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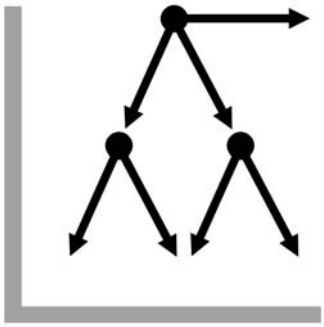

Incentives, Decision Frames, and Motivation Crowding Out - An Experimental Investigation

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Incentives, Decision Frames, and Motivation Crowding Out – An Experimental Investigation

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Abstract

A simple principal agent problem is experimentally investigated in which a principal repeatedly sets a wage and an agent responds by choosing an effort level. The principal's payoff is determined by the agent's effort. In a first setting the principal can only set a fixed wage in each period. In a second setting the principal has the possibility to supplement the fixed wage with a piece rate in return for a small fee. Surprisingly, efforts are lower in the case where piece rates can be paid. Furthermore, switching from a setting with possible piece rates to one where only fixed wages can be paid in the same treatment tends to lead to even lower effort levels.

Keywords: Incentives, Hidden Action, Reciprocity, Reputation, Experiment

JEL Classification Codes: C72, C91, J33

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1 Introduction

Classical agency theory in its hidden action strand is to a large extent concerned with the problem of how a principal should deal with an agent who takes a non-contractible action on which there is a basic conflict of interest between principal and agent. The broad message is mainly that a performance contingent payment to the agent is beneficial to motivate the agent to choose the appropriate actions.

Psychologists (compare Deci 1971; Lepper, Greene, and Nisbett 1973; Deci, Koestner, Ryan 1999) and more recently also some economists (for instance Frey 1997; Kreps 1997; Frey and Oberholzer-Gee 1997; Falk, Gächter, and Kovács 1999; Bénabou and Tirole 2002; Frey and Jegen 2001) have raised some doubts on whether this prescription is recommendable in all instances. Bewley (1999a, b), for example, finds in his extensive interviews with real-life managers that they are quite aware that monetary incentives have to be used very cautiously to motivate employees. A key argument is the claim that extrinsic rewards such as made by performance contingent payments may reduce *intrinsic motivation*. Frey (1997) terms this phenomenon as *motivation crowding out*. Deci (1975) defines that someone is intrinsically motivated for an activity, when there is no reward except the activity itself, i.e. the activity should be exercised even when reward is absent. But this implies that if a crowding out of intrinsic motivation takes place in a certain situation, at least in principle it has to be possible that the activity may be taken as a reward. Beginning with Deci (1971) many experimental studies have been carried out by psychologists testing the hypothesis that the introduction of extrinsic rewards reduces the intrinsic motivation of agents.[1] Most of those studies examine examples where participants had to carry out tasks that are potentially enjoyable, e.g. solving puzzles.[2]

There is a still growing literature that shows that social norms like reciprocity and fairness play an important role in employment relationships. Numerous studies show that agent are willing to reciprocate generous wages with remarkable high effort levels (see e.g. Fehr, Kirchsteiger, and Riedl 1993; Berg, Dickhaut, and McCabe 1995, Dufwenberg and Gneezy

[1] For an overview see for instance Pittmann and Heller (1987), Wiersma (1992), and Tang and Hall (1995). However, the argument that extrinsic motivation crowds out intrinsic motivation is not undisputed, see e.g. Cameron and Pierce (1994) and Eisenberger and Cameron (1996).

[2] A recent study carried out by economists finding a reduction in performance due to the introduction of a small reward is Gneezy and Rustichini (2000). In their study participants worked on 50 questions taken from an IQ test or had to collect donations for a charity.

2000). Note, however, that in experiments by Fehr, Gächter, and Kirchsteiger (1997), Fehr and Gächter (1998), Fehr and Rockenbach (2000), and Fehr and Gächter (2002) the introduction of explicit incentives by the threat of punishment reduces the performance of workers. The latter observation gives rise to the conjecture that reciprocal behavior can be compromised by incentive reward schemes.

In order to differentiate between motivation crowding out in the sense mentioned above and a reduced propensity to behave reciprocally, it appears to be interesting to study whether the introduction of direct incentive pay can also reduce incentives in a setting where the enjoyment of the task itself is excluded as a behavioral motivation. In fact, this is exactly what in general agency-theorists model. Typically in hidden action models it is assumed that agents have to choose some effort level for which they incur private costs and from which they enjoy no benefits. If in such a situation effort is also reduced by direct incentives either the decrease of intrinsic motivation cannot be the only reason or one has to think of a broader definition of intrinsic motivation.

To study this, we implemented a very simple principal agent model in a laboratory experiment. Two simple settings where compared. In both settings a player in the role of a principal played repeatedly with a player representing an agent. The agent had to choose a number which represents the "effort". The higher the number he had chosen, the higher were his private costs, but the higher was also the principal's revenue. In a first setting (*Pure Fixed*), we implemented a simple gift exchange situation, where the principal could make a fixed transfer to the agent before the latter chose his effort level. In a second setting (*Choice*), the principal had the choice between a fixed wage and an incentive scheme, where in addition to the wage he could offer to pay the agent a fraction of his revenue.

Interestingly, we observe something like a crowding out effect, i.e. if one compares the two settings, efforts are lower in the case where piece rates can be paid. Furthermore, giving the principal the additional possibility to set up a piece rate scheme instead of a pure fixed wage regime led to lower profits by the principal and moreover, a welfare loss is incurred. A post-experimental questionnaire provides us with evidence that agents take their decisions under different "mental frames" in the two settings: in the *Pure Fixed* setting agents mention the well-being of the principal significantly more often as a reason for their effort choice than agents do in the *Choice* setting.

