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**HOW WORKER PARTICIPATION
AFFECTS RECIPROCITY UNDER
MINIMUM REMUNERATION POLICIES:
EXPERIMENTAL EVIDENCE**

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How Worker Participation affects Reciprocity under Minimum Remuneration Policies: Experimental Evidence*

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Abstract

We analyze the role of worker participation for the success of minimum remuneration policies. In our experiments employers remunerate workers doing a real-effort task. We vary the way how a minimum remuneration policy is introduced. In the worker-participation treatment, workers bargain with the employer on the enforcement of the policy. In the control treatment the policy is exogenously introduced. We find a pronounced effort increase after the policy was enforced. An exogenous introduction has detrimental effects, i.e., employers frequently pay a premium to maintain performance. Thus, worker participation may be an effective means for maintaining reciprocity under minimum remuneration policies.

JEL Classification: C91, J31, J33, M52

Keywords: Bargaining, Experiment, Real Effort, Worker Participation.

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1 Introduction

On labor markets employers commonly pay wages above market-clearing prices. The reason is that workers reciprocate this by exerting positive effort (Akerlof and Yellen 1990). This so-called “gift-exchange” relationship is frequently confirmed by experimental evidence (e.g., Fehr *et al.* 1993; Fehr *et al.* 1998).¹ However, it is likely that labor market interventions may impair the positive relation between wages and effort. For instance, agreed wages or minimum wages may exacerbate the signaling of fairness (Brandts and Charness 2004). In this cases, minimum wages often become reference points, i.e., employees may start to compare the wage payments of the employers to the minimum wage (Falk *et al.* 2006). As a consequence, employers often have to overbid minimum wages when trying to signal kind behavior.

Reciprocity may not only be triggered by sufficiently high wages. A common view is that worker motivation is positively affected when worker interests are represented towards their employers, i.e., when workers receive “voice” in their companies. This can be acquired in labor unions or works councils. These institutions provide workers a platform to negotiate wages and working conditions. While wages frequently rise when unions are active (Menezes-Filho 1997; Menezes-Filho and Van Reenen 2003), institutional voice may also have productivity-enhancing effects (Freeman and Medoff 1979, 1984). Works councils represent institutions with similar characteristics playing an active role in co-determination. The right to speak is realized by “worker participation,” a concept where employees are involved in organizational decision-making within their companies. Empirical evidence documents that works councils facilitate communication between workers and management leading to increased efficiency. (FitzRoy and Kraft 1987, 2005; Frick 1996). Hence, understanding the behavioral effects of “voice” may be promising to maintain reciprocity when labor-market policies impair gift exchange.

In this paper we experimentally test the role of worker participation for one of these cases, namely a *minimum remuneration policy*. We focus on a stylized experiment where employers decide on the remuneration of three workers who do a real-effort task. We study worker participation and the role of voice effects by varying the way how a minimum remuneration policy is introduced (*endogenously* vs. *exogenously*). In our main treatment workers bargain with the employer on the introduction of a minimum remuneration requirement. In the control treatment, the minimum remuneration policy is exogenously introduced. We do not intend to model the actual practice and functioning of labor unions and works councils. Instead, our focus lies on the analysis of the behavioral effects of obtaining voice on employees’ reciprocity. Following Freeman and Medoff (1979, 1984) and the empirical evidence on works councils, we hypothesize that this form of worker participation will stabilize reciprocity when employers have to pay a minimum remuneration. We expect that workers exert higher effort after they actively enforced this policy through collective bargaining actions with their employer.

The results show meaningful support for our hypothesis. First, we find that effort generally increases under a minimum remuneration requirement. Second, the increase is more pronounced when the requirement was enforced by the employees. In this treatment where employees are warranted worker participation, effort increases by 12% after the minimum remuneration policy

¹Kocher *et al.* (2012a) experimentally show that in multiple-employee contexts the gift-exchange relationship is affected by the equality of paid wages. More precisely, employees exert more effort in a treatment where employers are bound to uniform wages as compared to a setting with flexible wages.

was enforced. By contrast, when the policy was exogenously introduced, effort only increases by 5%. The majority of workers (77%) increases productivity after they enforced the policy. Whereas, only 55% of the workers do so in the exogenous case. Interestingly, paying a high compensation to trigger effort becomes less important after the policy was enforced. Instead, employees even exert high effort under low compensation. In the absence of worker participation, employers overbid exogenous minimum remuneration requirements to trigger effort. Our findings suggest that warranting worker participation may be a promising tool to maintain reciprocity.

The idea that reciprocity may be reinforced by worker participation builds on Charness *et al.* (2012). Our study is most related to their paper which reports that “hidden advantages in delegation” exist in a gift-exchange setting.² Charness *et al.* (2012) modify the gift-exchange setup allowing principals to delegate the wage choice to the employees. Their major finding is that worker participation increases reciprocity leading to higher effort when employees have the right to set their wages. Jeworrek and Mertins (2014) confirm these findings in the field. The efficiency-enhancing effect of voice has also been shown in further labor-market experiments. Corgnet and Hernán González (2013) report in a principal-agent setting that agents increase their productivity when their demand is met by the principal. Mellizo *et al.* (2014) report a performance increase in a real-effort experiment when subjects vote on the payment scheme.³

In contrast to the aforementioned studies, we study the effectiveness of worker participation when a minimum remuneration policy is introduced. Our experiment tests whether worker participation may preserve effort when reciprocity is exacerbated by labor-market policies. In our setup employers cannot delegate the wage setting. Instead, employees *always* have the right to speak in a bargaining stage. Few experiments analyze the bargaining of wages. Kocher *et al.* (2012b) focus on voting decisions among employees participating in a union without employers. They find that productive workers ignore the employment of low productivity workers.⁴ By contrast, we focus on the effects of bargaining between *both*, employees and employers.

In a wider context, other experiments analyze voice effects in settings different from labor markets. For instance, in ultimatum games it is found that voice increases the acceptance of proposals when proposers can send messages (Andersson *et al.* 2010) or responders can state requests (Ong *et al.* 2012). Kleine *et al.* (2014) report that dictator giving is higher when dictators may state their concerns. The idea that worker participation increases the commitment to policies is also motivated by the findings of endogenous institutions. These papers highlight that cooperation increases in public-good games (Kosfeld *et al.* 2009; Sutter *et al.* 2010; Markussen *et al.* 2014), and prisoner’s dilemmas (Dal Bó *et al.* 2010) when subjects participate in the organization of institutions. Babcock *et al.* (2015) even find evidence in a field experiment that choosing a treatment substantially improves performance over being assigned to a treatment.

Another related strand of literature concerns experiments on minimum wages. Brandts and Charness (2004) find that minimum wages impair reciprocity in a gift-exchange setting. Employers face difficulties to signal kindness under minimum wages which leads to an effort decrease. Owens and Kagel (2010) find in a gift-exchange game that minimum wages lead to

²Falk and Kosfeld (2006) highlight in another paper that “hidden costs of control” may also play an important role in principal-agent settings. Put differently, revoking the freedom of employees may backfire, i.e., employees exert lower effort when principals specify minimum effort levels.

³In their experiment they do not model employers.

⁴Gose and Sadrieh (2014) focus on a modified gift-exchange game with multiple employees. Workers in this setup are given collective action, i.e., they may reject employers’ uniform wage offers.

significantly higher wages. However, effort only moderately increases. Other studies abstract from effort choices and highlight that minimum wages may work as reference points. Falk *et al.* (2006) show that minimum wages increase employees' reservation wages and thus lead to higher wage payments. In contrast to our setting these studies do not focus on the impact of worker participation on performance. The only exception is Dittrich *et al.* (2011), which however, abstracts from effort choices. Their main focus is the setting of wages when workers have bargaining power.⁵ The paper extends the setting of Falk *et al.* (2006) showing that wage payments significantly increase in minimum wages.

Our experiment combines several features of the aforementioned approaches. First, it builds on the evidence that worker participation and endogenous institutions may increase efficiency (Charness *et al.* 2012; Sutter *et al.* 2010). Second, it tests whether this may balance out the detrimental effects of minimum wages on reciprocity (Brandts and Charness 2004). Put together, we analyze the role of worker participation to reinforce reciprocity under a minimum remuneration policy

2 Experimental Design and Procedures

Our framework is a two-stage game where a principal (employer) is matched with three agents (employees, or workers). We apply a fixed-matching design with fixed roles which is repeated for 8 periods. Each period consists of a payoff-distribution stage and a working stage. First, we introduce the timing of the game. Afterwards, we present the treatments.

2.1 Timing

Stage 1: Payoff-Distribution

The first stage is a dictator game (Forsythe *et al.* 1994). The employer decides on the percental distribution of the firm revenue between her and the three workers. Afterwards workers receive information on the split dictated by the employer.⁶ The split can be chosen between 0% and 100% in increments of 10 percentage points. We apply this choice set to simplify the procedure. The fraction allocated to the employees is *equally* distributed between them. For instance, if the employer allocates 40% of the revenue to herself and 60% to the employees, each employee receives exactly 20% of the generated revenue. Splits which are not divisible by three are rounded to the first decimal place. For example, if an employer allocates 50% to the employees, each worker receives $50\%/3 = 16.66\% \approx 16.7\%$. We apply equal remuneration payments to the three workers as we intend to avoid horizontal fairness concerns. This is motivated by the findings of Kocher *et al.* (2012a). The paper reports that workers in multi-employee gift exchange settings exert higher effort when wage discrimination is not possible.

