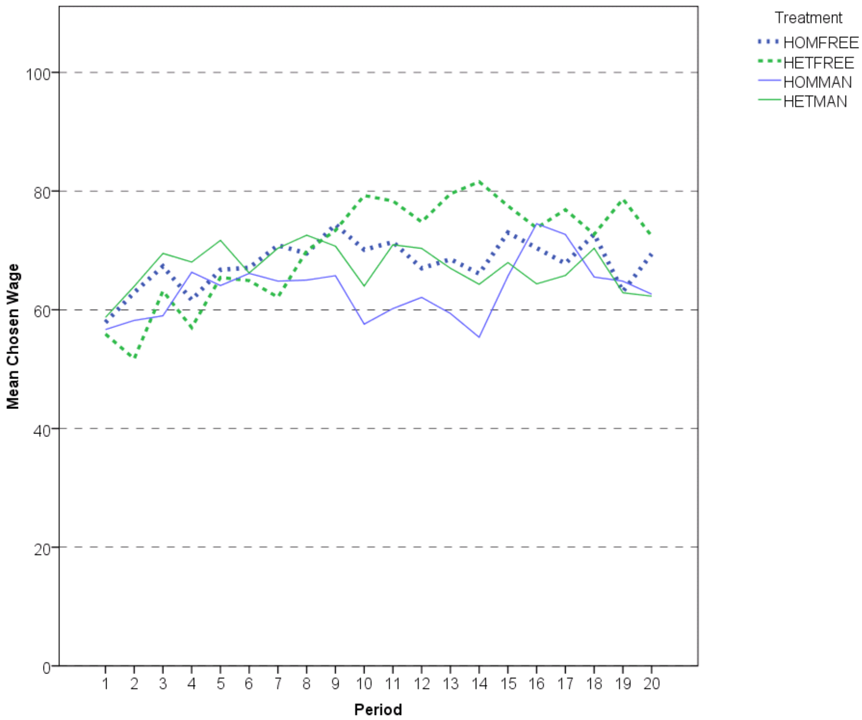

Figure 2: Time series of mean wages chosen by workers

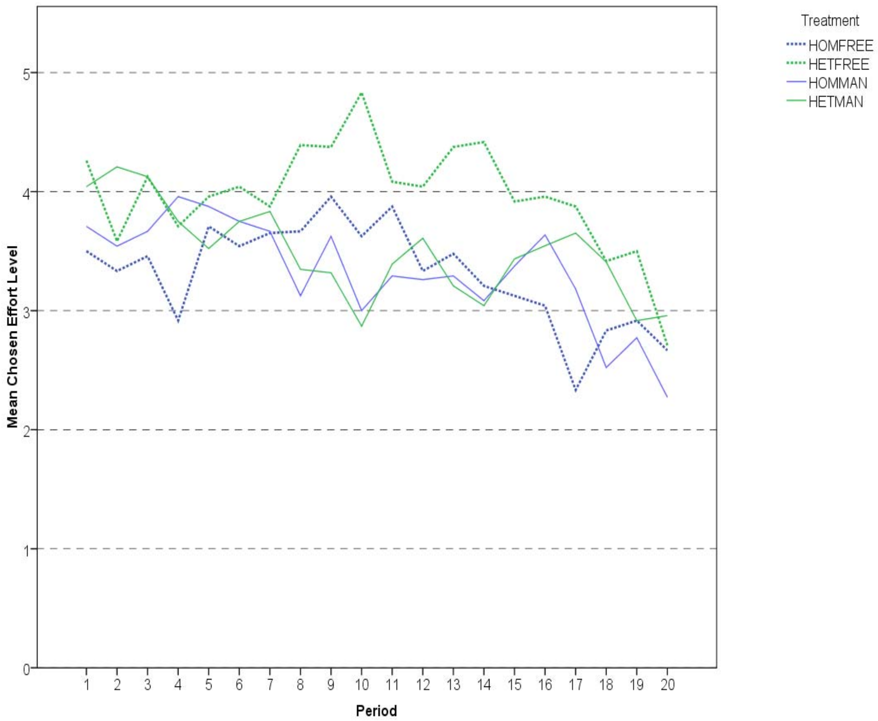

Figure 3: Time series of mean intended efforts.

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 sick pay rates in the Man treatments are significantly higher than those in the Free treatments (5% level, two–sided).

