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Reciprocity and economics: The economic implications of *Homo Reciprocans*[1]

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Abstract

A large number of studies suggest that reciprocity constitutes a basic motivational drive. This paper shows that reciprocity can account for a wide range of empirical phenomena: It (1) is a powerful effort elicitation device, (2) explains why employers refuse to hire underbidders and, hence, why wages are downwardly rigid, (3) gives rise to non-compensating wage differentials and to a positive correlation between profits and wages, (4) provides a rationale for the absence of explicit financial incentives, and (5) is a key force that sustains social norms.

JEL classification: C92; D64; J30; J50; J64

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1. *Homo Reciprocans* exists

There can be little doubt that selfish people exist and that material payoffs are powerful motivators. However, a large number of studies shows that many people are *also* driven by reciprocity. Positive reciprocity is the impulse or the desire to be kind to those who have been kind to us. The principle 'an eye for an eye, a tooth for a tooth' is the prototypical example of negative reciprocity. It is

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based on the impulse or the desire to strike back. Many people, and some non-human animals too, show clear patterns of reciprocal behavior. De Waal (1991), for example, reports that food sharing is a very common phenomenon among chimpanzees. However, chimpanzees do not share food regardless of past interactions. Sharing of individual A with B is highly positively correlated with sharing of B with A. Moreover, if A requests food from B, B is significantly more likely to respond to this request with aggression if A did not share with B in the past. That the close neighbours of our evolutionary ancestors behave reciprocally suggests that this behavior has deep evolutionary roots.[2]

There is also strong evidence that many human subjects respond kindly to 'gifts' and retaliate if they have been hurt. Such reciprocation occurs even in one-shot encounters among strangers and when it is costly for the responder.

Since the work of Güth et al. (1982), negative reciprocity has been reported in dozens if not hundreds of so-called *ultimatum bargaining games*.[3] In these games many subjects are willing to reject positive, yet uneven offers although the rejection is costly for them. This induces the other bargaining party to make offers that are closer to the equal split (see Güth (1995b), Camerer and Thaler (1995) and Roth (1995) for surveys of experimental results). Beginning with Fehr et al. (1993), positive reciprocity has been documented in many so-called *trust-* or *gift-exchange games*. In a gift exchange game a player A can voluntarily transfer resources to player B. A transfer from A represents a 'gift' because player B has no obligation to pay for the transfer. After observing A's choice B also can transfer resources to A. In case of reciprocal transfers both players are in general better off. However, selfishness dictates that nobody makes a transfer. The evidence clearly refutes this prediction: The vast majority of player A's makes positive transfers and many but not all player B's reward this by making a transfer as well.[4]

The evidence from ultimatum-, trust-, and gift-exchange games suggests that a large fraction of the people has a willingness to pay for rewarding kind and punishing hostile acts. Since in most experiments subjects interacted anonymously with each other reciprocity even applies if people do not know with whom they interact. Moreover, reciprocity has also been documented if it is common knowledge that *nobody* can observe individual choices. In the experiments of Berg et al. (1995), Bolton and Zwick (1995) and Abbink et al. (1997) the experimenter could not observe individual but only aggregate choices.

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[2] For evolutionary explanations of reciprocal preferences see, e.g., Güth (1995a) and Huck and Oechssler (1996).

[3] In the ultimatum game a proposer and a responder can agree on the division of a fixed amount of money. The proposer offers a share x to the responder who can accept or reject. If she accepts she receives x while the proposer receives $1 - x$. In case of rejection both receive zero. The standard model with selfish preferences predicts an offer $x = \varepsilon$, where ε is the smallest money unit, e.g., 1 penny. The responder is predicted to accept any $x > 0$.

[4] See also Berg et al. (1995), Jacobsen and Sadrieh (1996), Abbink et al. (1997).