⁵The wage determination follows an alternating-offers bargaining game similar to Rubinstein (1982)

⁶The revenue is generated by the workers in the following working stage. The remuneration mechanism implies that workers can increase profits by exerting more effort. We opted for this approach, because it minimizes the cases where employees exert no effort. Note that this commonly occurs in standard gift-exchange games (Fehr *et al.*, 1993; 1998). Shirking in our setup results in a payoff of zero if no employee exerts effort. We are aware that free-riding incentives still exist. An employee may exert no effort and speculate that at least one employee exerts effort. Our incentive mechanism resembles a revenue-sharing scheme which aims to motivate cooperation (e.g., Weitzman 1985, FitzRoy and Kraft 1986).

Stage 2: Working Stage

After employers have decided on a distribution of revenues, workers are informed about the allocated share and they have the possibility to generate the firm revenue by performing a real-effort task (Benndorf *et al.* 2014). The task corresponds to an encryption task where letters have to be encoded to numbers (see the appendix).

In each of the 8 periods workers are given five minutes to perform the task. In the meantime, employers have the possibility to surf the internet. The firm payoff (revenue) increases by €0.10 for each correctly solved puzzle. During the 5-minute time period employees may also make use of an outside option (surf the internet). On-the-job leisure activities constitute an important part of the work place and may help to attenuate participation in experiments (Lei *et al.* 2001). Real-effort tasks may become focal in experiments when no alternatives are present. Thus, adding a desirable outside option sets up trade offs between work effort and leisure (Corgnet *et al.* 2014). In our experiment workers can always decide on the allocation of the time (0-5 minutes) they want to spend on exerting effort or surfing the internet. While surfing the internet, workers cannot perform the task. However, surfing the internet still yields a payoff of €0.01 for each ten seconds spent on the internet. Paying subjects for using the outside option has been successfully applied in experimental economics (see Mohnen *et al.* 2008), as it ensures that subjects have significant opportunity cost when working on the real-effort task. The outside payoff is not shared with the other members of a firm. Workers can switch between the task and the outside option any number of times.

After five minutes, a period is finished and all members of a firm are informed on the total number of correctly solved tasks. Neither the employer nor the workers learn how many puzzles were solved by any individual worker. Employer and employees are also informed on the total firm revenue, the employer's profit, and the resulting individual worker profits. The payoff each worker receives from using the outside option is not communicated to the employer or the fellow employees.

The employer's profit in period t ($\pi_{e,t}$) is calculated as follows:

$$\pi_{e,t} = A \cdot \sum_i x_{i,t}(100 - s_t), \text{ where } 0 \leq s_t \leq 100 \quad (1)$$

$$\text{with } s_t = \{0; 10; 20; 30; 40; 50; 60; 70; 80; 90; 100\}, \\ \text{and } t \in \{1, \dots, 8\}, \text{ and } i = 1, 2, 3.$$

A refers to the remuneration for each correctly solved problem. We set $A = €0.10$. $\sum_i x_{i,t}$ is the total number of correctly solved tasks of all three employees in period t where $x_{i,t}$ is the number of correctly solved tasks of worker $i \in \{1, 2, 3\}$ in the current period t . The expression $A \cdot \sum_i x_{i,t}$ represents the corporate profit of the firm. The expression $(100 - s_t)$ is the share of the joint revenue kept by the employer. Finally, s_t represents the current share of revenue which the employer allocates to the workers in period t .

An individual worker i 's payoff in period t ($\pi_{w_i,t}$) corresponds to the share of revenue she receives plus the amount of money she has generated in the working stage by using the outside

option $(\pi_{o_i,t})$:

$$\pi_{w_i,t} = \frac{s_t \cdot A \cdot \sum_i x_{i,t}}{3} + \pi_{o_i,t} \text{ for } i = 1, 2, 3 \text{ and } t \in \{1, \dots, 8\}. \quad (2)$$

2.2 Treatments

We apply a within-subjects design with eight periods. The setting consists of two parts with four periods each. Before the experiment begins, subjects are provided with the instructions explaining the first part of the experiment (periods 1–4). Subjects also know that a second part will follow but they do not have information on the procedures of the second part. Furthermore, subjects are informed that they will receive new instructions after part one is finished. In periods 1–4, they take part in the payoff-distribution and working stages as described above.

In periods 5–8, we apply two different treatments which correspond to institutional changes (Fehr and Gächter 2000). We follow the literature on endogenous institutions (e.g., Kosfeld *et al.* 2009; Sutter *et al.* 2010) where subjects have voting rights on the implementation of institutions. These papers compare treatments with voting settings to environments where institutions are introduced exogenously. In our case, we study the effects of the *endogenous* vs. *exogenous* introduction of minimum remuneration policies on performance. In our main treatment employees take part in a bargaining process on the implementation of a minimum-remuneration institution. In the control treatment the institution is exogenously introduced.

Endogenous Minimum Share of Revenue (MSR)

Our main treatment studies the impact of worker participation on the efficiency of a minimum remuneration requirement. In the treatment, workers participate in a onetime bargaining process with their employer over the introduction of such a minimum remuneration requirement. When a requirement was successfully enforced, the employer is required to pay a minimum share of revenue (henceforth MSR) in the subsequent periods. We call this treatment: *endogenous Minimum Share of Revenue (MSR)*.

The treatment works as follows: After workers have completed the first part of the experiment, they receive new instructions and are informed on the bargaining stage. This stage *only* occurs before period 5 begins. Here, the three employees jointly bargain with the employer over the level of an MSR. The bargaining process is similar to the framework of the *reverse ultimatum game* introduced by Gneezy *et al.* (2003).⁷ The following procedural rules apply: First of all, workers need to agree on an MSR level they want to request from the employer. To reach an agreement, the three employees individually and simultaneously decide on a request level (r_i) between zero and 100 in increments of 10 percentage points. It follows that: $r_i = \{0; 10; 20; 30; 40; 50; 60; 70; 80; 90; 100\}$. To this end they are presented a grid with three rows encompassing request levels between 0% and 100%. Each row corresponds to the choice set of one of the three workers. The grid is depicted below. It presents workers' MSR-choice set

⁷In Gneezy *et al.* (2003), the proposer makes an offer to the responder who can accept or reject. Following a rejection, the proposer has to make another offer. The main difference in our experiment is that the workers submit the offer (the request) and the employer decides whether to accept or to reject the request. Further differences are that subjects bargain over a percental split of a firm revenue and we are not interested in the impact of a time restriction on the bargaining process.

in the bargaining stage. Each employee is allocated a unique name (employee 1, 2, and 3). The workers are informed on their names and have to enter the desired MSR level.

Chosen minimum wage⁸ by the employees:

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
employee 1							X				
employee 2											
employee 3							X				

You are employee 2. Please enter your minimum-wage request: 60

In the given example, employees 1 and 3 have already entered a request level of 60% and employee 2 is currently entering a request level of 60%. Employees cannot change their selection after they have decided. To determine workers' joint MSR request, an *unanimity rule* is applied. If at least one of the three workers selects a request level different from the others, no agreement is reached. In this case, all entries are deleted and the choice process restarts. In total, the workers are given 90 seconds to reach an agreement. If they fail, a *majority rule* selects the choice of the MSR request which was chosen most often. In case of a tie, a random draw selects one of these requests. This case never occurred in our experiments. Once an agreement is reached, the chosen MSR request is sent to the employer.

The employer observes it and has to decide whether she accepts or rejects the request. If the employer accepts workers' claim, the bargaining stage ends. In this case the accepted request level will be implemented as MSR for periods 5–8. However, if the request is rejected, the employees are informed and have to send a new request. In what follows, new request levels will be determined with the same procedure as described above. However, from now on the requests have to be below the rejected request (see Gneezy et al. 2003). In this case, agents are presented a new computer screen with a shortened grid of possible request levels between 0 and $r_{rej} - 10$, with r_{rej} being the previously rejected MSR request level. The bargaining process is repeated as long as both parties have not reached an agreement. It also ends when employers reject a request level of 10%, or when employees request a level of zero. In these cases, no MSR is introduced.

When an MSR was enforced, the employer has to allocate at least this percentage to the agents in each of the following periods, but she is free to allocate more. The MSR can be of any percentage level in the intervall: $0 \leq MSR \leq 100$. For the case of $MSR = 0$, employers are not required to pay a positive minimum share of remuneration. After the bargaining stage the experiment proceeds with periods 5–8. The timing is exactly the same as before the bargaining stage. In periods 5–8, employers' choice set (s_t) can be described as:

$$\begin{aligned}
 MSR \leq s_t \leq 100 \quad \text{with } MSR &= \{0; 10; 20; 30; 40; 50; 60; 70; 80; 90; 100\}, \\
 \text{and } s_t &= \{0; 10; 20; 30; 40; 50; 60; 70; 80; 90; 100\}, \quad t \in \{5, \dots, 8\}
 \end{aligned}
 \tag{3}$$

⁸In the experiment we chose the wording “minimum wage” to simplify the understanding for the subjects.