The interesting question is whether the well–known gift exchange effect for wages also works with respect to sick pay. To test this, we run fixed effect regressions (to control for group effects) of effort choice on wage, sick pay and period.[12] We use the sick pay rate rather than sick payment, which is the product of wage and the sick pay rate, because we want to isolate the effect of sick pay 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. Sick pay 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.[13]

From the viewpoint of the employer, raising the wage and raising sick pay are about equally cost effective despite the larger wage coefficients in Table 4. This is because each dollar increase in wage costs in expectation $0.8 + 0.2r$, which evaluated at the mean of r is about 0.88. Raising sick pay 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) as large as the sick pay coefficients, raising effort through wages in the Free treatments is about as expensive as raising effort through sick pay.

[12] A random effects regression, reported in Table 7, yields almost identical estimates. An (unreported) Tobit version of this regression also yields qualitatively the same results.

[13] 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)
sick pay	.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.

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

4.2 The consequences of mandating sick pay

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

Figure 4 shows clearly that there is no 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. A Kolmogorov–Smirnov test rejects the hypothesis that the

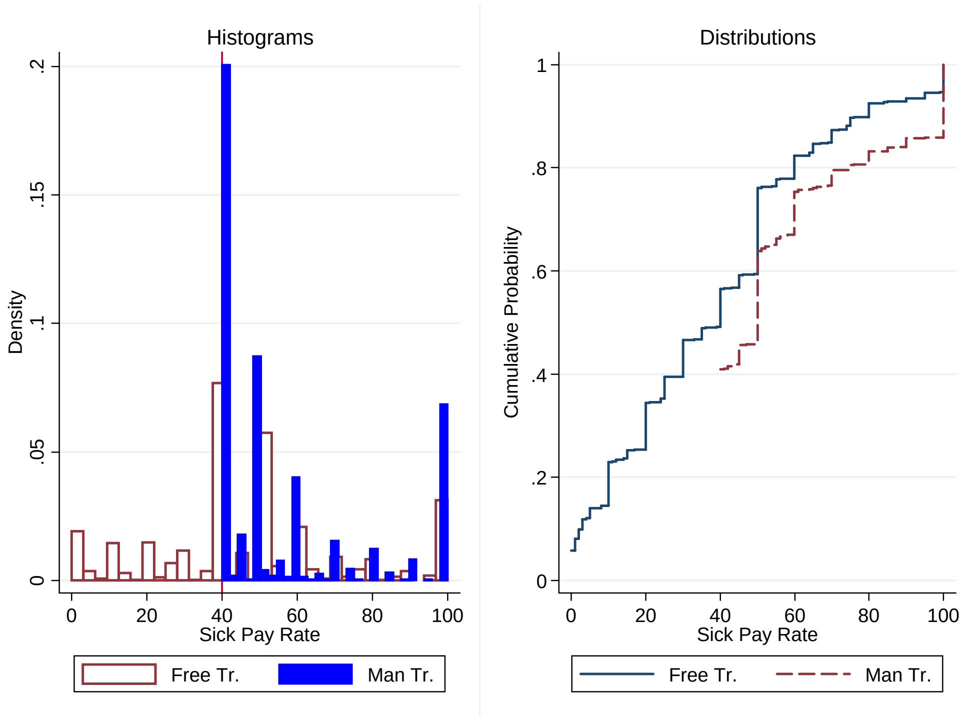

Figure 4: Histograms (left panel) and cummulative distribution functions (right panel) of sick pay rates for the Free and the Mandatory treatments. Note: Pooled over Hom and Het treatments.

distributions are the same at the 1% level (two–sided).[14] Note, in particular, the pronounced increase in sick pay contracts that offer a 100% replacement rate.

Result 2 (crowding out vs. anchoring): The imposition of a mandatory sick pay rate shifts the entire sick pay distribution upwards.

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

[14] To conduct the test we use only data with a sick pay rate of $r > 40$. An alternative method would be to shift all mass below 40 in the Free treatments to 40, which yields the same significance level.

important difference is that in their case, had the market collapsed around the minimum wage, workers would not have been able to distinguish among employers in any way. Firms might therefore find it extra useful to distinguish themselves by increasing their wages above the level of competition. The competitive forces of the market are particularly strong in their setting. In our case, however, this argument is much weaker because even if the market collapsed around the minimum level of sick pay, firms could still compete via wages. This would be consistent with the logic of shifting the resources to the most productive uses. The fact that this does not happen and that the market provides sick pay well in excess of what is required indicates an important role that sick pay plays in how firms compete for workers.

The higher sick pay 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 compensated for higher sick pay 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 sick pay on efforts. This seems compatible with the findings of Brandts and Charness (2004) who find that the kindness of 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 sick pay, 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 sick pay?