The paper proceeds as follows. In section two the simple principal agent model is analyzed and the subgame perfect equilibrium is determined. Section 3 described the experimental

design and procedure. Section 4 summarizes our results and discusses explanations and section 5 concludes.

2 A Simple Principal Agent Model

Consider the following simple principal agent model. A principal is matched with an agent for T periods. In each period the agent can choose an effort level e_t for which he incurs costs $c(e_t) = \frac{c}{2} e_t^2$. With this effort he produces an output of $k \cdot e_t$ received by the principal. We compare two settings. In a first setting the principal can only determine a *fixed wage* a_t in the beginning of each period paid to the agent before he chooses his effort level. Hence, the principals overall payoff in a period t is

$$k \cdot e_t - a_t \tag{1}$$

and the agent receives

$$a_t - \frac{c}{2} e_t^2 . \tag{2}$$

In a second setting, the principal can choose between either setting a *fixed wage* or selecting a revenue dependent *incentive scheme* in the beginning of each period. When she decides to select an incentive scheme she has to pay a given fee f representing a performance measurement which is costly.

After having chosen the type of compensation, the principal can determine its size. If she has chosen a fixed wage she just has to determine a_t, the agent chooses his effort level and the payoffs are given as above in (1) and (2).

If she has chosen an incentive scheme instead, she has to determine a fixed wage a_t and a variable rate b_t. We assume that both a_t and b_t have to be non-negative, which corresponds to a limited liability assumption in standard principal agent theory. Now, the agent receives in addition to a_t a payment of $b_t \cdot k \cdot e_t$ from the principal. The principals payoff in a period t is therefore

$$(1 - b_t) k \cdot e_t - a_t - f \tag{3}$$

and the agent receives now

$$a_t + b_t \cdot k \cdot e_t - \frac{c}{2} e_t^2 . \tag{4}$$

The solution for the stage game with pure fixed wages is very simple if we assume rational and self-interested behaviour. The agent will never exert any effort and the principal will not set positive wages. Both principal and agent earn nothing. In the first setting, this stage game is repeated for *T* periods and by backward induction the prediction is the same for each stage.

Now we analyze the subgame perfect equilibrium in a period where the principal has decided to set up an incentive scheme. For a given incentive scheme, the agent maximizes expression (4). Solving the first order condition for e_t yields

$$e_t = \frac{b_t \cdot k}{c}. \tag{5}$$

We can now go back to the first stage where the principal specifies a_t and b_t. She will of course never choose a positive value of a_t as this will only reduce her own payoff without improving incentives. To compute the optimal value of the piece rate b_t we insert (5) in the principal's payoff function (3)

$$\max_{b_t} (1 - b_t)k \cdot \frac{b_t \cdot k}{c} - f\ . \tag{6}$$

Solving the first order condition of this problem for b_t yields the simple prediction that the principal chooses $b_t = \frac{1}{2}$ whatever the values of *k* and *c*. Hence, it is optimal to share half of her profits with the agent. The equilibrium effort level is then

$$e_t^* = \frac{k}{2c}. \tag{7}$$

Note that we did not allow negative values for a_t and therefore "sell the shop" contracts where the agent is residual claimant are infeasible. Hence, the optimal contract does not attain the first best solution. The efficient effort level would be chosen such as to maximize the total payoff of principal and agent and is twice as high as the equilibrium effort

$$e_t^{FB} = \frac{k}{c}. \tag{8}$$

The principal's overall equilibrium payoff when choosing the incentive scheme is therefore

$$\frac{k^2}{4c} - f. \tag{9}$$

When $\frac{k^2}{4c} > f$ it will always be optimal for the principal to choose the incentive scheme. For this case theory yields the clear-cut prediction that the principal will never choose a pure fixed

wage in the setting where he had the choice between fixed wage an incentive scheme. Furthermore we should expect that effort levels and the principal's profits are higher when she can choose an incentive scheme.

Finally, note that the agent's expected profit is positive due to our limited liability assumption. It is given by $\frac{k^2}{8c}$.

3 Experimental Design and Procedure

The experiment was conducted in the *Laboratorium für experimentelle Wirtschaftsforschung* (*eLab*) at the University of Erfurt. In total 42 students participated – most of them were enrolled in the Faculty of Law, Economics, and the Social Sciences. Two treatments were implemented. For each of the two treatments we conducted two sessions with 12 participants in the first and 9 in the second session of each treatment. A session consisted of two parts with 20 identical periods in each part and lasted for about one and a half hours. During the session payoffs were given in our fictitious experimental currency "Taler". After a session payoffs were converted to € and paid in cash with an exchange rate of 6 € for 100 Taler.

At the outset of a session the instructions were handed out and read by the experimenters. In addition the participants were advised how to use the experimental software.[3] In order to reduce the influence of uncontrollable connotations the strategic situation of the experiment was presented in completely neutral terms. Terms like "principal" or "agent" were avoided, instead the roles were referred to as players of type A (principals) and type B (agents). We spoke of "transfers" instead of "wages" and instead of "effort" a "number" could be selected. After the instructions were read all participants took seat in a cubicle with the number they had previously drawn on a card. The computer software matched participants into pairs randomly and anonymously. Half of the participants were assigned the role of a principal and the other half the role of an agent. Pairs and roles were fixed during the whole experiment. We collected 21 independent observations for each treatment. Communication – other than over the experimental software – was not allowed.