Exogenous Minimum Share of Revenue (MSR)

Our control treatment aims to disentangle the effect of worker participation on the efficiency of a minimum remuneration requirement. The situation in periods 1–4 is exactly the same as described before.

A crucial difference is, that the MSR is *not* enforced by the workers. Instead, we exogenously introduce it after the end of period 4. Before period 5 starts, all subjects are informed on the exact level of the MSR which is introduced. In the control treatment, we only focus on MSR levels which were enforced by the workers in *endogenous MSR*. In periods 5–8, employers are required to allocate a share of revenue which is as least as high as the MSR.

2.3 Procedures

Subjects in both treatments receive written instructions before the beginning of period 1. They learn that the experiment consists of two parts and the second part is going to start after period 4, but they do not receive information about the content (and length) of the second part. After subjects have processed periods 1–4, they receive a new set of instructions. In *endogenous MSR* subjects are informed about the bargaining stage and that an MSR may be enforced. By contrast, in the control treatment workers and employers are informed that the MSR is exogenously introduced. All treatments were programmed with z-Tree (Fischbacher 2007). In total, 144 subjects participated in the experiment, i.e., we had 64 subjects in *endogenous MSR* and 80 subjects in *exogenous MSR*. Subjects were from various fields and were recruited with ORSEE (Greiner 2004). The sessions in *endogenous MSR* (*exogenous MSR*) lasted approximately 70 (65) minutes. Subjects earned on average €16.26 including a show-up fee of €4.

3 Hypotheses

In this section we outline our hypotheses. We start with the worker remuneration before and after the introduction of an MSR. In a next step, we focus on the impact of endogenous/exogenous MSRs on worker effort.

Falk *et al.* (2006) and Owens and Kagel (2010) find that employers increase their wage payments in the presence of minimum payment requirements. Following Falk *et al.* (2006) the MSR requirement in our experiment should lead to “spillover” effects. Put differently, employers are not only forced to pay a higher remuneration, they also anticipate that employees expect a higher compensation. Thus, remuneration payments will significantly increase in periods 5–8 of both treatments.

Hypothesis 1:

- (a) *Employers increase the allocated share of revenue under an endogenous MSR.*
- (b) *Employers increase the allocated share of revenue under an exogenous MSR.*

When employers increase the remuneration of workers exerting effort becomes more profitable. As a consequence, workers should increase their performances in periods 5–8 of both treatments.

Hypothesis 2:

- (a) *Workers increase their effort after the introduction of an endogenous MSR.*
(b) *Workers increase their effort after the introduction of an exogenous MSR.*

Experiments have shown that workers may perceive minimum wages as reference points (Falk *et al.* 2006; Brandts and Charness 2004). There is evidence that reciprocity may be mitigated when a minimum wage is exogenously introduced (Brandts and Charness 2004). At the same time, the literature on worker participation emphasizes that the right to speak may significantly increase performance (Corgnet and Hernán González 2013; Mellizo *et al.* 2014). Similar evidence is reported by the literature on endogenous institutions, which finds that voting enhances subjects’ commitment to policies (e.g., Kosfeld *et al.* 2009). Additional support is given by the *responsibility-alleviation* effect which predicts that agents bearing the responsibility for an outcome behave more pro-socially (Charness 2000). Moreover, delegating wage choices to workers may substantially increase their performances (Charness *et al.* 2012; Jeworrek and Mertins 2014). Thus, we expect that the signaling of kind behavior is exacerbated under exogenous minimum remuneration requirements. We anticipate that reciprocity may be maintained when employers accept the enforcement of MSRs. As a consequence, we hypothesize that endogenous MSRs are more effective, leading to a more pronounced performance increase.

Hypothesis 3:

The effort increase will be more pronounced after the introduction of an endogenous MSR as compared to the exogenous case.

4 Results

In this section we present our results. First, the analysis focuses on the remuneration of the workers. Second, we report our main findings of the impact of worker participation on the success of minimum remuneration policies. Afterwards, we study work incentives and reciprocity. When using non-parametric tests, we always report two-sided p – *values*.

Table 1: Summary statistics.

	Part 1	Part 2	
		endogenous MSR	exogenous MSR
Allocated share of revenue (in%)	54.6	63.4	66.5
Individual effort	19.2	21.5	20.1
Workers’ payoff (in €)	4.6	5.7	5.7
Employers’ payoff (in €)	9.5	9.3	7.6
number of subjects	144	64	80
number of independent observations	36	16	20

Table 1 presents summary statistics on the results of our experiment. The table reports the means of the first part (periods 1–4) and the second part (periods 5–8) of the experiment, conditioned on the treatments. We find that the average share of revenue allocated to the workers increases under endogenous and exogenous MSRs. In more detail, the average remuneration is

higher under exogenous MSRs (66.5%) as compared to endogenous MSRs (63.4%). Introducing MSRs stimulates exerted effort in both treatments. Noteworthy, the mean performance is higher in the bargaining treatment (21.5) than in the exogenous treatment (20.1). In part two, we find that the increases of remuneration and effort yield higher payoffs for employees, independently of the treatment. A conspicuous finding is that employers' profit is clearly higher under endogenous MSRs (€9.3) as compared to the exogenous case (€7.6).

4.1 Worker Remuneration

We start our analysis by focusing on the outcome of the bargaining stage. Table 2 overviews the number of different MSR levels which were enforced in the endogenous treatment. It also depicts the number of the MSR levels we exogenously introduced. To increase power we additionally included observations from a session on exogenous MSRs which we ran before we collected the endogenous data.⁹

Table 2: Number of endogenously/exogenously introduced MSR levels.

	MSR 40%	MSR 50%	MSR 60%	MSR 70%	Total
endogenously introduced	3	1	6	6	16
exogenously introduced	4	4	6	6	20

Remarkably, all firms managed to enforce an MSR of 40% or higher in the endogenous treatment. In most cases MSRs of 60% or 70% were established. By contrast, low MSRs of 40% and 50% were only rarely observed. A closer look at the data reveals that employers on average reject two MSR requests before they accept employees claims.

Table 3 presents random-effects panel regressions studying the impact of endogenous/exogenous MSRs on the allocated share of revenue. We analyze two regressions for the endogenous treatment (models 1 and 2) and for the exogenous treatment (models 3 and 4). In models 1 and 3, *MSR present* is a dummy variable testing the impact of MSRs on paid remuneration. Models 2 and 4 add control variables. Here, *MSR level* controls for the level of the MSR, it is zero in periods 1–4 and attains values between 40 and 70 in periods 5–8. Furthermore, we implement *female employer*, a dummy which is positive for female employer and *period* as further control variables. The regressions estimate Huber-White (robust) standard errors.

Model 1 highlights that endogenous MSRs generally increase employees' compensation. The coefficient of *MSR present* is positive and significant. Model 2 demonstrates that this is triggered by the level of the MSR. We find that the *MSR level* has a significant positive impact on remuneration. None of the control variables is significant. Summarizing, we find support for Hypothesis 1a.

Focusing on exogenous MSRs, model 3 emphasizes that *MSR present* is highly significant with a positive sign. We therefore confirm Hypothesis 1b. Moreover, model 4 once again reveals that higher levels of the MSR yield a significant higher remuneration. We find that *female employer* is insignificant. Interestingly, *period* is highly significant and the coefficient is positive.

⁹Therefore, the data is not perfectly balanced for MSRs of 40 and 50. The results do not change if we exclude this data.

Table 3: Random effects GLS panel regressions on the average allocated share of revenue.

allocated share of revenue	endogenous MSR		exogenous MSR	
	(1)	(2)	(3)	(4)
<i>MSR present</i>	6.875** (2.773)	-15.281 (11.266)	13.500*** (3.327)	-34.049*** (11.311)
<i>MSR level</i>		0.386** (0.177)		0.715*** (0.177)
<i>female employer</i>		-4.446 (4.239)		-5.535 (4.426)
<i>period</i>		-0.188 (0.816)		1.700*** (0.572)
<i>constant</i>	56.563*** (3.239)	59.254*** (3.552)	53.000*** (3.348)	51.518*** (5.014)
Observations	128	128	160	160
Number of Subjects	16	16	20	20
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

This demonstrates that learning plays an important role in the treatment with exogenous MSRs. Thus, employers generally increase the remuneration payments over time.

Remarkably, exogenous MSRs apparently lead to a more pronounced increase of the allocated share of revenue. The exogenous case (model 3) reveals that the coefficient of *MSR present* is almost twice as high (13.500) as compared to endogenous MSRs (6.875; see model 1). A similar pattern occurs when focusing on the MSR levels. Here, regression 4 finds that the level of exogenous MSRs has a more pronounced impact in contrast to the endogenous case. The coefficient of the exogenous *MSR level* is more than twice as high (0.716) compared to endogenous *MSR levels* (0.354; see regression 2). Employers paying a higher compensation in the exogenous treatment could be a first indication that gift-exchange may become exacerbated under minimum remuneration requirements.