As in any insurance market there is potential for adverse selection in the presence of sick pay. Firms offering generous sick pay may end up with a higher percentage of high–risk workers (those with a sickness rate of 0.3 rather than 0.1) which would harm their profits. Thus, we ask two questions in this section: (1) Do firms attract more high–risk workers when offering generous sick pay? And (2), does this potential adverse selection problem become so severe that it leads to a market break down, i.e. to the elimination of sick pay on a voluntary basis?

Table 5 sheds light on the first question. High–risk workers tend to accept contracts with an average sick pay rate which is 3 percentage points higher than those of low–risk workers. Taking the average sick pay rate of low–risk workers in a group as one observation and the corresponding sick pay 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, sick pay 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 ($p = 0.010$) than those accepted by low–risk workers. Thus, high–risk workers in their attempt to obtain higher sick pay *rates*, apparently need to accept lower wages as predicted by screening contracts. However, sick *payment,* the amount paid out when sick, is the product of wage and sick pay rate. The third column in Table 5 shows that high–risk workers actually get a bad deal as their average sick 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 sick–pay 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 sick payment as low–risk workers. Just to the contrary, high–risk workers may feel entitled to slack somewhat as 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 sick–pay with higher effort. In HetMan high–risk types do not even reciprocate higher wages with higher efforts (see Tables 8 and 9 in the 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 sick pay is mandated. Low–risk workers are particularly harmed by the introduction of a mandated minimum sick pay rate.

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

	Wage	Sick pay	Sick payment	Effort	Worker's payoff
HetFree low–risk	73.47	37.12%	27.32	4.08	61.10
HetFree high–risk	67.50	40.90%	26.59	3.86	50.45
HetMan low–risk	69.08	54.63%	39.93	3.80	54.83
HetMan high–risk	65.14	57.73%	40.26	3.21	52.80

Notes: Averages calculated for accepted contracts.

Already in Table 3, we saw that the lemon problem in the market for sick pay is not very severe. In fact, employers offer about the same sick pay 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 sick pay. Profits of employers are even slightly higher in Het treatments as compared to Hom treatments although the difference is not significant (see Table 3).

Result 3 (Adverse Selection): We find evidence of adverse selection: workers with higher probability of being sick choose contracts with higher sick pay and vice versa. However, we can reject the hypothesis that adverse selection leads to employers offering less sick pay.

4.4 Competition in the labor market and sick pay

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 sick pay only very rarely. Competition on the other hand evidently forces them to offer sick pay. Thus, our paper mainly applies to labor markets for qualified labor in which there is strong competition for employees. Our finding that sick pay is 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.[15]

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.

To assess the question whether competition is strong enough to force employers to offer sick pay, we run a fixed effect linear probability regression to obtain the probability that a proposed contract is being accepted by workers.[16] The explanatory variables are the wage and the sick pay 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 sick pay 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 sick pay rates.

Furthermore, it turns out that risk–aversion plays no role for the contracts choice of workers. The correlation coefficient between the average sick pay accepted by workers and their switching point according to the Holt and

[15] 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 Poliy Institute, 2007).

[16] We use fixed effects regression rather than clustered standard errors because inspection of the data on the groups level reveals that there are substantial differences across groups. Clustering would only affect the standard errors but not the coefficients. However, the qualitative results are similar. Table 10 in the Appendix shows that a random effects specification yields almost identical results.

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

	Wage			Sick pay		
	coeff.	std. err.	P	coeff.	std. err.	P
HomFree	.006	.001	.000	.001	.000	.004
HomMan	.010	.001	.000	.000	.001	.962
HetFree low-risk	.006	.001	.000	.001	.000	.094
HetFree high-risk	.004	.001	.000	.001	.000	.002
HetMan low-risk	.004	.000	.000	.001	.000	.030
HetMan high-risk	.004	.000	.000	.003	.000	.000

Note: Includes period as control variable.

Laury (2002) procedure is very close to zero and far from significant.[17]

Finally, Figure 5 shows how average wage and sick pay offers develop over the 60 seconds of a period. It appears that employers post better offers at the beginning of a period. This effect is more pronounced for wages than for sick pay. Clearly there is no bidding war at the end of the period by employers who have not attracted any workers so far.

