

## RECIPROCITY AND CONTRACT ENFORCEMENT<sup>1</sup>

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### 1. The Contract Enforcement Problem

The problem of contract enforcement is a central issue for the functioning of market economies. During the last two decades economic theory has made much progress in the understanding of the *endogenous* enforcement of contracts (see, e.g., [Milgrom and Roberts, 1992](#)). Almost all of these models assume that the parties involved in a contract enforcement problem are rational and *selfish*. The assumption that economic actors are *solely* driven by rationality and selfishness is a good starting point for a theoretical examination. It is, however, clearly refuted by many experiments. There is, in particular, a lot of experimental evidence that indicates that a considerable fraction of the population is driven by reciprocity motives (for an overview of results see [Fehr and Falk, 1998](#) and [Fehr and Gächter, 1998b](#)). Being motivated by reciprocity means that one is willing to forgo some money in order to punish behavior that is considered as unfair and to reward behavior that is considered as fair.

In this chapter we report on experiments that were designed to test whether *reciprocity* is able to mitigate the contract enforcement problem. The experiments were set up in a labor market framework where the enforcement of workers' effort was problematic. However, we would like to stress that our argument is more general and applies also to contractual relations beyond the employment relationship. In our context a contract enforcement problem exists if, due to limitations in the enforcement technology, a firm which faces rational and purely selfish workers cannot enforce the efficient effort level. Instead, the firm can only enforce a minimal effort level,  $e^{\min}$ , that is below the efficient level.

To illustrate how reciprocity can, in principle, mitigate the effort enforcement problem consider the following example. Suppose that a firm stipulates a contract which specifies a wage  $w$  and a *desired* effort level  $\hat{e}$ . Once the worker accepts the contract she has to choose the actual effort  $e$ . If the worker is purely selfish the firm can only enforce  $e^{\min}$ . However, if the worker is motivated by reciprocity the firm can, by making a generous offer, induce the worker to respond with  $e > e^{\min}$ . If, after observing the worker's effort choice, the firm has the additional option to punish the worker even a selfish worker may be induced to provide  $e > e^{\min}$ . Of course, if the punishment of

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the worker is costly for the firm a selfish firm will never punish. Yet, if the firm is motivated by reciprocity it may well be willing to punish the violation of the contract by the worker even if that punishment is costly for the firm. As a consequence, if the worker anticipates that the firm is willing to punish she may not violate the contract in the first instance.

## 2. Experimental Design and Results of Fehr and Gächter (1998a)

### 2.1. Design

In the experiment, subjects acted in the roles of firms and workers, respectively. The design consisted of two major elements: First, *firms posted contracts in a posted bid market* with an excess supply of workers (in all experiments there were 8 workers and 6 firms) to create a lot of competitive pressure. Second, workers had some discretion in exerting work effort. This is regarded to be an essential characteristic of naturally occurring labor relations (see, e.g., Williamson, 1985; Milgrom and Roberts, 1992; Malcomson, 1999) and a precondition for reciprocity to become effective. The experiment consisted of 12 trading days. To determine the effectiveness of reciprocity as a contract enforcement device, two treatment conditions were designed. In the *two-stage treatment*, only workers could respond reciprocally. In the *three-stage treatment*, firms could punish or reward ‘their’ worker at the third stage after they have learned about workers’ actual effort choice at the second stage. Hence, in the three-stage treatment both workers and firms could respond reciprocally. Table 1 summarizes the design and the predictions.

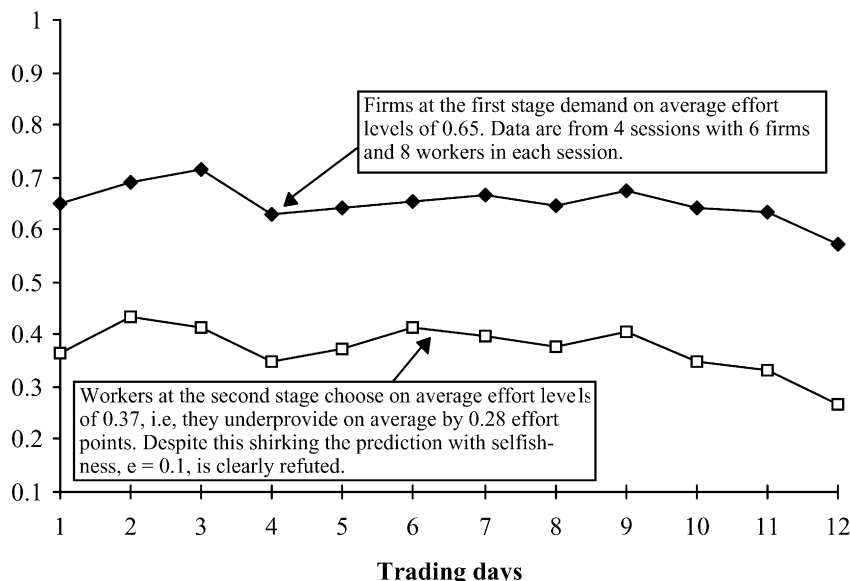
An important design feature concerns the information about payoffs and the anonymity of trading partners. Payoff functions of firms and workers were common knowledge. Individual firms and individual workers could develop no reputation across periods because all interactions were fully anonymous.