Result 1:

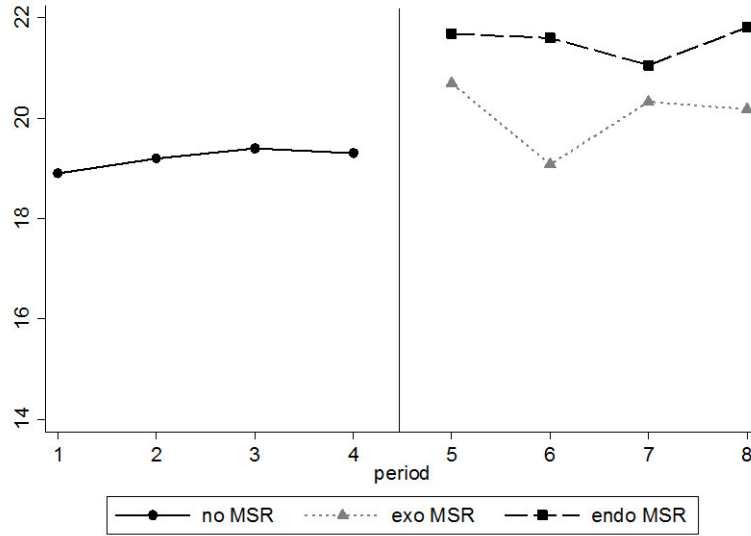
- (a) *The revenue share allocated to workers increases under endogenous and exogenous MSRs.*
- (b) *The increase is clearly more pronounced when the MSR was exogenously introduced.*

4.2 Worker Performance

Our data reveals that the different levels of MSRs have no diverse effects on workers' performance in both treatments. The Spearman's rank correlation coefficients between the *level of MSR* and effort are insignificant, indicating no correlation between the MSRs and workers' performance (endogen: $\rho = -0.027$, $p = 0.922$; exogen: $\rho = 0.064$, $p = 0.789$). Hence, we merge the effort data under different MSRs (periods 5–8) in both treatments for the subsequent analyses.

Figure 1 presents subjects' average effort over time before and after the introduction of MSRs. In the absence of an MSR (periods 1–4), we observe an average performance of 19.22. We find that workers' effort significantly increases to 21.54 (periods 5–8) after they enforced an

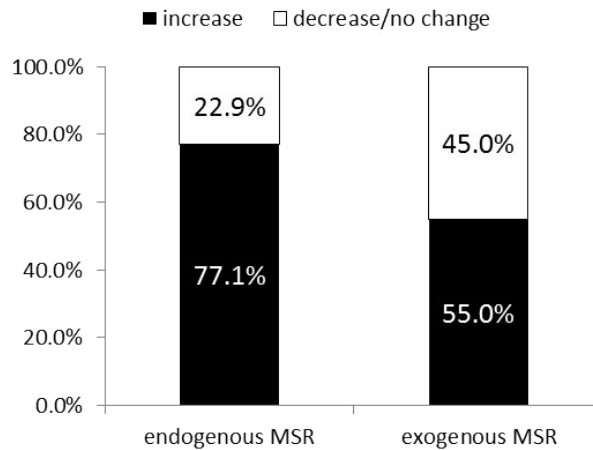
Figure 1: Effort development over time, before and after the introduction of an MSR.



MSR (Wilcoxon Matched-Pairs test, $p = 0.019$). This supports Hypothesis 2a. By contrast, employees' performance insignificantly increases to 20.08 when MSRs were exogenously imposed (Wilcoxon Matched-Pairs test, $p = 0.654$). Hence, we reject Hypothesis 2b.

The previous results reveal that the performance increase is higher when MSRs are enforced by worker participation. To investigate whether endogenous MSRs are more effective than exogenous MSRs in more detail, we analyze the percentage of workers who increase their performance in periods 5–8. Figure 2 displays the fraction of workers who increased or who decreased or did not change their performance (decrease/no change).

Figure 2: Fraction of subjects who increased/decreased or showed no change in performance.



In the treatment with worker participation, we find that the vast majority of workers (77.1%) enhances the performance after the enforcement of MSRs. This holds only for 55% of the workers in *exogenous MSR*. A χ^2 -test emphasizes that significantly more employees increase their effort in *endogenous MSR* ($\chi^2(1) = 5.703$, $p = 0.017$). Summarizing, our findings demonstrate that MSRs only significantly increase performance when employees have worker participation. Moreover, a significantly higher fraction of workers increases effort in the treatment where MSRs

were enforced. Hence, our data support Hypothesis 3.

Result 2:

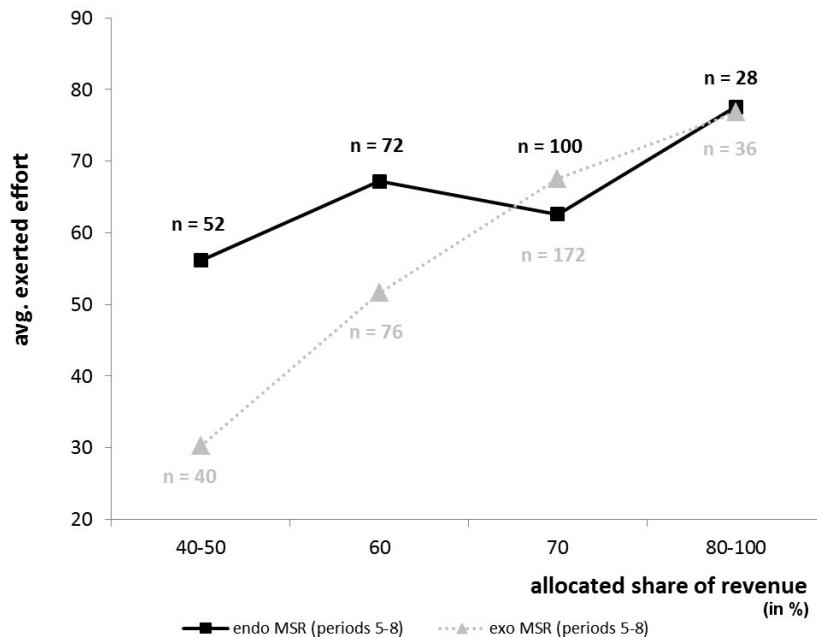
- (a) *Workers significantly increase their performance after the enforcement of an MSR.*
- (b) *Endogenous MSR are more effective than exogenous MSRs.*

The results highlight that MSRs are particularly effective when enforced by employees. Hence, we confirm the positive effect of worker participation on performance (Charness et al. 2012; Jeworrek and Mertins 2014). The data is also in line with the literature on endogenous institutions (e.g., Kosfeld et al., 2009; Sutter et al., 2010) and the *responsibility-alleviation* effect (Charness 2000). Thus, the results extend these findings and emphasize that worker participation may reinforce reciprocity under minimum remuneration policies.

4.3 Work Incentives and Reciprocity

In this section we analyze the drivers of the previous results in more detail. More specifically, we investigate whether the acceptance of wage requests stimulated the maintenance of reciprocity in the treatment with worker participation. Therefore, the analysis focuses on the exerted effort conditioned on the allocated share of revenue under endogenous/exogenous MSRs. Figure 4 depicts this relation.¹⁰

Figure 3: The relation between remuneration payments and effort under MSRs.



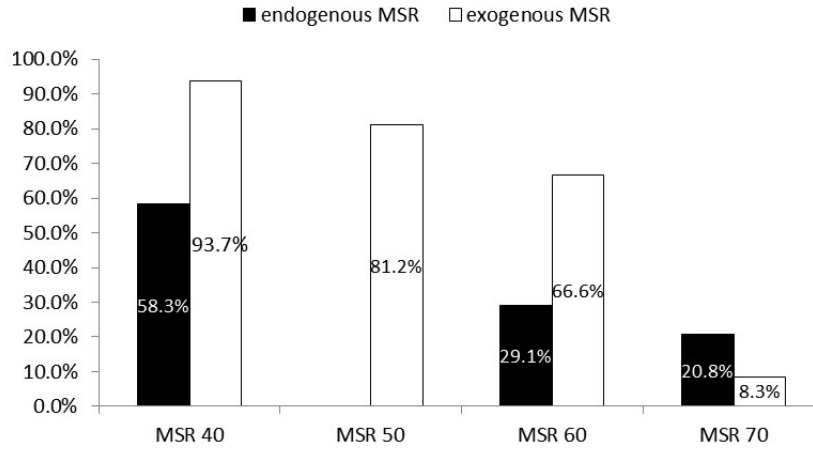
It can be seen that under exogenous MSRs (grey line) workers’ average effort is sharply increasing in the level of the allocated share of revenue. Thus, remuneration payments obviously work as signaling device. This supports the importance of remuneration payments as an “instrument” to trigger performance under exogenous MSRs. By contrast, the curve is much flatter under endogenous MSRs (black line). The finding that employees constantly exert high

¹⁰We present the categories where we only had very few observations in a merged way. This holds for a remuneration of 40% and 50% and for the cases where employers allocated a share of revenue of at least 80%.

effort, emphasizes that worker motivation and reciprocity is high after they enforced an MSR. Interestingly, workers exert high effort even when the remuneration is low. Hence, paying high remuneration to motivate workers obviously becomes less important under endogenous MSRs. By contrast, the presence of low exogenous MSRs triggers low effort when employers pay a remuneration similar to the MSRs (see the remunerations of 40%-50%). In these cases employees obviously show negative reciprocity. Thus, it is interesting to analyze, whether employers under exogenous MSRs anticipate that increasing the remuneration payments is of importance to maintain reciprocity.