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 of becoming "sick." 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

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

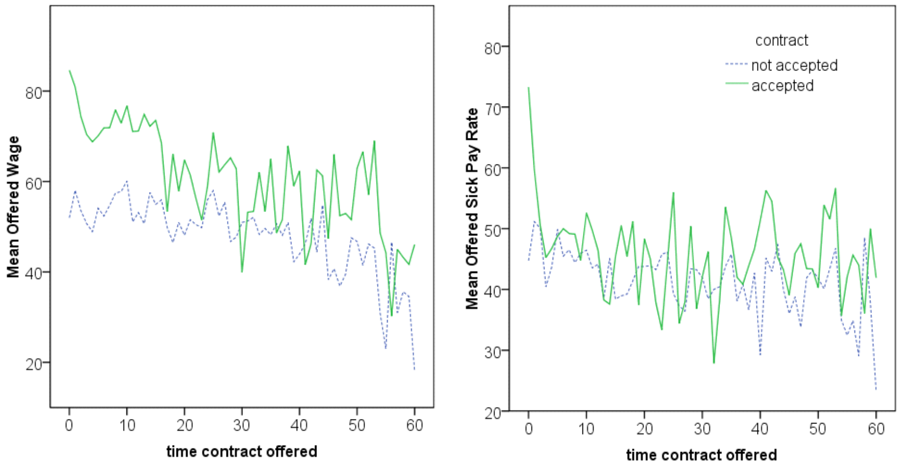

Figure 5: Timing of contract offers in a period (in seconds) regarding wages (left panel) and sick pay rates (right panel), separately for accepted and non-accepted contracts.

relationship between offered sick pay and efforts. We do find some evidence for reciprocity of sick pay but only in treatments without a minimum sick pay rate. Nevertheless, employers offered even more sick pay when a minimum rate was in place.

The primary object of our interest was the impact of a minimum sick pay rate. Consistent with our crowding out hypothesis, the reciprocal response to sick pay in terms of workers' efforts vanished. One interpretation of this finding is that the mandatory minimum reduced the gift–value of sick pay in the eyes of workers and crowded out the implied kind intentions. A severe crowding out of kind intentions 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 sick pay 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.

The 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 probabilities and the other half high probabilities of getting sick. The sicker workers ended up choosing significantly higher sick pay than the healthier workers but we found no evidence that adverse selection had a negative impact on contract offers or efforts.

Thus, overall our study paints a rather optimistic picture about the cost and benefits of sick pay regulation. Although regulation does to some extent crowd out the voluntary provision of effort by workers, employers still offer more sick pay than without regulation. We have to be careful though to generalize this to all labor markets. As pointed out above, 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 sick pay 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. We hope that future work will address those issues.

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Appendix

A Instructions

Welcome to our experiment! Please read these instructions carefully. From now on, do not talk to your neighbors anymore. Please turn your mobile phone off and keep it off till the end of the experiment. If you have any questions, raise your hand. We will then come to you.

The experiment has the roles of "employer" (EM) and "worker" (WO). You will have your role assigned to you by the computer at the start of the experiment.

You will remain in the same role during the entire experiment.

The experiment will run **over 20 periods**. You are in a group with, in total, 4 workers and 4 employers. Each period is divided into 2 phases.

In phase 1, the employers make *wage offers* to the workers. An employer can employ several workers, but a worker can only be employed by one employer. You can learn more details about this phase below.

In phase 2, workers chose a *work effort*, given the contract which they accepted. The **work effort** can be any integer number between 0 and 10. The work effort is costly for the worker, as specified in the following table. All workers share the same cost table. The income of the employer is twenty times the work effort, however, wage payments have to be deducted from this.

Work Effort	0	1	2	3	4	5	6	7	8	9	10
Cost for WO	0	3	4	6	8	10	12	14	17	20	24
Income for EM	0	20	40	60	80	100	120	140	160	180	200

With a certain probability, the work effort chosen by the worker **will be set to 0 by the computer**. The **effective** work effort, which also determines the payment of employer and worker, is then 0. This happens for reasons which can not be influenced by the employer, nor the worker. The **probability** of this happening during any period is independent of all previous periods and independent of the work effort chosen by the worker. The probability that the work effort is set to 0, is **20%** for all workers. [The probability that the work effort is set to 0, is **10%** for two out of the four workers in each period and **30%** for the other two workers. Employers can not tell which workers this are.]

The payment of a worker is determined by his effective work effort and the wage offer made to him by his employer.

The payment of an employer is determined by the wage offer made by him and the effective work effort of his workers. If an employer remains without workers (e.g. because all workers preferred the wage offers of other employers), this employer will not get a payment in that period. Similarly, a worker who did not accept any wage offer does not get a payment in that period.

No employer will be informed about the identity of his workers in a given period. Similarly, no worker will be informed about the identity of the employers.