Each treatment consisted of two parts. In each part of a treatment we either implemented a setting in which only fixed wages could be set for 20 periods or another setting where the

[3] A translation of the instruction sheet is given in the appendix – the original German text is available from the authors on request. The experimental software was developed by making use of the toolbox zTree (Fischbacher 1998).

principals could choose between a fixed wage and an incentive scheme in the beginning of each of the 20 periods. In the first treatment we started with the *pure fixed wage* setting in the first part and switched to the *choice* setting in the second part. In the second treatment the reverse order was implemented. In the beginning of each session only the first part was explained. Although the participants knew that there would be a second part they did not know of what kind the experiment would be in that second part.

In the *pure fixed wage* setting each principal chooses in the beginning of each period a wage level from the integer set {0,...,40} which was directly transferred from her account to that of the agent assigned to her. After this the respective agent had to choose an effort level from the integer set {0,...,20}. Then the output was determined by simply doubling the effort level.[4] Thus, the total payoff for the principal was defined as output minus wage. The total agent's payoff was the wage minus the cost[5] for the chosen effort level. This procedure was repeated 20 times with unchanged principal-agent pairs.

In the *choice* setting in each period the principal could first choose whether to set a fixed wage or to implement an incentive scheme consisting of a fixed wage and a variable rate. When a principal did choose a fixed wage the agent was informed about this decision and the period proceeded exactly as in the pure fixed wage setting. When choosing the incentive scheme the principal incurred a cost of 2 Taler[6] directly subtracted from his account and had to specify a fixed payment from the integer set {0,...,40} and choose a variable rate from the set {10%, 20%, ...,100%}. The fixed payment was directly transferred from the principal's to the agent's account. After this, again the respective agent had to choose an effort level from the integer set {0,...,20} and the output was determined by doubling the effort level. But now the agent received the specified variable share of the output produced and the principal only the remaining part of the output. Table 1 summarizes our experimental setting.

[4] Therefore, the value of the variable k in our theoretical model is 2 in the experiment.

[5] The cost function for agents' efforts is given in the appendix. The efficient outcome is achieved at an effort level of 12, i.e. $c = 1/6$.

[6] Hence, this corresponds to a value of $f = 2$ in our theoretical model.

Table 1 : Experimental design

treatment	pure fixed wage – choice	choice – pure fixed wage
# independent observations	21	21
Part one	pure fixed wage	choice
Part two	choice	pure fixed wage
Initial capital balance of principals	100	
Initial capital balance of agents	100	
# rounds per treatment	40	
# rounds per setting	20	
Integer set of effort levels	{0, ..., 20}	
Integer set of fixed wages	{0, ..., 40}	
Variable rates	{10%, 20%, ...,100%}	

4 Results

We start by comparing only the first part in both treatments. Hence, we compare a situation in which a principal can only offer a fixed wage to an agent to one were she has the additional possibility to set up an incentive scheme.

4.1 Pure Fixed Wages or Choice?

Our key motivation was to examine whether the possibility of performance dependent wages does lead to higher efforts as our simple agency model suggests or whether we can observe something like a *crowding out*-effect such that the possibility of making performance based wage payments leads to lower effort levels.

To analyze this question we first compare the average efforts in both treatments across all 20 periods of the first part. In the *pure fixed wage* setting we observe an average effort level of *9.15*. Interestingly, it turns out that average efforts are only *6.25* in the *choice* setting. The difference is weakly significant (Mann-Whitney U-Test, p = 6.1%, two-tailed).[7] Figure 1 shows the time-series of average effort levels across the 20 periods of the first part of both treatments.

[7] The difference is clearly significant with p = 3.7% (two-tailed) if we correct for outliers by dropping the 5 percent highest and 5 percent lowest effort observations in each setting.

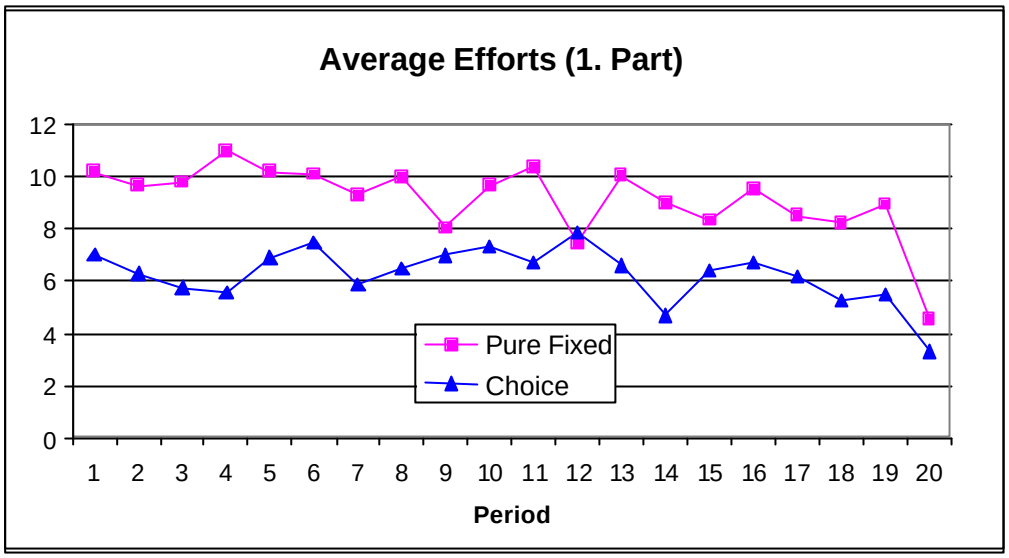

Figure 1 : Average efforts in part one

Hence, we observe something like a crowding out effect. Recall that in the *Choice* setting the principal also has the possibility to set a pure fixed wage. But it is the additional policy option to choose a performance contingent wage that seems to lead to reduced effort levels.