To account for this we focus on the cases, where employers overbid the minimum remuneration requirements. These data are presented in Figure 4. The bars display the frequency of the cases where employers overbid endogenous/exogenous MSRs in periods 5-8. The diagram is conditioned on the different levels of MSRs.

Figure 4: Frequency of overbidding under endogenous/exogenous MSRs.



Overall we identify in *exogenous MSR* common cases (58%) where employers overbid the MSR. By contrast, under endogenous MSRs, employers less often overbid the MSR (30%). A conspicuous pattern is that employers more frequently overbid all kinds of exogenous MSRs (40%, 50%, and 60%) as compared to the endogenous counterparts. The only exception are MSRs of 70%. This once more emphasizes the importance of excess remuneration payments to signal kind behavior when MSRs are exogenous.

We run random-effects panel regressions on the relation between the allocated share of revenue and exerted effort under MSRs. Table 4 presents two models which focus on the data after the introduction of endogenous/exogenous MSRs. The dependent variable is the effort exerted by individual workers. Both regression models control for the *allocated share of revenue* which is the percentage of the firm revenue offered to an individual worker. We also include control variables: *female worker*, a dummy variable which is positive for female workers, whereas *period* focuses on time dynamics. The regressions estimate Huber-White (robust) standard errors. The regressions analyze the data of periods 5-8.

Table 4: Random effects GLS panel regressions on average individual effort.

individual effort	periods 5–8	
	(1) endogenous MSR	(2) exogenous MSR
<i>allocated share of revenue</i>	0.416** (0.188)	1.578*** (0.256)
<i>female worker</i>	-0.960 (1.732)	1.667 (1.652)
<i>period</i>	0.122 (0.350)	-0.503 (0.411)
<i>constant</i>	12.451** (5.351)	-12.263** (6.050)
Observations	192	240
Number of Subjects	48	60
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Regressions 1 and 2 show that a higher compensation significantly increases effort under both types of MSRs. A conspicuous result is that the coefficient of *allocated share of revenue* is more than three times higher under exogenous MSRs (1.578) ($p < 0.01$) than under endogenous MSRs (0.416) ($p < 0.05$). This supports the pattern observed in Figure 3, i.e., paying high remuneration to motivate workers is of less importance under endogenous MSRs. Hence, workers are less sensitive to remuneration payments after the enforcement of minimum remuneration requirements. We do not find evidence for learning, i.e., *period* is insignificant in both models.

To quantify the effect of worker reciprocity, we calculate the ratio of exerted effort per allocated share of revenue (*epsr*). We define: $epsr = \text{exerted effort} / \text{allocated share of revenue}$. The *epsr* is derived by applying the share of revenue which is allocated to an individual worker.

In the absence of an MSR, we find that workers' average *epsr* is 1.11. The exogenous introduction of an MSR leads to a significant decrease to 0.89 (Wilcoxon Matched-Pairs test, $p = 0.007$). This demonstrates once more that the introduction of exogenous MSRs comes at the cost of decreased reciprocity. By contrast, the *epsr* does not significantly change (1.05) after the endogenous introduction of an MSR (Wilcoxon Matched-Pairs test, $p = 0.836$). Thus, the results emphasize that workers' willingness to exert effort is not mitigated under endogenous MSRs. This may explain why workers' performance is higher under worker participation where they could enforce an MSR.

Result 3:

Workers' performance becomes less responsive to remuneration payments after they enforced an MSR.

4.4 Payoffs

The performance section has revealed that productivity increases more pronounced under endogenous MSRs. However, employers pay higher wages when MSRs were exogenously intro-

duced. Hence, it will be interesting to investigate whether employers in turn achieve higher payoffs when employees are granted worker participation.

In the absence of MSRs workers achieve an average payoff of €4.6. The introduction of MSRs lead to significant increases of workers' payoffs. More precisely, employees earn significantly more under endogenous MSRs (€5.7) (Wilcoxon Matched-Pairs test, $p < 0.001$) and exogenous MSRs (€5.7) (Wilcoxon Matched-Pairs test, $p < 0.001$).

Focusing on employers, it turns out that the introduction of an exogenous MSR significant lowers employers' payoff by 20% from €9.5 down to €7.6 (Wilcoxon Matched-Pairs test, $p = 0.005$). By contrast, employers earn a similar amount after the introduction of an endogenous MSR. In this case, their payoff insignificantly decreases by 2% down to €9.3 (Wilcoxon Matched-Pairs test, $p = 0.196$). Interestingly, we find that employers earn significantly more when MSRs were enforced compared to the exogenous case (Mann-Whitney test, $p = 0.065$). Hence, our data suggests that enforced MSRs may also have less detrimental effects for employers. The reason is that employees behave reciprocal when employers accepted their minimum remuneration request. As a consequence, workers even exert high effort when employers do not overbid the minimum wage requirement.

5 Conclusion

We investigated the role of worker participation for the efficiency of minimum remuneration requirements. A special focus was the analysis whether participating in collective bargaining reinforces reciprocity under minimum remuneration requirements. Although MSRs generally increase effort, they are particularly efficient when workers enforce them. This supports the findings on the positive effects of worker participation in the lab (Charness *et al.* 2012; Corgnet and Hernán González 2013) and the field (Jeworrek and Mertins 2014). Our paper adds to these findings, as it highlights that labor market policies may be more successful when achieved by collective bargaining.

So far, the literature demonstrated that the introduction of minimum wages may come at the cost of reduced effort. The reason is that reciprocity becomes impaired in the presence of minimum wages. That is, minimum wages may complicate the gift-exchange relationship, i.e., the payment of sufficiently high wages to signal kind behavior (Brandts and Charness 2004). As a consequence, employers may have to overbid minimum wages maintaining worker reciprocity

Our results demonstrate that worker participation is an “instrument” which may substitute the payment of wage premiums after the introduction of minimum wage requirements. The findings in the bargaining treatment show that performance less strongly depends on the remuneration payments by the employers after workers enforced an MSR. In this case workers generally exert higher effort, even if employers do not clearly increase remuneration payments above the required minimum level. This suggests that employers' acceptance of MSR requests seems to work as a positive signaling device to employees. In return workers exert high effort independently of the remuneration level. This holds although employers on average rejected the first two MSR requests. Obviously, employees care less about the level of the MSR, but rather on the fact that the employer ultimately said “yes”. By contrast, under exogenous MSRs there exists a positive and significant relation between compensation levels and the exerted effort of

workers. Apparently, the exogenous MSR becomes a reference point for the employees when it was automatically introduced. As a consequence, workers shift their reservation remuneration and expect a higher compensation. Employers realize this and start to overbid the MSR to induce worker motivation from the employees' side. This is in line with the findings of Falk *et al.* (2006) on the “spillover” effects of minimum wages.

The findings of this paper may have interesting implications for a better understanding of worker participation in the context of labor market institutions. First, although stylized in nature, our bargaining setting may represent workers in an employee organization negotiating with their employer. The results suggest that works councils or labor unions may serve as important inter-mediators. They not only defend employees' rights, but also give institutional voice to workers, which may enhance work motivation. Second, the data provides insights for the analysis of behavioral voice effects in labor unions (Freeman and Medoff 1979, 1984) when labor policies can be enforced. We are aware that we present findings of a lab experiment which does not resemble complex labor institutions such as unions. Nonetheless, we believe that these insights may help to better understand the behavioral patterns of work motivation of union members. Thinking of statutory minimum wages, our results suggest that institutional voice in the form of bargaining power may have promising effects on the efficiency of these policies.

References

- AKERLOF, G. A. and YELLEN, J. L. (1990). The fair wage-effort hypothesis and unemployment. *The Quarterly Journal of Economics*, pp. 255–283.
- ANDERSSON, O., GALIZZI, M. M., HOPPE, T., KRANZ, S., VAN DER WIEL, K. and WENGSTRÖM, E. (2010). Persuasion in experimental ultimatum games. *Economics Letters*, **108** (1), 16–18.
- BABCOCK, P., BEDARD, K., CHARNESS, G., HARTMAN, J. and ROYER, H. (2015). Letting down the team? social effects of team incentives. *Journal of the European Economic Association*, **13**.
- BENNDORF, V., RAU, H. A. and SÖLCH, C. (2014). Minimizing learning behavior in experiments with repeated real-effort tasks. *Available at SSRN 2503029*.
- BRANDTS, J. and CHARNESS, G. (2004). Do labour market conditions affect gift exchange? some experimental evidence. *The Economic Journal*, **114** (497), 684–708.
- CHARNESS, G. (2000). Responsibility and effort in an experimental labor market. *Journal of Economic Behavior & Organization*, **42** (3), 375–384.
- , COBO-REYES, R., JIMÉNEZ, N., LACOMBA, J. A. and LAGOS, F. (2012). The hidden advantage of delegation: Pareto improvements in a gift exchange game. *The American Economic Review*, **102** (5), 2358–2379.
- CORGNET, B. and HERNÁN GONZÁLEZ, R. (2013). Don't ask me if you will not listen: The dilemma of consultative participation. *Management Science*, **60** (3), 560–585.