Details regarding phase 1

In phase 1, the employers make *wage offers* to the workers. These wage offers always consist of two components, the **wage W** itself and the **wage replacement rate r**. The wage W is paid if the effective work effort of the worker is at least 1, i.e. is between 1 and 10. On the other hand, if the effective work effort of the worker is 0, the worker is paid r × W, that is, the wage replacement rate times the wage. Note that the effective work effort can be 0 for two reasons: Either the worker chose a work effort of 0 or the work effort of the worker was set to 0 by the computer. In the event, the employer can only see that the effective work effort is 0, but not the reason for this.

Note that the payments always depend on the **effective** work effort (which might have been set to 0 by the computer).

The wage W can be any integer number between 0 and 100, that is, W can be chosen from {0, 1, 2, . . . , 99, 100}. The wage replacement rate r has to be between 0% and 100% and can be chosen from {0%, 1%, 2%, . . . , 99%, 100%}. [The wage replacement rate r has to be between 40% and 100% and can be chosen from {40%, 41%, . . . , 99%, 100%}.]

During phase 1, all employers in one group make a wage offer to the workers via the computer. The first worker who accepts a wage offer gets this offer and the offer will be marked as accepted on the computer screens. If the employer wants to employ an additional worker, he can enter another wage offer. Employers can replace a not yet accepted wage offer with a changed wage offer. In total, the employers have 60 seconds to enter their wage offers. If an employer has not made any wage offer till the end of this deadline, he will not get any workers in this period. After the end of the deadline, workers can still accept still outstanding wage offers. Note that one employer can employ several workers, but one worker can only work with one employer.

Payments in a period

At the end of each period, workers are informed about their wage and whether the work effort was set to 0 by the computer. The employers are informed about their number of workers, whether these had an **effective work effort** of 0 or higher than 0 (but not the reason for this), and their own payment. The respective payments are determined as follows:

- Payment to an employer from a single worker: 20 × work effort – wage
- Payment to a worker: wage – the cost of work effort

(Work effort is always means the *effective* work effort.)

Then a new period starts. After 20 periods, there will be a questionnaire. At the end of the experiment, you will be called up for payment. For the **workers** one period will be chosen randomly by rolling a 20-sided die. They will be paid the **payment of this period** with an exchange rate of 10 points = 1 € in cash. On the other hand, **employers** are paid **the average profit over all periods** with an exchange rate of 10 points = 1 € in cash.

Additionally, you will earn 5,00 € for your participation and the payment from a lottery which will happen at the end of the experiment.

B Additional tables

Table 7: Random effects regressions of contracts on efforts

	Treatments			
	HomFree	HetFree	HomMan	HetMan
wage	.046***	.064***	.055***	.041***
	(.006)	(.007)	(.006)	(.007)
sickpay	.010**	.008*	−.003	−.006
	(.004)	(.005)	(.006)	(.008)
period	−.069***	−.108***	−.072***	−.044*
	(.019)	(.020)	(.018)	(.024)
constant	.545	.299	.773	1.582**
	(.487)	(.618)	(.548)	(.631)

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

Table 8: Fixed effects regressions of contracts on efforts by type

	Wage			Sick pay		
	coeff.	std. err.	*P*	coeff.	std. err.	*P*
HetFree low–risk	.063	.010	.000	.020	.007	.003
HetFree high–risk	.061	.009	.000	−.005	.007	.443
HetMan low–risk	.056	.011	.000	−.000	.009	.960
HetMan high–risk	−.004	.011	.697	−.012	.009	.182

Note: All regressions Include a constant and a period variable.

Table 9: Random effects regressions of contracts on efforts by type

	Wage			Sick pay		
	coeff.	std. err.	P	coeff.	std. err.	P
HetFree low-risk	.068	.009	.000	.017	.007	.009
HetFree high-risk	.075	.008	.000	−.001	.007	.937
HetMan low-risk	.056	.010	.000	.000	.009	.967
HetMan high-risk	.006	.010	.581	−.013	.009	.175

Note: All regressions Include a constant and a period variable.

Table 10: Linear probability random–effect regression: acceptance probabilities of workers

	Wage			Sick pay		
	coeff.	std. err.	P	coeff.	std. err.	P
HomFree	.006	.001	.000	.001	.000	.007
HomMan	.008	.001	.000	−.001	.001	.119
HetFree low-risk	.004	.000	.000	.000	.000	.268
HetFree high-risk	.002	.000	.000	.001	.000	.005
HetMan low-risk	.002	.000	.000	−.000	.000	.855
HetMan high-risk	.002	.000	.000	.002	.000	.001

Note: All regressions Include a constant and a period variable.