### 2.2. Results

In the *two-stage treatment* workers actually behaved reciprocally as it has been observed in many other similar experiments (see Fehr and Falk, 1998). The higher the wage payment, the higher the actual effort choice. Workers’ reciprocity led firms to actually pay above minimum wages to induce higher than minimum effort levels. Figure 1a gives the most important result concerning contract enforcement. It depicts both firms’ average desired effort levels ( $\hat{e}$ ) and workers’ actual average effort levels ( $e$ ). The figure shows that the prediction of a minimum actual effort level (of  $e = e^{\min} = 0.1$ ) derived under the assumption of selfishness, clearly receives no support. Workers are willing to provide above-minimum effort levels. However, firms cannot completely enforce their desired effort level. Firms demand, on average, an effort level of 0.65 and receive an

Table 1  
Reciprocity and contract enforcement: the design of Fehr and Gächter (1998a)

A. Sequence of events during a trading day		
Stage 1	1. Firms choose wage $w \in [0, 100]$ and desired effort $\hat{e} \in [0.1, 0.2, \dots, 1.0]$ . 2. Workers observe all contracts $(w, \hat{e})$ and choose among the available contracts in a randomly determined order. There are more workers than jobs (= firms) to create competition among the workers.	
Stage 2	3. Workers who accept a contract choose an actual effort level $e \in [0.1, \dots, 1.0]$ . They incur effort costs $c(e)$ with $c(e^{\min}) = 0$ , $c'(e) > 0$ and $c''(e) > 0$ . 4. Firms are privately informed about the worker's actual effort choice ( $e$ ). In the two-stage treatment a trading day ends here.	
Stage 3	5. (In the three-stage treatment only!) Firms decide whether they punish $p \in [-0.1, \dots, -1]$ or reward $p \in [0.1, \dots, 1]$ (no punishment/reward means $p = 0$ ) their worker at some cost $k(p) = 10 *  p $ , i.e., only $p = 0$ is costless.	
B. Payoffs		
Firms:	2-stage-treatment: $\pi = 100 * e - w$	3-stage-treatment: $\pi = 100 * e - w - k(p)$
Workers:	2-stage-treatment: $u = w - c(e)$	3-stage-treatment: $u = w - c(e) + 25p$
C. Main predictions		
In the absence of reciprocity		In the presence of reciprocity
2-stage treatment:		2-stage treatment:
2nd stage. Workers choose $e = e^{\min} = 0.1$ because $e > e^{\min}$ is costly;		2nd stage. Workers react reciprocally to firms' wage offers, i.e. $e'(w) > 0$ .
1st stage. Firms pay the minimum wage $w = 0$ .		1st stage. Firms pay above-minimum wages $w > 0$ to induce $e > e^{\min}$ .
3-stage treatment:		3-stage treatment:
3rd stage. Firms do not punish/reward (i.e., $p = 0$ ) because punishment is costly for them;		3rd stage. Firms punish shirking (i.e., $e < \hat{e}$ and reward contract fulfillment (i.e., $e = \hat{e}$ );
2nd stage. Workers choose $e = e^{\min} = 0.1$ because $e > e^{\min}$ is costly for them;		2nd stage. Workers choose $e > e^{\min}$ for reciprocal reasons and because of the expected reciprocity of firms at the third stage.
1st stage. Firms pay the minimum wage $w = 0$ .		1st stage. Firms pay above-minimum wages $w > 0$ .
$\Rightarrow$ With selfishness, firms can only enforce the minimum effort level!		$\Rightarrow$ Reciprocity allows the enforcement of $e > e^{\min}$ . Since in the 3-stage treatment both workers and firms can react reciprocally, actual effort levels in the 3-stage treatment are expected to be at least as high as in the two-stage treatment.



Source: Fehr and Gächter (1998a).

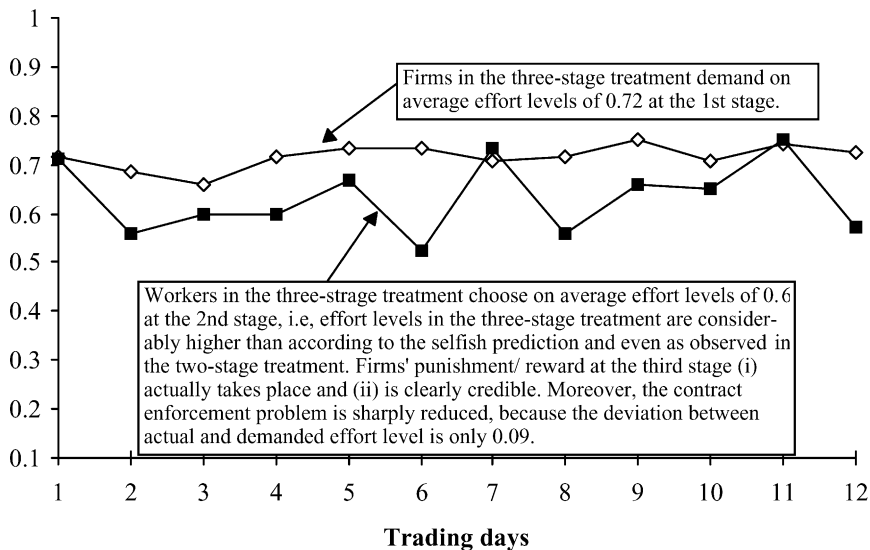
Figure 1a. Contract enforcement (i.e., workers' deviation from firms' desired effort level) in the TWO-stage treatment (workers can react to firms' contract offers).