The impact of reciprocity has also been observed under *high-stakes conditions*. Cameron (1995) conducted a one-shot ultimatum game in Indonesia in which the bargaining pie amounted to the income of three months. She observed the same behavioral pattern in these high-stake games compared to games with much lower stakes. Fehr and Tougareva (1995) conducted gift exchange games in Russia in which subjects earned on average three month's income in a two-hour session. In a control session the earnings opportunity decreased by a factor of ten. They could not detect any effect of the stake level on the frequency or strength of reciprocal responses. The existence of reciprocal choices also seems to be robust with regard to the introduction of one-shot repetitions. If subjects have the opportunity to learn by playing a series of identical games against different opponents behavior remains rather stable over time. In particular, the frequency and strength of reciprocal responses does not decline over time (Roth et al., 1991; Fehr et al., 1994, Charness, 1996; Gächter and Falk, 1997).

Reciprocal behavior may be interpreted in terms of a *desire* to be kind or hostile in response to kind or hostile acts. Alternatively, it may be interpreted in terms of evolutionarily driven, low rationality stimulus–response behavior (e.g., Gale et al., 1995). We doubt this interpretation because ultimatum and gift exchange games are so simple that it is difficult to believe that people are unable to behave according to their true preferences in these games.[5] However, from an economic viewpoint the issue of interpretation becomes less important as long as one recognizes the stability of reciprocal *behavior*. The important fact is that reciprocal behavior emerges under well-defined conditions and gives rise to economically relevant phenomena.

2. *Homo Oeconomicus* also exists

The number of subjects who behave reciprocally in one-shot situations is relatively high. In Berg et al. (1995), Gächter and Falk (1997), Miller (1997), Fehr et al. (1994), Fehr and Falk (1996), Abbink et al. (1997) the fraction of subjects exhibiting reciprocal choices is never below 40% and sometimes above 60%. However, there is also a non-negligible fraction of subjects who does not reciprocate and behaves completely selfish. In the previously cited studies between 20% and 30% of the subjects behaved in this way. Thus, a non-trivial minority of subjects exhibits selfish behavior.[6] The coexistence of reciprocal and selfish types raises exciting and important questions: How do selfish and

[5] In a longer version of this paper we have dealt in more detail with this problem. The larger version of this paper can be found on our homepage (http://www.unizh.ch/iew/grp/fehr/workingpapers.html).

[6] Not all subjects can be classified as being either reciprocal of selfish. Yet, the vast majority of subjects seems to fall into these two categories.

reciprocal types interact? When do the reciprocal types shape the aggregate outcome and when the selfish types? Which features of the institutional environment enable the dominance of one of the types? What are the welfare consequences of institutions in the presence of heterogeneous types?

At the theoretical level only little research exists to answer the above questions.[7] At the empirical (experimental) level the situation is somewhat better. In the following sections we will provide several examples indicating that the presence of reciprocal types can generate aggregate outcomes which differ radically from the standard prediction. As we will see the power of reciprocity to shape aggregate outcomes does not only derive from the mere fact that many reciprocal subjects exist. It is also due to the fact that *the existence of reciprocal types changes the behavior of the selfish types.* In particular, the existence of positive reciprocity may induce selfish types to behave 'nicely' for purely selfish reasons because they can expect a reward from the reciprocal types. Likewise, the existence of negative reciprocity may prevent opportunistic behavior of selfish subjects because they are afraid of being punished by the selfish types. However, we will also see an example in which the selfish types cause the reciprocal types to behave purely selfish. Thus, the influence of one type on the behavior of the other is no 'one-way street'. Ultimately, the institutional environment is decisive, too.

3. Reciprocity as an effort elicitation device

In contemporary labor markets employment relations are to a large extent regulated by incomplete contracts. The employers agree that – within limits that are rarely completely described and only partly understood – they will obey the orders of the employer while the employer agrees to pay the employees. The obligations of both employer and employee are left unspecified in many states of the world.[8]

In practise incomplete labor contracts often take the form of a fixed wage contract without explicit performance incentives and a considerable degree of worker discretion over the work effort. The absence of explicit performance incentives can be viewed as a rational response of employers to the difficulties of measuring and verifying a worker's performance in a multitask environment (Holmström and Milgrom, 1991; Baker, 1992). Under conditions of incompletely specified obligations and only weak or no explicit performance incentives a worker's general job attitute, or what Williamson (1985) called 'consummate

[7] For attempts in this direction see Fehr and Schmidt (1997) and Kolm (1994).