- , HERNÁN-GONZÁLEZ, R. and SCHNITER, E. (2014). Why real leisure really matters: Incentive effects on real effort in the laboratory. *Experimental Economics*, pp. 1–18.
- DAL BÓ, P., FOSTER, A. and PUTTERMAN, L. (2010). Institutions and behavior: Experimental evidence on the effects of democracy. *The American economic review*, **100** (5), 2205–2229.
- DITTRICH, M., KNABE, A. and LEIPOLD, K. (2011). Spillover effects of minimum wages: Theory and experimental evidence.
- FALK, A., FEHR, E. and ZEHNDER, C. (2006). Fairness perceptions and reservation wages: The behavioral effects of minimum wage laws. *The Quarterly Journal of Economics*, pp. 1347–1381.
- and KOSFELD, M. (2006). The hidden costs of control. *The American economic review*, pp. 1611–1630.
- FEHR, E. and GÄCHTER, S. (2000). Cooperation and punishment in public goods experiments. *American Economic Review*, pp. 980–994.
- , KIRCHSTEIGER, G. and RIEDL, A. (1993). Does fairness prevent market clearing? an experimental investigation. *The Quarterly Journal of Economics*, pp. 437–459.
- , — and — (1998). Gift exchange and reciprocity in competitive experimental markets. *European Economic Review*, **42** (1), 1–34.
- FISCHBACHER, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental economics*, **10** (2), 171–178.
- FITZROY, F. and KRAFT, K. (2005). Co-determination, efficiency and productivity. *British journal of industrial relations*, **43** (2), 233–247.
- FITZROY, F. R. and KRAFT, K. (1986). Profitability and profit-sharing. *The Journal of Industrial Economics*, pp. 113–130.
- and — (1987). Cooperation, productivity, and profit sharing. *The Quarterly Journal of Economics*, pp. 23–35.
- FORSYTHE, R., HOROWITZ, J. L., SAVIN, N. E. and SEFTON, M. (1994). Fairness in simple bargaining experiments. *Games and Economic behavior*, **6** (3), 347–369.
- FREEMAN, R. and MEDOFF, J. (1979). The two faces of unionism. *Public Interest*, (57), 69–93.
- and — (1984). What do unions do? *New York: Basic Books*.
- FRICK, B. (1996). Co-determination and personnel turnover: The german experience. *Labour*, **10** (2), 407–430.
- GNEEZY, U., HARUVY, E. and ROTH, A. E. (2003). Bargaining under a deadline: Evidence from the reverse ultimatum game. *Games and Economic Behavior*, **45** (2), 347–368.
- GOSE, K. and SADRIEH, A. (2014). Strike, coordination, and dismissal in uniform wage settings. *European Economic Review*, **70**, 145–158.

- GREINER, B. (2004). The online recruitment system orsee 2.0-a guide for the organization of experiments in economics. *University of Cologne, Working paper series in economics*, **10** (23), 63–104.
- JEWORREK, S. and MERTINS, V. (2014). *When pay increases are not enough: The economic value of wage Delegation in the field*. Tech. rep., IAAEU Discussion Paper Series in Economics 08/2014.
- KLEINE, M., LANGENBACH, P. and ZHURAKHOVSKA, L. (2014). How voice shapes reactions to impartial decision makers: An experiment. *MPI Collective Goods Preprint*, (2013/11).
- KOCHER, M., LUHAN, W. and SUTTER, M. (2012a). Testing a forgotten aspect of akerlof’s gift exchange hypothesis: Relational contracts with individual and uniform wages. *IZA Discussion Paper*, (6415).
- KOCHER, M. G., POULSEN, O. M. and ZIZZO, D. J. (2012b). Social preferences, accountability, and wage bargaining. *Working Paper*.
- KOSFELD, M., OKADA, A. and RIEDL, A. (2009). Institution formation in public goods games. *The American Economic Review*, pp. 1335–1355.
- LEI, V., NOUSSAIR, C. N. and PLOTT, C. R. (2001). Nonspeculative bubbles in experimental asset markets: Lack of common knowledge of rationality vs. actual irrationality. *Econometrica*, **69** (4), 831–859.
- MARKUSSEN, T., PUTTERMAN, L. and TYRAN, J.-R. (2014). Self-organization for collective action: An experimental study of voting on sanction regimes. *The Review of Economic Studies*, **81** (1), 301–324.
- MELLIZO, P., CARPENTER, J. and MATTHEWS, P. H. (2014). Workplace democracy in the lab. *Industrial Relations Journal*, **45** (4), 313–328.
- MENEZES-FILHO, N. and VAN REENEN, J. (2003). Unions and innovation: a survey of the theory and empirical evidence.
- MENEZES-FILHO, N. A. (1997). Unions and profitability over the 1980s: some evidence on union-firm bargaining in the united kingdom. *The Economic Journal*, **107** (442), 651–670.
- MOHNEN, A., POKORNY, K. and SLIWKA, D. (2008). Transparency, inequity aversion, and the dynamics of peer pressure in teams: Theory and evidence. *Journal of Labor Economics*, **26** (4), 693–720.
- ONG, Q., RIYANTO, Y. E. and SHEFFRIN, S. M. (2012). How does voice matter? evidence from the ultimatum game. *Experimental Economics*, **15** (4), 604–621.
- OWENS, M. F. and KAGEL, J. H. (2010). Minimum wage restrictions and employee effort in incomplete labor markets: An experimental investigation. *Journal of Economic Behavior & Organization*, **73** (3), 317–326.
- RUBINSTEIN, A. (1982). Perfect equilibrium in a bargaining model. *Econometrica: Journal of the Econometric Society*, pp. 97–109.

SUTTER, M., HAIGNER, S. and KOCHER, M. G. (2010). Choosing the carrot or the stick? endogenous institutional choice in social dilemma situations. *The Review of Economic Studies*, **77** (4), 1540–1566.

WEITZMAN, M. L. (1985). The simple macroeconomics of profit sharing. *The American Economic Review*, pp. 937–953.

Appendix

The Real-Effort Task

In the task of Benndorf et al. (2014) subjects are asked to encode random combinations of three letters into numbers (see Table 4). Each letter in the first row “word” has to be encrypted in a three-digit number. The “allocation table” of the task presents subjects the correct allocation of the letters and the corresponding three-digit numbers. The table always displays all 26 capital letters of the Latin alphabet.¹¹ The workers have to type in the correct three-digit numbers of each letter in the “code” row below the letter.

<i>word:</i>	Z	N	T
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<i>code:</i>	113	154	
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allocation table:

B	T	R	S	U	Z	F	N	C	Y	V	X	H	Y	K
384	118	201	543	386	113	980	154	745	265	432	262	110	960	245

Table 5: Example of a problem in the real-effort task.

After all three letters are encoded the workers can press a submit button and are informed whether they correctly solved the puzzle. Subjects are also provided with information on the total number of correctly solved puzzles. The task furthermore mitigates learning behavior of subjects by applying a double-randomization mechanism. Whenever a subject enters a correct solution, the word to be encrypted changes. At the same time, the mapping from letters to numbers and the positions of the letters in the table are randomly rearranged. When subjects enter a wrong answer they are informed by the computer program. Here, the number allocations and the locations of the letters will not be shuffled until subjects make a correct input. After the end of five minutes the real-effort task automatically stops and inputs are not possible anymore.

¹¹For reasons of space only 15 allocations are presented in the example of Table 1.

Instructions of part one. Not intended for publication

Instructions: PART 1

Welcome to today's experiment. Please do not talk to others from now on. In today's experiment you have the opportunity to earn money depending on your and the other participants' behavior. You will receive your remuneration cash in the end of the experiment. For participating in the experiment you receive a show-up fee of

4 Euro

General procedure of the experiment

Today's experiment consists of two parts. Part 1 comprises **four rounds**. The experiment starts only after all participants read and understood the instructions. The experiment stops automatically after round four and the participants receive a new set of instructions for part 2. The experiment proceeds only after all participants read and understood the new set of instructions.

You will be randomly assigned the role of either an employer or an employee. You keep this role for the **whole** experiment.

The employers and employees act as firms. One firm comprises 1 employer and 3 employees. The composition of firms is identical for the whole experiment. Moreover, the identities of all subjects of a firm will never be revealed. Each participant learns her assigned role in the beginning of the experiment.

Procedure of the rounds

Each round consists of exactly **three** subsequent **stages**:

- The employer decides in the first stage,
- The three employees act in stage two.
- Finally, the employer and the three employees are informed on the results.

Summarizing, each round comprises the following three stages:

- 1.) The employer decides about the **Payoff-distribution** between her and the three employees.
- 2.) The employees **work on stage 2** and generate the firm revenue.
- 3.) **Information on the earnings.**

1. stage: Payoff-distribution

The employer decides about a percentage split of the firm revenue between her (*share E*) and the three employees (how the firm revenue is generated will be explained in more detail below). The share which the three workers jointly receive (*share W*) will be split equally among them. If the employer chooses a *share W* which is not divisible by three, it will be rounded to the first digit. The *share W* has to be chosen between **0%** and **100%** in increments of 10 percentage points. Thus, there are 11 possible splits available.