In order to gain some deeper insights why the *Pure Fixed* setting is quite successful we asked the participants several questions after the experiment. The answers provide us with convincing evidence that the decision frame perceived by the agents in the two settings differs: in the *Pure Fixed* setting agents mention the well-being of the principal significantly more often as a reason for their effort choice than agents do in the *Choice* setting (Fisher-Test, p = 5%, two-tailed).

As a next step, we investigate the impact on the principal's profit. Our theoretical model suggests that the principal should of course be strictly better off in the *Choice* setting. However, the observed effort choices indicate that this may not be the case in our experiment. In fact, the principal's profits are *2.98* in the *Pure Fixed* setting but only *.69* when the principal has the additional option to set up an incentive scheme. This difference is highly significant (p = .5%, two-tailed). A time series plot of the average profits is given in Figure 2. The principals are worse off when they have the additional possibility of setting up incentive schemes!

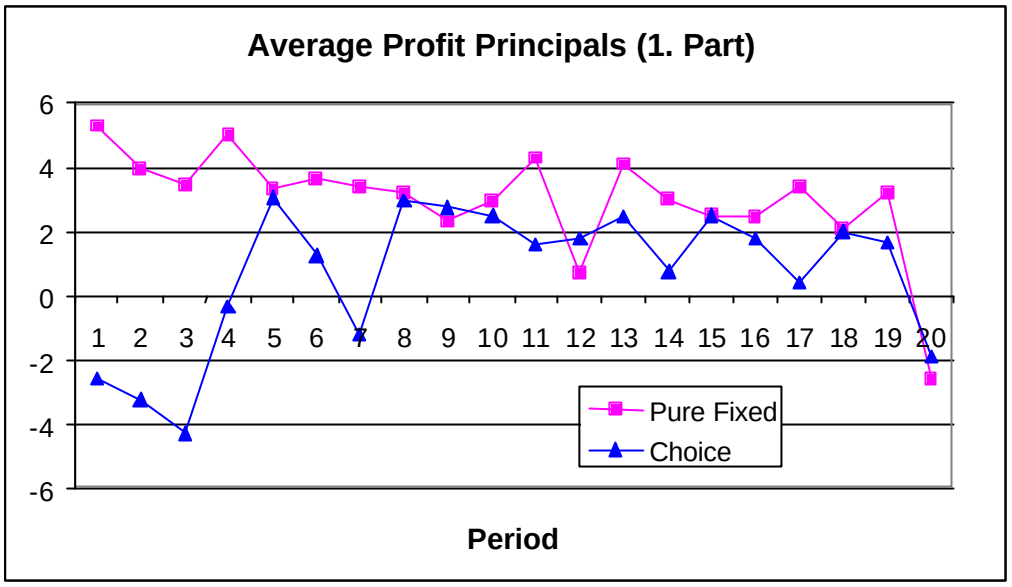

Figure 2 : Principal's average profits in part one

The profits of the agents however are (insignificantly) higher in the choice setting (*5.33*) than with fixed wages only (*4.71*). Now, we can compare both treatments in terms of efficiency by comparing the average total profits per group. With fixed wages only it is *7.68*, with the choice possibility only *6.02*. This difference is significant (U-Test, p = 0.9%, two-tailed). Therefore, it is not only from the principal's point of view, that pure fixed wages are preferable in our experiment, but also from a welfare perspective. For an overview Table 2 shows the average efforts, wages and profits in both treatments.

Table 2: Average efforts and profits in part one

	pure fixed wage	choice
Effort	9.15	6.25
Profit Principals	2.98	0.69
Profit Agents	4.71	5.33
Total Profits	7.68	6.02

4.2 A Closer Look at the Choice Setting

Note that so far we have only looked on the average efforts and profits in the choice setting and did not differentiate between pure fixed wages and incentive schemes within that setting. We now take a closer look at the compensation schemes chosen. On average in roughly the

half (*9,71*) of the 20 periods principals did choose a fixed wage. There seems to be no time-trend in the number of fixed wages chosen as indicated in Figure 3.

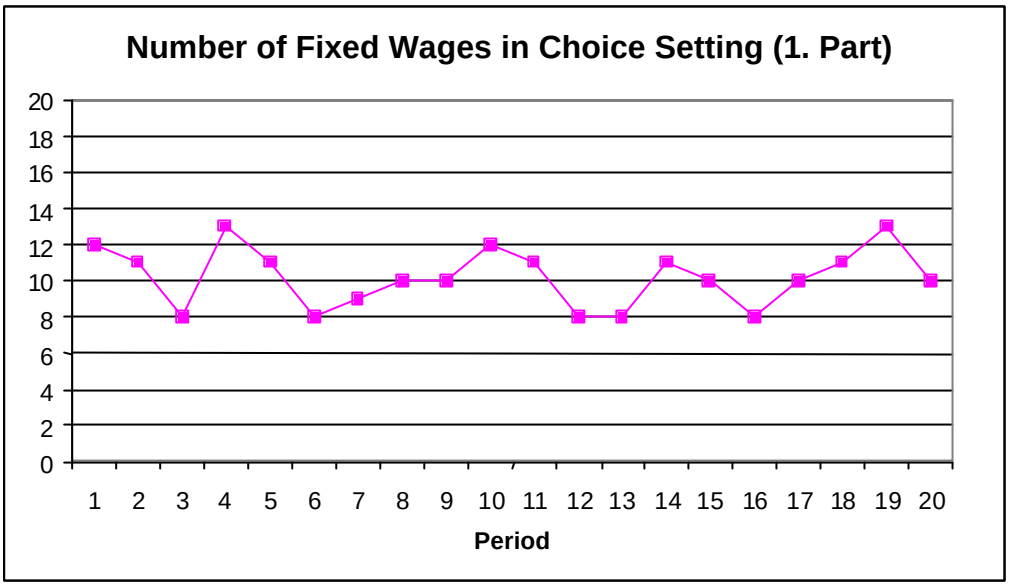

Figure 3 : Time series of the number of fixed wages in the choice setting (part one)