[8] This incompleteness has been stressed, for example, by Williamson (1985) and more recently by Milgrom and Roberts (1992) and Hart (1995).

cooperation' becomes important. Williamson defines 'consummate cooperation' as opposed to merely 'perfunctory cooperation' as 'an affirmative job attitude whereby gaps are filled, initiative is taken, and judgment is exercised in an instrumental way'. It is clear that under a complete labor contract a generally cooperative job attitude would be superfluous because all relevant actions would be unambiguously described and enforceable. However, how should one describe, assess, and enforce 'initiative', 'good judgment' and 'potentially arising gaps' unambiguously in an explicit contract?

In our view it is the requirement of a generally cooperative job attitude that renders reciprocal motivations potentially very important in the labor process. If a substantial fraction of the work force is motivated by reciprocity considerations employers can vary the degree of 'cooperativeness' of workers by varying the generosity of the compensation package. Therefore, variations in the base wage that are unrelated to variations in performance incentives may nonetheless have a large impact on effort behavior.

In several papers the conjecture of reciprocal effort choices has been investigated in tightly controlled laboratory experiments (e.g., Fehr et al., 1993; Charness, 1996; Gächter and Falk, 1997; Fehr and Gächter, 1997; Fehr et al., 1997).[9] In the latter two studies experimental employers could offer a wage contract that stipulated a wage w and a desired effort level e'. If an experimental worker accepted (w, e') she was free to choose *any* e in the interval $[e_0, e^0] = [0.1, 1]$, where e_0 is the minimum and e^0 is the maximum effort level. Since effort costs where increasing in e any $e' > e_0$ represents a non-enforceable desire, that is, merely cheap talk. However, in the presence of reciprocal motivations employers may well be able to induce workers' voluntary cooperation, i.e., $e > e_0$, by being sufficiently generous.

The black bars in Fig. 1 show workers' average effort as a function of the rent offered to the workers.[10] If all workers are fully selfish effort levels should not exceed $e_0 = 0.1$. However, as Fig. 1 shows, average effort levels are strongly increasing in the rent offered and far above the selfish level. This suggests that on average people are willing to put forward extra effort above what is implied by purely pecuniary considerations. In a large interview study conducted by Bewley (1995, 1997) field evidence supporting this view is provided. The interviewed managers stress 'that workers have so many opportunities to take advantage of employers that it is not wise to depend on coercion and financial incentives alone as motivators. … Employers believe that other motivators are necessary, which are best thought of as having to do with generosity' (Bewley, 1995, p. 252).

[9] In all these studies anonymous strangers interacted with each other and individual reputation formation was ruled out by the experimental design.

[10] Any contract offer (w, e') implies a particular rent. The rent is defined as the worker's income that is implied by (w, e') minus the (constant) opportunity costs of accepting the offer.

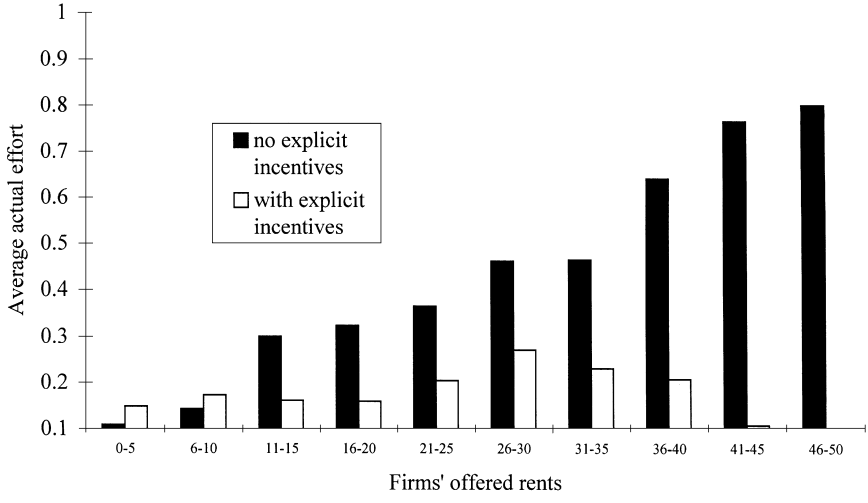

Fig. 1. Effort–rent relation in the absence and presence of explicit performance incentives. *Source*: Fehr and Gächter (1997) and Fehr et al. (1997).