Please, see also the following screenshot:

Please indicate a **share W** (in%) you want to allocate jointly to the employees in this period.

Please note:

- You can choose each share between 0% and 100% (in increments of 10 percentage points)
- The share you allocate to the workers will then be divided by 3.
- That is, each worker receives exactly the same share.

Allocated **share W** (wage level):

OK

Example:

- The employer chooses a *share W* of **X%** of the firm's revenue as remuneration.
- Accordingly, each worker earns **(X/3)%** as individual payment.
- Furthermore, the employer receives share E **100 - X%** of the firm's revenue.

2. stage: Working phase

Each worker is informed on the percentage split of the revenue between the employees (*share W*) and the employer (*share E*). Furthermore, all workers are informed on the resulting individual payments (*share W/3*).

Subsequently, in each round the employees get **5 minutes** to do a real-effort task or to press a free-time button. Pressing the free-time button opens an Internet-Explorer tab and the employee can use the internet. During this time she earns money depending in how much time she spent on the internet (more on this later). While surfing in the internet a subject **cannot** work on the real-effort task.

Revenue generation

- The employees can increase the firm revenue by working on the real-effort task (this task will be explained in more detail below). Each correctly solved task adds **10 Cent** to the firm revenue.
 - A worker **does not increase** the firm revenue as long as she has activated the free-time button and is using the internet.
- The overall firm revenue at the end of each round can be defined as follows:

Firm revenue = [(correctly solved tasks of worker 1 + correctly solved tasks of worker 2 + correctly solved tasks of worker 3)] x **10 Cent**

Earnings with activated free-time button:

With an activated free-time button, the employee receives a payment which will not be shared with the other employees and with the employer. In the end of a round, an employee receives this payment on top of her earnings from the percentage split of the firm revenue.

The remuneration from using the internet is as follows:

- While having activated the free-time button and using the internet, the employee automatically receives an individual payment of **1 Cent for each 10 seconds**. This payment will only be accredited for completed time intervals. For example, activating the free-time button and using the internet for 60 seconds gives an additional payment (earnings internet) of **6 x 1 Cent = 6 Cent**.
- The earnings from using the internet is defined as:

Earnings internet =

Number of completed time-intervals (10 Sek.) x **1 Cent**

Employer:

During stage 2, an Internet-Explorer tab opens automatically for the employer. Thus, she can use the internet during this stage. However, the employer does not get any additional payment from using the internet. The tab closes automatically after 5 minutes at the end of stage 2.

3. stage: Information on earnings

After 5 minutes, the members of a firm are informed on the firm's revenue and the resulting payments.

- The **employer's earnings** result from:

Employer's payoff =

Firm revenue x share E in %

- For the individual **worker's earnings** it follows that:

payoff worker 1 =

(**Firm revenue** x share W in %) / 3 + earnings internet of worker 1

payoff worker 2 =

(**Firm revenue** x share W in %) / 3 + earnings internet of worker 2

payoff worker 3 =

(**Firm revenue** x share W in %) / 3 + earnings internet of worker 3

The employer receives the following information

- Sum of correctly solved tasks (of all three employees)
- Generated firm revenue
- Employer's payoff
- Payoff of worker 1 (the earnings internet of worker 1 not included)
- Payoff of worker 2 (the earnings internet of worker 2 not included)
- Payoff of worker 3 (the earnings internet of worker 3 not included)

Each worker receives the following information

- Sum of correctly solved tasks (of all three employees)
- Generated firm revenue
- Own payoff (**including** her earnings from the internet)
- Own payoff from real-effort task
- Own payoff from using the internet
- Payoff of other workers (the earnings internet of those workers not included)

Information on the real-effort task

1.) How the real-effort task works

For the real-effort task, **words** have to be encrypted in numbers. Each word consists of **three capital letters** each of which has to be encrypted with a number. The encryption is given by a table below the word to be encrypted. Please, also see the screenshot below.

															38 seconds																								
Encryption																																							
share W is X% of the firm revenue Your are currently encrypting word number: 1																																							
Word:										O										D										G									
Code:										<input type="text"/>										<input type="text"/>										<input type="text"/>									
S	W	O	Y	N	E	T	D	K	U	P	V	I	Z	R	F	H	B	X	L	G	J	M	Q	A															
442	844	899	855	195	440	775	878	592	236	565	430	335	488	410	478	670	129	255	163	765	222	774	124	107															
<input type="button" value="break/start internet"/>															<input type="button" value="Submit request"/>																								

In this example the participant is currently encrypting word number 1 (see centered field: above). Here, the three capital letters: **“O”, “D” and “G”** have to be encoded. The solution follows immediately from the table:

- For **“O”** applies: 899
- For **“D”** applies: 878
- For **“G”** applies: 765

To make an input please click on the grey box below the first capital letter.

Furthermore, you will receive the following information:

- „share W is X% of the firm revenue“ = allocated share to the workers in the corresponding period.
- “You currently encrypt word number” = current word to encrypt.
- “Remaining time [sec]” = remaining time in the current period.

Important hints:

- Please note that after having entered the three-digit number you can easily switch to the next grey box by using the **tabulator key** on your keyboard.

In the following picture you can see the position of the tabulator key on your keyboard:



- The input of the numbers can be performed faster by using the numpad (on the right) of your keyboard.

In the following picture you can see the position of the numpad on your keyboard:



If all 3 numbers have been entered, please click the “OK”

- The computer then checks whether all capital letters haven been encoded correctly. Only then the word is counted as correctly solved. Thereafter a new word (again consisting of three capital letters) is randomly drawn.
- Furthermore, a new encryption table is randomly generated in two steps:
 - 1) The computer program randomly selects in the table a new set of three-digit numbers to be used for the encoding of the capital letters.
 - 2) Additionally, the computer program shuffles the position of the capital letters in the table. Please note that the program always uses all 26 capital letters of the German alphabet.

Please note that if a new word appears, you have to click with your mouse on the first of the three blue boxes. Otherwise, no input is possible!

- The computer will mark (in red font) wrong inputs after pressing the “OK” button.

After 5 minutes, the possibility to work on the task stops automatically. Then, you cannot enter any new input.

2.) How the free-time button and the internet usage work:

During the working phase, the workers are free to choose how much time they spend for working on the real-effort task and how much time they want to spend for using the internet.

The time of stage 2 runs from the beginning of stage 2 on. There is no time-out when using the internet.

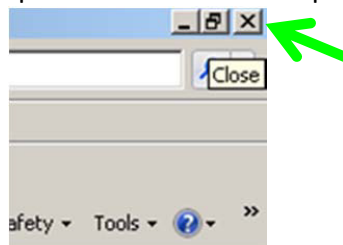
Use of the internet (for employees):

On the screen there is button called **“break/start internet”**. By pushing this button the internet access can be activated. Activating the internet by pushing the button locks the input fields from the real-effort task and an “Internet Explorer” window opens automatically.

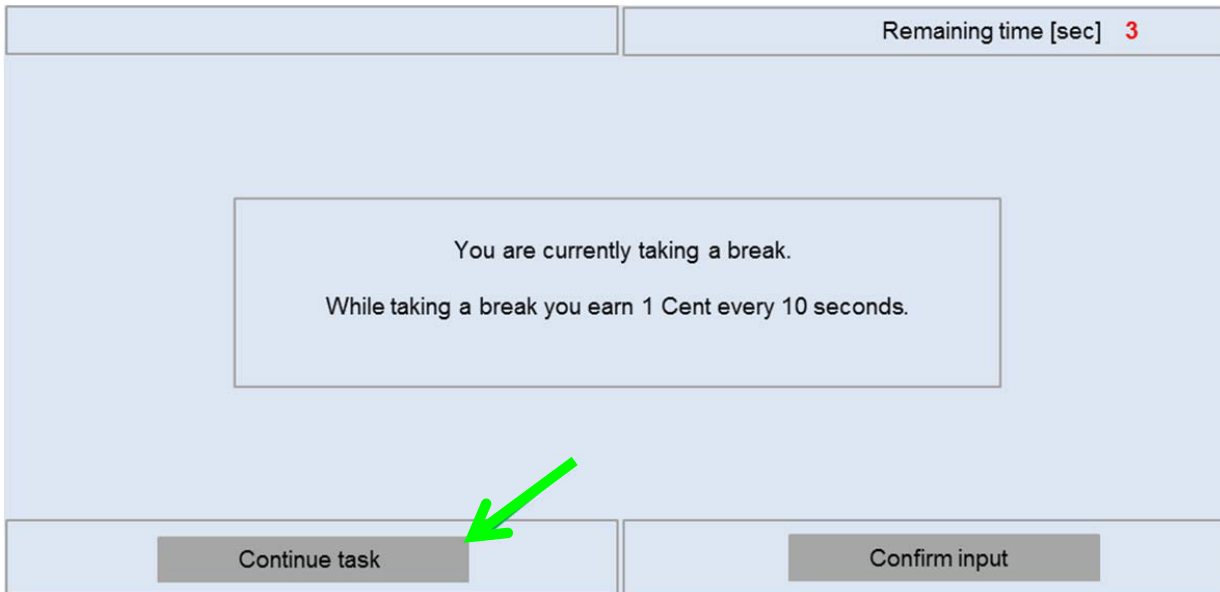
The Browser opens at full screen. While the internet is activated, a timer in the background records the time used for surfing in the internet. You will earn **1 Cent** automatically for every **10 seconds** spent on the web. This amount will be added to your earnings from the allocated *share W* (see above).