Table 3 summarizes the key differences between both forms of compensation. A first interesting observation is that the average effort in the choice setting was higher with an incentive scheme than after a pure fixed wage. This difference is significant (Wilcoxon, p = 2.4% two-tailed). Both averages are lower than the average effort in the pure fixed wage treatment. Hence, the possibility of setting variable wages seems to reduce the motivational power of a fixed wage.

Table 3: Average efforts and profits in the choice setting (part one)

	fixed wage chosen	incentive scheme chosen
Effort	4.65	7.77
Profit Principals	0.68	0.71
Profit Agents	5.08	5.56
Total Profits	5.76	6.27

The motivational power of a fixed wage might be high because the agent to which this wage is offered behaves reciprocally, i.e. responds to a high wage payment with an appropriate effort level. This may either be the case, because the agent is truly reciprocal or because he imitates reciprocal behavior in the earlier periods of the game to build up a reputation for

reciprocity.[8] As a measure for reciprocal behavior, we computed the ratio of effort per unit of wage for each agent and period. We compared this ratio in the fixed wages only setting with the same ratio for the cases where fixed wages have been chosen in the choice setting. In the choice setting the average ratio is *0.62*. In fact in the fixed wage only setting it is higher at *0.74*. This difference is weakly significant (U-Test, p = 8.5%, two-tailed). Hence, the possibility of setting variable wages seems to reduce the extent of reciprocal behavior.

It is interesting to note that although the efforts are significantly larger when an incentive scheme is chosen, the principal's profits do not differ significantly (compare Table 3). Recall that the principals had to pay a fee of 2 Taler when choosing the incentive scheme. Hence, within the choice setting the principals are roughly indifferent on whether to set a fixed wage or an incentive scheme. This may explain why there is no time trend in the number of fixed wages because the principals do not experience that one type of compensation dominates the other. However, the number of fixed wages varied strongly among groups as Figure 4 shows.

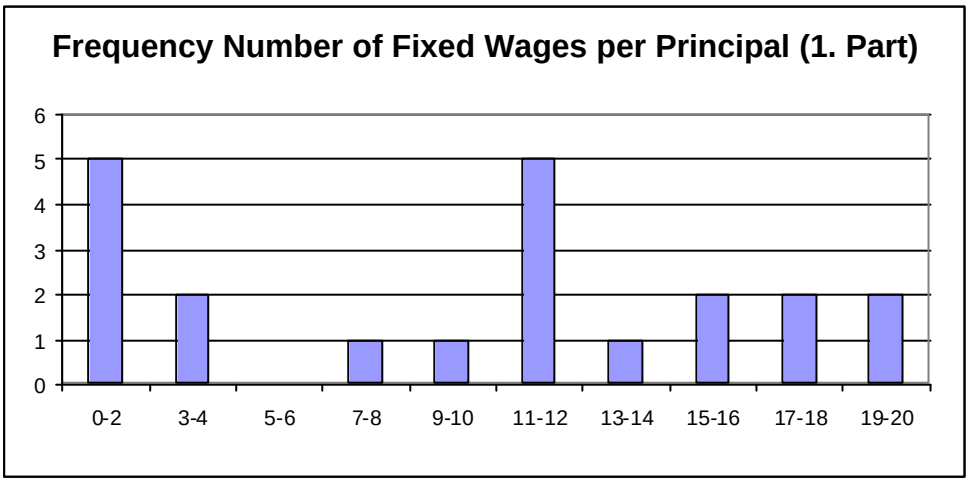

Figure 4 : Frequencies of the number of fixed wages in the choice setting (part one)

Some principals relied nearly entirely on fixed wages while others did choose incentive schemes in most periods. But what did drive the principals' decisions to choose a fixed wage or an incentive scheme? A simple answer is that a principal did choose a fixed wage more often, when she performed better with the fixed wage. This is supported by the observation, that there seems to be some weak positive correlation between the number of chosen fixed wages and the average profit after a fixed wage has been chosen (Spearman Rank Correlation Coefficient across groups: *0.33*, not significant) and there is a significant negative correlation

[8] Compare for instance Gächter and Falk (2002) for an experimental investigation of the formation of a reputation for reciprocity.

between the number of chosen fixed wages and the profit after a variable wage has been chosen (Spearman: *-0.67*).

In a second step, the question has to be answered under what conditions the principal performed better with a fixed wage. As we have seen, a rational agent with purely self-regarding preferences will never choose a positive effort level. Hence, a precondition for the success of a fixed wage contract might be that the agent behaves reciprocally. Our data yield an indication for this conjecture. As a measure for the extent of reciprocal behavior of a single agent in the choice setting we computed the average ratio of effort to wage across all periods in which he received a pure fixed wage. Recall that the average value across all agents was *0.62*. The Spearman Rank Correlation Coefficient between this ratio and the number of fixed wages chosen by the respective principal has a value of *0.43* and is therefore significant at the 5% level. In this view, the principals rely on fixed wages more often when being confronted with an agent who gave a stronger indication for reciprocal behavior.