4. Reciprocity versus performance incentives

In the presence of a reciprocity-based cooperative job attitude of employees the question arises how performance incentives affect worker's willingness to cooperate. One possibility is that reciprocity gives rise to extra effort on top of what is enforced by financial incentives alone. However, it may also be the case that explicit performance incentives reduce the willingness to voluntarily cooperate. This possibility may arise because explicit performance incentives may cause an atmosphere of threat and distrust. It seems quite conceivable that reciprocity-based extra-effort is reduced in a hostile work environment. Bewley (1995), for example, reports that many managers stress that explicit 'punishment should be rarely used as a way to obtain cooperation' (p. 252).

In the experiments conducted by Fehr and Gächter (1997) and Fehr et al. (1997) the impact of performance incentives on reciprocity-based voluntary cooperation was examined. In addition to (w, e') firms in one treatment had the opportunity to stipulate a fine f that the worker had to pay in case of verified shirking. The fine was constrained to be below f^0 and at the maximum fine f^0 the incentive compatible effort level of a selfish and risk neutral worker was given by $e^* = 0.2$. The white bars in Fig. 1 show the effort–rent relation in the presence of this explicit performance incentive. As one can see the average effort is lower at each rent level. Hence, the joint gains from trade are lower, too. This suggests that reciprocity-based incentives and explicit performance incentives

may indeed be in conflict with each other. In particular, explicit incentives may destroy trust- and reciprocity-based incentives and, hence, may lead to welfare losses.[11] Therefore, the presence of reciprocal motives may provide a reason for the absence of explicit incentives.

5. Rent-sharing and competition

If effort levels depend positively on the rents offered to the workers it may be profitable for employers to pay rents (Akerlof, 1982; Akerlof and Yellen, 1988). As a consequence, employers may be reluctant to cut wages in a recession as reported by, for example, Bewley (1995, 1997) and Blinder and Choi (1990), for wage cuts may decrease productivity. In addition, one would expect that more profitable firms pay, ceteris paribus, on average, higher wages. Higher profitability is likely to be associated with a higher marginal product of effort. Therefore, the return of a given effort increase is higher and employers have an incentive to pay higher rents (wages).

There are now several papers which confirm that the presence of reciprocal types gives rise to downward wage rigidity (Fehr et al., 1993, 1994; Fehr and Falk, 1996). In the following we draw on the Fehr–Falk paper because they confirmed the existence of downward wage rigidity in the most competitive environment – the competitive double auction. In this environment both experimental firms and experimental workers are unconstrained in their wage setting behavior. In particular, workers have the opportunity to underbid the prevailing wage level.

Fehr and Falk implemented two treatment conditions – one with incomplete labor contracts and endogenous effort choices by the workers, and one condition in which the labor contract was complete because the experimenter enforced an exogenously given effort level. In both conditions there was a large excess supply of labor so that the standard model predicts a competitive wage level of 20. Fig. 2a shows the evolution of the wage level over time in a market with incomplete contracts while Fig. 2b shows wages in a market with complete contracts.

In addition, both figures show worker's wage bids. As one can see wage levels are radically different in the two conditions. In the market with complete contracts employers take full advantage of the low wage offers made by the workers and, as a consequence, wages are close to the competitive level in this

[11] There exists a large psychological literature on the crowding out of intrinsic motivation by explicit incentives (e.g., Deci and Ryan, 1985). In the psychological experiments the motivation that is crowded out by explicit incentives is intrinsic to the task performed. In our experiment no such intrinsic motivation was possible. It is, therefore, better to speak of a crowding out of trust- and reciprocity. For an application of intrinsic motivation theory to economics see Frey (1997).