actual average effort of 0.37. Therefore, one can conclude that workers' reciprocity partly mitigates the contract enforcement problem.

In the *three-stage treatment*, firms at the third stage actually rewarded or punished although this was costly for them. This is evidence for firm's reciprocity. At the second stage workers again showed a highly significantly positive wage-effort relation. Firms tried to induce reciprocity by offering generous contracts.<sup>2</sup> The most important result is that two-sided reciprocity further reduced the contract enforcement problem. As can be seen from Figure 1b, workers' average actual effort in the three-stage treatment was considerably higher than in the two-stage treatment. Moreover, the difference between firms' desired effort level and workers' actual effort level shrank from 0.28 in the two-stage treatment to 0.09 in the three-stage treatment.

Table 2 provides further evidence for the effectiveness of reciprocity as a contract enforcement device. Whereas in the two-stage treatment firms in only 17 percent of the trades were able to fully enforce the contract (i.e., to induce workers to actually choose  $e = \hat{e}$ ), this number increased to 73.8 percent in the three-stage treatment.

<sup>2</sup> Gächter and Falk (1998), in a reanalysis of the data of Fehr and Gächter (1998b), find that workers' effort choice at the second stage is influenced by both workers' reciprocal reaction to the generosity of firms' contract offers at the first stage and of workers' anticipation of firms' reciprocal reaction at the third stage.



Source: Fehr and Gächter (1998a).

Figure 1b. Contract enforcement (i.e., workers' deviation from firms' desired effort level) in the THREE-stage treatment (firms can react to workers' actual effort choice).

Table 2  
Contract enforcement (i.e., the deviation from  $\hat{e}$ ) in the two- and three-stage treatment

Treatment	No. trades	Shirking $e < \hat{e}$		No shirking $e = \hat{e}$		Excess effort $e > \hat{e}$	
		% of trades with $e < \hat{e}$	Average amount of $(\hat{e} - e)$	% of trades with $e = \hat{e}$	% of trades with $e > \hat{e}$	Average amount of $(e - \hat{e})$	
2-stage	141	82.98	0.31	14.18	2.84	0.18	
3-stage	141	26.24	0.54	36.17	36.88	0.16	

Note:  $e(\hat{e})$  denotes actual (desired) effort;  $e, \hat{e} \in [0.1, 0.2, \dots, 1]$ .

3. Contract Enforcement with an Imperfect Verification Technology

In the experiments of Fehr and Gächter (1998a) it was assumed that third parties (like, e.g., the courts) have no means to verify the underprovision (i.e.,  $e < \hat{e}$ ) of effort. Fehr, Gächter, and Kirchsteiger (1997) and Zanella (1998) conducted experiments where it was possible to verify the underprovision of effort with probability 0.5. Due to this verification possibility, firms could impose fines on shirking workers. They could offer contracts that consisted of (i) a wage payment, (ii) a desired effort level, and (iii) a fine the worker had to pay to the firm in case of verifiable shirking.

In this setup, Fehr, Gächter, and Kirchsteiger (1997) conducted two- and three-stage experiments similar to the procedures outlined in Table 1. *Again, it turns out that reciprocity is a very powerful contract enforcement device in the three-stage treatment. The authors report results that are qualitatively similar to those documented in Figure 1b.* It turns out that (i) shirking is drastically reduced relative to the two-stage treatment and (ii) firms are able to enforce effort levels that are far above the levels of both the two-stage treatment and the incentive compatible level under selfish preferences. In the two-stage treatments with fines, however, less reciprocal behavior and lower effort levels are observed compared to the two-stage treatments without fines. *This indicates that the explicit threat of fining shirking workers undermines reciprocal responses and reduces the average effort in the two-stage treatment.*<sup>3</sup>

#### 4. Summary

This chapter reports the results of experiments that were designed to test the effectiveness of reciprocity as a contract enforcement device. It turns out that reciprocity generates a significant increase in effort levels relative to the prediction based on selfish preferences. Moreover, it gives rise to a considerable mitigation of the contract enforcement problem. The impact of reciprocity is particularly strong if both parties have possibilities to reciprocate. Hence, reciprocity can lead to considerable efficiency gains for the contracting parties. These results indicate that models that neglect reciprocity are likely to make wrong predictions and are, thus, seriously incomplete as a basis for normative advice.

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<sup>3</sup> Zanella (1998) replicates and further analyses this result.