4.3 Switching Settings

Recall, that each session had a second part, in which the same principal-agent pairs continued to play in a different setting. In the treatment where we started with pure fixed wages, we switched to the choice setting for another 20 periods and vice versa.

Figure 5 shows the average efforts in the second part of the experiment. Surprisingly, here efforts are higher in the choice setting than in the pure fixed wage setting. In the pure fixed wage setting the average is *4.96*, in the choice setting it is *8.83*. This difference is highly significant (p=0,4%, U-Test, two-tailed).

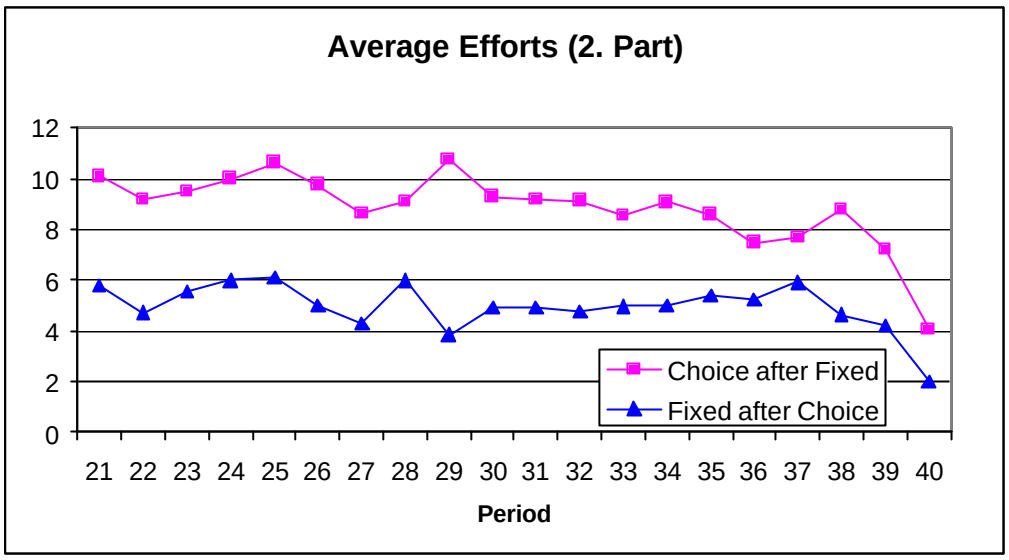

Figure 5 : Average efforts in part two

The same holds for the total profits of principal and agent. In the pure fixed wage setting the average total profits are *5.84* and in the choice setting it is significantly higher at *8.10* (*p*=1.1%, U-Test, two-tailed). Table 5 shows an overview of average efforts and total profits in both parts.

Table 4: A comparison of average efforts and payoffs in both parts

Treatment	pure fixed wage – choice	choice – pure fixed wage
Effort in Part 1	9.15	6.25
Total Profits in Part 1	7.68	6.02
Effort in Part 2	8.83	4.96
Total Profits in Part 2	8.10	5.84

It is interesting to compare the average effort in the pure fixed wage setting in the first part (when the participants started with this setting) with the efforts in the fixed wage setting in the second part (when they already have experienced the choice setting). As the graphs in Figure 1 and 5 already indicate, pure fixed wages lead to significantly higher efforts when principals and agents started with this pure fixed wage setting (p=0.8%, U-Test, two-tailed). Again, the same relation holds for the total profits: whereas total profits are on average *7.68* when the experiment starts with a fixed wage, they are only *5.84* after a preceding choice setting (*p*=3.6%, U-Test, two-tailed).

Hence, as a first conjecture the experience of possible piece rates seems to harm the usefulness of fixed wages as an incentive instrument. The removal of the choice option even

leads to weakly lower efforts (*4.96* against *6.25*) and total profits (*5.84* against *6.02*) in the same treatment.[9]

On the other hand, the choice setting yields significantly higher efforts and total profits when it follows after the pure fixed wage setting, than when it starts right from the beginning (p=2.1% for the efforts, p=0.2% for the total profits, both U-Test, two-tailed). The interesting question is therefore why the choice setting performed so well after the pure fixed wage setting. In this respect it is instructive to consider the numbers of fixed wages set within the choice setting in the second part. This numbers are plotted in Figure 6.

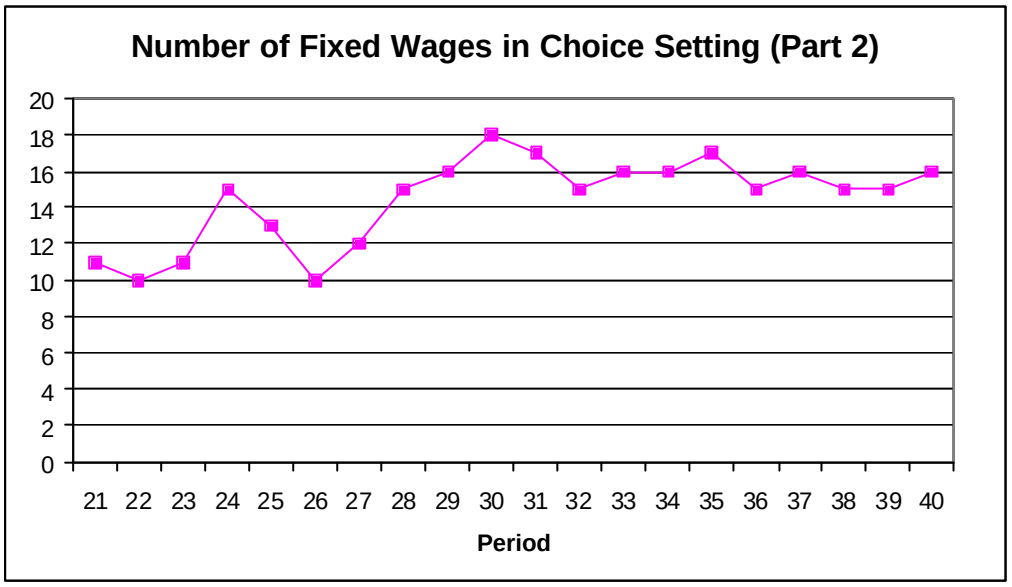

Figure 6 : Time series of the number of fixed wages in the choice setting (part two)