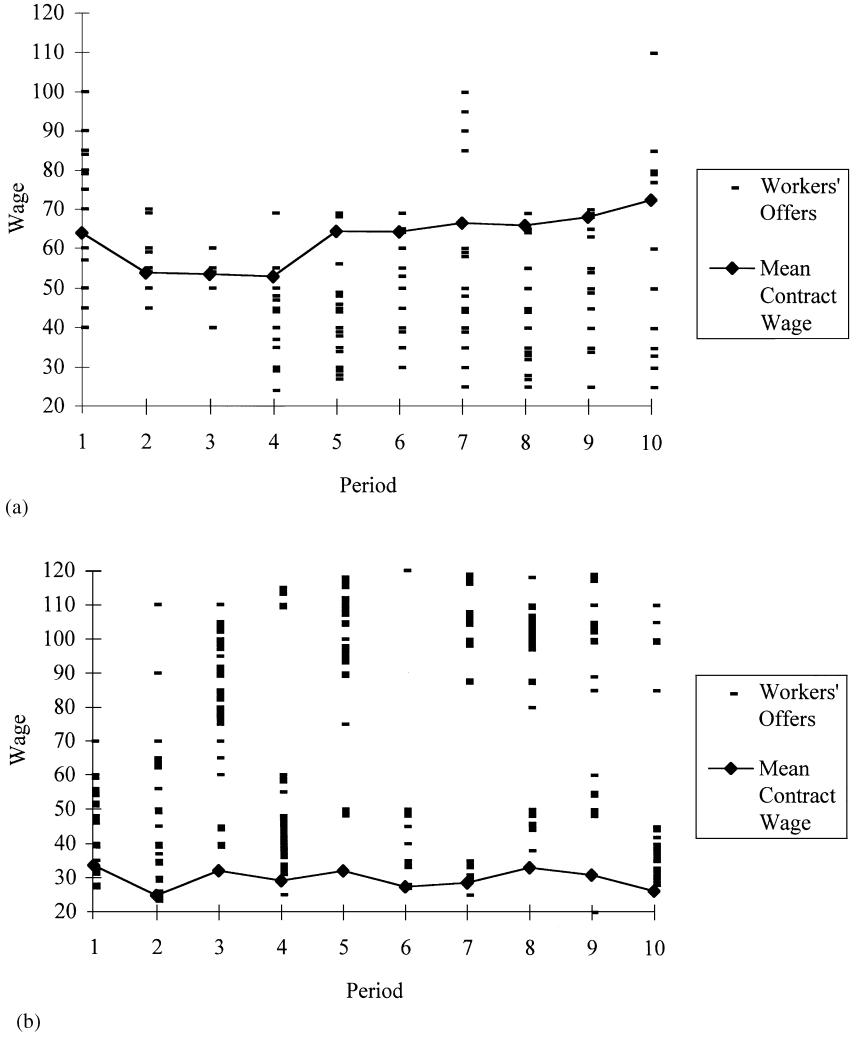

Fig. 2. (a) Workers' offers and mean contract wages in the market with *incomplete* contracts. *Source*: Fehr and Falk (1996). (b) Workers' offers and mean contract wages in the market with *complete* contracts. *Source*: Fehr and Falk (1996).

market. In contrast, in the market with incomplete contracts employers are very reluctant to accept worker's underbidding of prevailing wages. From period 4 onwards wages even move further away from the competitive level. The data analysis conducted in Fehr and Falk (1996) shows that employers' high-wage

policy in the market with incomplete contracts was quite rational because in this way they could sustain higher effort levels and increase profits relative to a low-wage policy.

The Fehr–Falk evidence indicates that the presence of reciprocal types generates non-competitive wage levels despite fierce competition among workers for scarce jobs. By comparing these results with a result reported in Fehr et al. (1994) an even more striking conclusion can be made. Fehr et al. (1994) had the same design as Fehr and Falk, except that in one treatment condition there was no competition among workers or firms. Surprisingly, it turns out that wage levels in the bilateral trading institution of Fehr et al. (1994) are indistinguishable from wage levels in the competitive double auction. This indicates that competition has no impact at all and that the anticipation of reciprocal effort choices is the major determinant of wage formation under incomplete contracts.

The work of Bewley (1995, 1997) and Blinder and Choi (1990) provides field evidence on the reasons for downward wage rigidity. According to Bewley the major reason why managers are reluctant to cut wages in a recesssion is the fear that wage cuts may inhibit work performance. Managers are afraid that pay cuts 'express hostility to the work force' and will be 'interpreted as an insult'. Similar findings are presented in the study of Blinder and Choi (1990). That considerations of fairness and reciprocity are important determinants of firms' wage settings is also suggested by the work of Agell and Lundborg (1995), Campbell and Kamlani (1997) and Levine (1993).