Stop using the internet:

After time ran out on stage 2, the automatic remuneration from using the internet stops. The window closes automatically. During the remaining time on stage 2 you can also switch back to the real-effort task by clicking the “window-close” button in the upper right part of the “Internet Explorer” window (see picture)



Doing so redirects you to the real-effort task. You can continue the task by clicking the button **“continue task”**. (see screenshot below)



Please notice:

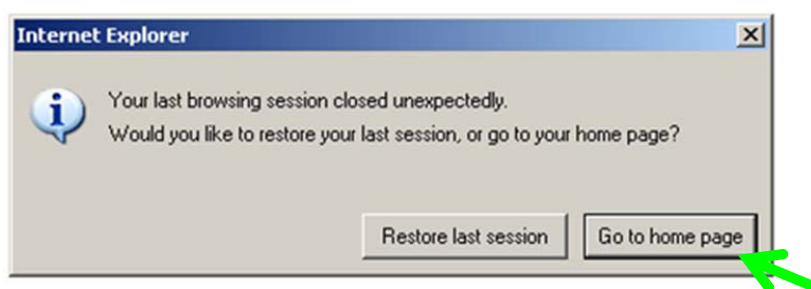
- Alternatively, workers can also switch back to the screen above with the keyboard combination „**Alt-TAB**“
- Workers can switch between the task and the internet any number of times.
- If you want to return to the internet after switching back to the task, you need to click on the **“break/start internet”** button again.
- The employer will not receive any information on the time employees spent on the internet.

Use of the internet (for employers):

As soon as stage 2 starts, the employer can click on the button “start Browser”. An “Internet Explorer” window opens automatically and the employer can use the internet during the five minutes. After five minutes the window closes automatically.

Important notice for both employer and employee:

If you receive the following warning when starting the „Internet Explorer“



You will only need to click on the „Go to home page“ button to start the Browser.

If you have any question during the experiment, please raise your hand. We will answer your question in private.

Please, answer the following control questions. Raise your hand when you completed the answers. The experiment will be started after all subjects answered the questions correctly.

Before the actual experiment starts you will see a hypothetical question on the screen. Please, answer this question. You will not receive a payment for this question and it will not have any consequences for the subsequent experiment. Nevertheless, please answer this question honestly. After that, the actual experiment starts.

Control questions

Please, imagine the following:

The employer allocated a *share W* of 20% of the firm revenue to the workers. The employees solve 10 tasks in total

- a.) Determine the firm revenue: _____
- b.) What is the percentage share of the firm revenue for the employer (*share E*)? _____
- c.) What is the overall share allocated to the employees? _____
- d.) What is the share for an individual worker (fraction)? _____

Assume now, that a worker used the internet for 60 seconds.

- a.) How much does the worker earn for the time he spent on the internet? _____

Instructions of the *endogenous MSR* Treatment. Not intended for publication

Instructions (Part II)

The second part of the experiment also comprises **4 rounds**.

The following 4 rounds consist of the 3 stages you already learned from Part I of the experiment. Before rounds 5-8 will start, there is a **onetime change** compared to Part I:

A negotiation over the introduction of a **minimum wage** will take place.

A **minimum wage** would guarantee the employees a **minimum share W** (i.e. the split the workers receive *jointly*) for rounds 5-8. The employer would be bound to allocate at least this minimum share and could not offer a share lower than the minimum share.

In the negotiation stage the 3 employees of a firm bargain collectively with their employer over a **minimum share**.

Please note: The negotiation takes place **only once** and **only before round 5** starts.

Procedure of the negotiation

The negotiation consists of two stages:

Bargaining stage 1:

The employees have to agree on a common minimum share W -request before it is sent to the employer. Each employee can suggest minimum share between **0%** and **100%** in increments of 10 percentage points.

In what follows the procedure of how to submit suggestions is described.

Please see the corresponding screenshot.

38 seconds

Submitted requests of the employees

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
AN1							X				
AN2											
AN3							X				

You are AN 2. Please enter your minimum share W request:

|

Submit request

Please note that all three employees in bargaining stage 1 see this screenshot simultaneously and decide simultaneously.

Each employee is first allocated a neutral number (AN1, AN2 or AN3) and is informed about that number in the lower input box.

The upper box represents the table where employees can enter their suggestion on a minimum share-request. The grid encompasses all possible requests (from 0% to 100%). Already submitted suggestions of the employees are marked with an X. In the example above, AN1 and AN3 already submitted a request of 60%.

Submitting a suggestion for a request:

- Minimum share requests (0%-100%) can be entered in the text box to the left of the button “submit request”.
- To submit, the button “submit request” needs to be pushed.
- After submitting a request, it is marked in the row of the corresponding employee.

Please note again:

The requested **minimum share** is the minimum share the **three employees receive jointly (share W)** from the employer (on stage 1 in rounds 5-8).

How to achieve an agreement?

On bargaining stage 1 (see above), the three workers of a firm decide on a common minimum share W-request. They are provided **at most 90 seconds** to agree upon this request (we come back to that below). The remaining time can be checked in the upper right corner (see screenshot above).

The minimum share request will only be sent to the employer if all **three** employees agreed on **the same** request. The computer compares the requests only after all employees submitted their requirement.

- If only one request differs from the others, no agreement is reached. The marks remain on the screen for 3 seconds and are deleted subsequently. New requests can be submitted now.

Therefore, consider your decision carefully.

- This procedure is repeated until **unanimity** is reached or **after 90 seconds without an agreement**.
- If **unanimity** is reached bargaining stage 1 stops and the employees are informed on the request which will be submitted to the employer.
- If **no unanimity is reached after 90 seconds**, the request which was chosen most of the time is automatically selected as the request which is to be sent to the employer (the request is chosen from all the suggested requests during the 90 seconds). In the case of a tie, one request will be selected randomly.

Bargaining stage 2:

At this stage the employer receives the minimum share W-request of the employees. She has to decide whether to accept or to reject the wage request. Please see the following screenshot:

The employees request a minimum share W of:

60 % of the firm revenue

Do you want to accept the request?

☐ Yes

☐ No

OK

The employer decides on the acceptance of the request (see screenshot)

- By clicking “yes” the negotiation ends and the request will be implemented as minimum share W in the subsequent four rounds.
- Marking “no” restarts bargaining stage 1. The employees then have to decide again on a minimum share W -request.

Bargaining stage 1: Restart

Verhandlungsstufe 1: Erneuter Beginn

Bargaining stage 1 changes slightly if it restarts. The change concerns the minimum share W -requests the employees can choose. After a restart the requests have to be **lower** than the previously rejected one.

The employees are shown the same screen as above with the only difference being the shortened grid of shares in the table. For example, if the employer rejects a request of 60%, the workers can only submit a new request between 0% and 50%.

The same conditions (as described above) apply to the unification process.

The new request will be submitted to the employer and she again decides on whether to accept or to reject.

- The **latest request** will be implemented as minimum share W if the employer accepts it.
- If the employer rejects it, the employees have to decide again on a new request, which again has to be lower than the previously rejected one and so on.

The negotiation ends:

1.) If the employer accepts a request. The accepted request will be implemented as minimum share W in rounds 5-8.

Or:

2.) If the employer rejects a minimum share W request of 10%. In this case, there will be no minimum share W .

Or:

3.) If the employees request a minimum share W of 0%.

Procedure of rounds 5-8

- The employer and the workers are informed whether a minimum share W is implemented and if so also on the size before round 5 starts.
- An implemented minimum share W guarantees the workers **at least this share of the firm revenue** in stage 1.

After the negotiation the 3 stages from Part I follow.

Please raise your hand if you have any questions!

Instructions of the *exogenous MSR* Treatment. Not intended for publication

Instructions (Part II)

The second part of the experiment also comprises **4 rounds**.

The following 4 rounds consist of the 3 stages you already learned from Part I of the experiment. Before rounds 5-8 will start, there is a **onetime change** compared to Part I:

A **minimum wage** will be implemented.

This **minimum wage** would guarantee the employees a **minimum share W** (i.e. the split the workers receive *jointly*) for rounds 5-8. The employer would be bound to allocate at least this minimum share and could not offer a share lower than the minimum share.

For rounds 5-8

A **minimum share W**

of: **60%**

applies.

The procedure of Part II of the experiment is as in Part I. It again consists of 3 stages in each round:

First, the employer decides about the percentage split she allocates to the three employees jointly. Then, the workers can generate the firm revenue by exerting a real-effort task while they also have the possibility to stop working and using the internet instead. The employers can use the internet during the working stage. After the working stage the members of a firm (the employer and the three workers) are informed on the results of the current round. The experiment ends after rounds 5-8.

The procedure is as follows (and conforms with Part I):

- 1.) The employer decides on the ***payoff-distribution*** (bound to allocate at least the minimum share W)
- 2.) The employees ***work in stage 2*** and generate the firm revenue.
- 3.) ***Information on the earnings.***