Note, that when the choice option is introduced right from the beginning, in about half of the cases the fixed wage is used. But contrary to the choice setting in the first part, in the second part the principals switch back to fixed wages up to more than *75%* of the cases. Hence, it seems to be of importance, that the principals learn that pure fixed wages work quite well in the first part of the experiment and experience in the second part that using the (costly) option to set a piece rate does not improve on this.

[9] However, these differences are not significant.

5 Summary

In this paper we experimentally investigate the effectiveness of two different reward schemes: fixed and a combination of fixed and variable wages. We conducted two treatments, each consisting of two parts. In part one of the first treatment the principal may repeatedly propose a fixed wage to the agent. After each wage transfer the agent chooses an effort level, where exerting effort is costly for the agent. In part one of the second treatment the principal may choose between a fixed wage or a combination of fixed and variable pay, which again is always followed by an agent's effort choice. The second parts of both treatments consist of the same setting as the respective first parts of the other treatment.

Interestingly, we observe something like a crowding out effect, i.e. if one compares the first parts of our two treatments, efforts are lower in the case where piece rates can be paid. Furthermore, giving the principal the additional possibility to set up a piece rate scheme instead of a pure fixed wage regime led to lower profits by the principal and moreover, a welfare loss is incurred.

The difference of average efforts exerted in part one and part two of our first treatment are negligible such that the introduction of the possibility to pay a piece rate does not crowd out incentives once the participants have experienced that pure fixed wage can work quite well. This is due to the fact that principals continue to offer fixed wages although they have the opportunity to propose variable pay.

Starting with the choice setting (part one of the second treatment), however, yields lower average effort compared to the choice treatment after having experienced purely fixed wages (part two in the first treatment). In the second treatment, however, average effort and total profit tends to be diminished from part one to part two. It seems that the prior experience of variable pay reduces the willingness to exert effort when only fixed wages can be offered. Average effort and overall efficiency is significantly higher under purely fixed wages if agents have not experienced variable pay before.

A more detailed analysis and discussion of our results is of course necessary to explore possible explanations for our findings and consider implications for the construction and development of incentive schemes in practice. Our results at least yield some indications that the use of piece rates should be carefully considered, as switching to fixed wages once piece rates have been experienced may lead to worse results as compared to a situation when they have never been introduced.

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Appendix: Experimental Instructions

(In the following we give an example instruction from the treatment PURE FIXED in part one and CHOICE in part two. Original instructions were in German; they are available upon request from the authors.)

Initial capital and groups

- At the beginning of the experiment each participant is endowed with a certain amount of money (**initial capital**) in the experimental currency „Taler".
- The experiment consists of **two parts**.

Part One

Rounds, Groups, and Roles

- The first part consists of **20 rounds.**
- During the first part of the experiment you belong to a **group of two** participants, yourself included. You do not know the identity of the other member of your group. The groups do not change throughout part one.
- There are two different roles in each group: a **type-A player** and a **type B-player**. The roles are assigned randomly in the beginning and they do not change either throughout part one.

Sequence of one Round

- **Transfer by type-A player**

  At the beginning of each round, the type-A player announces a **transfer** in the experiment's currency "Taler" to the type-B player. He specifies an amount out of the set {0, ..., 40}. This transfer is implemented immediately. The determined amount is taken from the type A-player and credited to the type-B player.

- **Selection of a number by the type-B player**

  When the transfer has taken place, the player of type B has to select a **number** out of the integer set {0, ..., 25}. The higher the number chosen, the higher are the costs the type B-player has to bear (see cost table). After the selection the respective costs are subtracted (in "Taler") from the account of the type B-player.

  The so-called **result** is **twice** the selected number. This result is announced to the type-A player and credited onto his (type-A's) account. The round ends with the announcement of the result and a new one will be started.

Initial Capital and Total Payoffs

- At the end of the experiment, the total account will be changed into € at an exchange rate of 6 € per 100 Taler and will be paid in cash to the player.

Please note:

- During the experiment no communication is permitted – except via the experimental software.
- All decisions are made anonymously, i.e. no one gets to know the identity of someone else who has made a certain decision.
- In addition the final payment is made anonymously, i.e. nobody learns, how much another participant has earned.

Part Two

Rounds, Groups, and Roles

- Part two of the experiment also consists of **20 rounds**.
- You belong to the same **group** as in part one of the experiment
- Your **role** is also the same as in part one of the experiment

Sequence of one Round

- **Selection of the transfer by the type-A player**

  At the beginning of each period the type-A player can decide whether he wants to transfer a **purely fixed amount** to the type-B player or whether he wants to transfer an amount which is **dependent on the result**. If she opts for an amount dependent on the result, this costs her 2 "Taler", which are subtracted from her account immediately.