Next we turn to the question whether reciprocity can indeed account for a positive correlation between profitability and wages and whether this gives rise to *non-compensating* wage differentials. The previously discussed experiments on downward wage rigidity already show unambiguously that workers earn rents. This follows from the fact that in the experiments workers' reservation wage, which is exactly known by the experimenter, was below the actual contract wage. The existence of rents is also indicated by the many wage bids below the prevailing wage level in Fig. 2a. It remains to be shown that the rents paid to the workers vary with firms' profitability.

Fehr et al. (1996) have conducted competitive market experiments in which experimental firms differed according to their profit opportunities. Once a worker had accepted a firm's wage offer and before she made her effort choice she was informed about the profit opportunity of the firm. This procedure ensured that only the effort decision but not the contract acceptance decision of the worker is affected by the firm's profit opportunity. Both firms and workers knew this information revelation procedure in advance. Fig. 3 shows the average rent paid to the workers at different levels of the profit opportunity. As one can see there is a clear positive correlation which is also supported by formal statistical tests. This result is compatible with evidence on rent-sharing provided by Blanchflower et al. (1996) and Hildreth and Oswald (1997) who show that

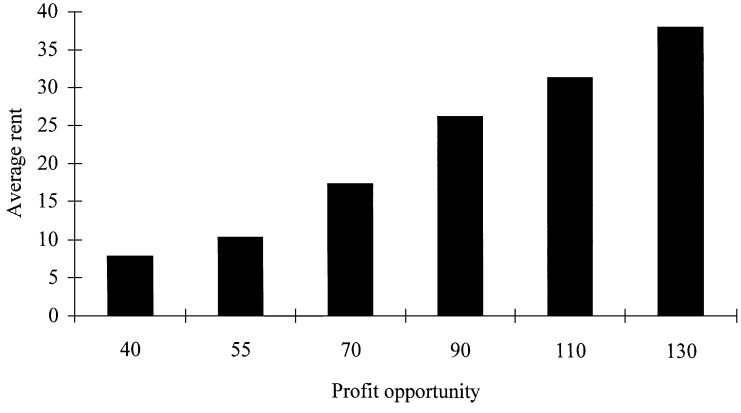

Fig. 3. The relation between workers' rents and firms' profit opportunities. *Source*: Fehr et al. (1996).

there is a positive relation between long-run wages and the profitability of non-unionized companies or non-unionized industries, respectively.

6. *Homo reciprocans* as a norm enforcer

Social norms are ubiquitous. There are norms against cheating and lying, against and in favor of conspicuous consumption (Veblen, 1899), norms of belonging to clubs, political parties, peer groups and unions (Booth, 1985; Naylor, 1989; Kandel and Lazear, 1992), voting norms (Knack, 1992), norms that restrict production under piece rate regimes (Roethlisberger and Dickson, 1947; Whyte, 1955) and against overusing common pool resources (Ostrom, 1990). A particularly important class of norms is related to collective action problems (Elster, 1989; Opp, 1996). In our views there can, thus, be little doubt that human behavior is shaped by social norms. They constitute constraints on individual behavior beyond the legal, information and budget constraints usually considered by economists. We will argue and show below that reciprocity provides a key mechanism for the enforcement of social norms. In view of the fact that most social relations in neighborhoods, families and work places are not governed by explicit agreements but by social norms the role of reciprocity as a norm enforcement device is perhaps its most important function.

Before we proceed further it is necessary to define a social norm more precisely: it is (i) a *behavioral regularity* that is (ii) based on a *socially shared belief how one ought to behave* which triggers (iii) the *enforcement* of the prescribed behavior by *informal social sanctions*. The problem of norm enforcement

can be parsimoniously captured by a situation in which the *material* payoffs have the structure of a public good. Therefore, let us suppose a *one-shot*, *n*-person game in which each agent decides simultaneously about the contribution g_i to the public good G. Each agent has an endowment y and $g_i \in [0, y]$. Furthermore, the *material* payoffs from G imply that free-riding ($g_i = 0$) is a dominant strategy, while $g_i = y$ for all $i = 1, \ldots, n$ maximizes joint gains. In this context a social norm can be thought of as a behavioral regularity in which everybody should contribute $g_i = g > 0$ and where g is enforced by informal social sanctions.