- **Specification of the transfer by the type-A player**

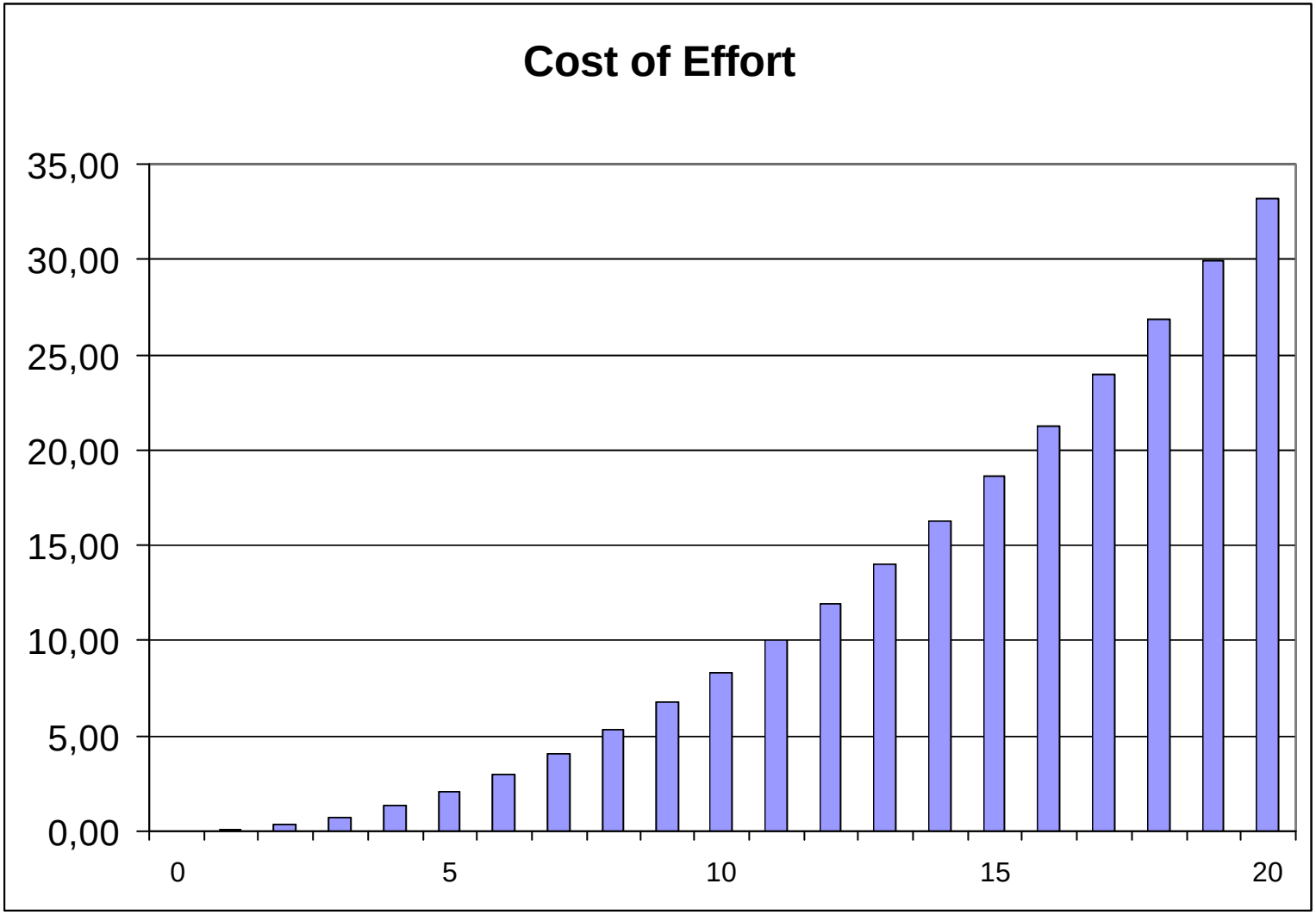
  After having selected the transfer the type-A player has to specify it.

  If he opted to transfer a **fixed amount** he specifies an amount of the experiment's currency "Taler" out of the set {0, ..., 40}. This transfer is implemented immediately. The determined amount is taken from the type A-player and credited to the type B-player.

  If he opted to transfer an amount which is **dependent on the result**, then he has do two things. At first he specifies a fixed basic amount of the experimental currency "Taler" out of the set {0, ..., 40}. Secondly he determines a percentage at which the type-B player participates in the result. He can select a share out of the set {10%, 20%, 30%, ..., 100%}. The fixed basic amount is taken from the type A-player and credited to the type B-player immediately. As soon as the result is realized (see below), the type-B player receives the specified percentage of the result and the type-A player receives the remainder of the result.

- **Selection of a number by the type-B player**

  After the type-A player has selected and specified a transfer the type-B player will be informed about the kind of transfer (fixed or dependent on the result). Then the type-B player selects a number out of the integer set {0, ..., 20}. The higher the number chosen, the higher the costs the type B-player has to bear (see cost table). After the selection the respective costs are subtracted (in "Taler") from the account of the type B-player. The so-called **result** is **twice the selected number**. If a **fixed transfer** was chosen this result is announced to the type A-player and credited onto his (type A's) account. If this transfer is **dependent on the result,** the type-B player is credited the percentage of the result, which had been specified by the type-A player earlier. The type-A player receives, the remainder of the result. The round ends with the announcement of the result and a new one will be started.



Effort	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cost	0,00	0,08	0,33	0,75	1,33	2,08	2,99	4,07	5,31	6,72	8,30	10,04	11,95	14,03	16,27	18,68	21,25	23,99	26,89	29,96	33,20