To what extent can reciprocity provide the basis for the enforcement of $g > 0$? First of all, positive reciprocity implies that subjects are willing to contribute something to G if others are also willing to contribute. This follows from the fact that a contribution to G provides positive externalities, i.e., represents a kind action, which induces reciprocally motivated subjects to contribute, too. Thus, positive reciprocity implies a conditionally cooperative behavior that makes it easier to sustain g. However, to sustain g as a stable behavioral regularity *sufficiently many* agents in the *n*-person game have to be motivated by reciprocity. That is, these agents have to be willing to forgo the material gains from defection provided that all other agents have the same willingness. This argument also shows that even if *many* people had such a *conditional* willingness to forgo the gains from defection the successful establishment of a norm g is not guaranteed. Only if people also believe that others have this willingness and if they are able to coordinate on a particular $g \in [0, y]$ the norm g can be sustained. However, since we know already from Section 1 that a non-negligible minority of subjects is *not* motivated by reciprocity it is unlikely that $g > 0$ can be sustained as an equilibrium.[12]

Note that in the previously described simultaneous move game there are no opportunities for *direct* retaliation in response to observed free riding. Thus, negative reciprocity can play no role except that if subjects expect that others free-ride they can 'punish' others by free-riding, too. This means that in the presence of pessimistic expectations about the behavior of others, negative reciprocity is even likely to make it more difficult to sustain a norm g.[13] The impact of negative reciprocity however changes radically if subjects are given the *costly* opportunity to *directly* punish the behavior of others *after* they could observe others' contribution decisions. Under these conditions, *homo*

[12] This argument is rigorously developed in Fehr and Schmidt (1997) where the term 'sufficiently many' also is defined exactly.

[13] This public good game provides, therefore, an example where selfish types can induce reciprocal types to make 'selfish' choices. Although the motivation to free-ride is different for the reciprocal type, in the end the behavior of the selfish and the reciprocal type is indistinguishable, i.e., both types free-ride completely.

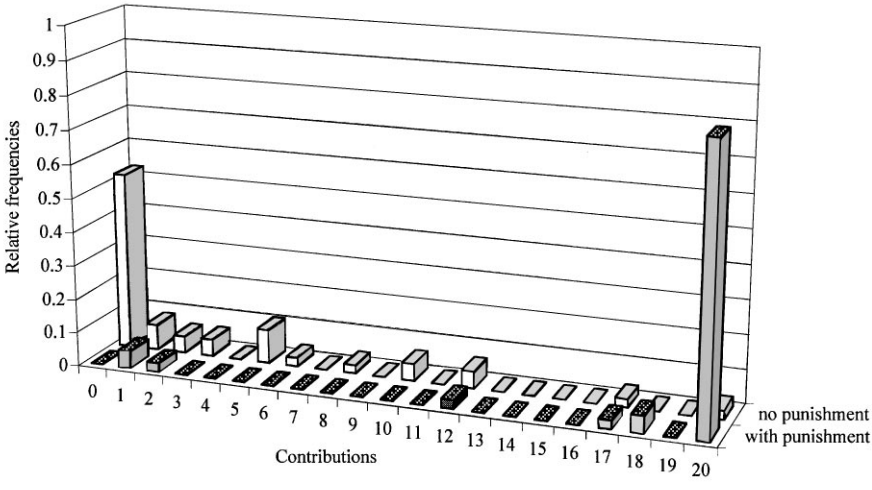

Fig. 4. Distribution of contributions in the final period of public good games with and without punishment. *Source*: Fehr and Gächter (1996).

reciprocans has the opportunity to discipline those subjects who are selfish or insufficiently motivated by positive reciprocity.

It is important to stress that the addition of costly punishment to the simultaneous public good game does *not* change the contribution decisions if all subjects are selfish. Since punishing is costly for the punisher a selfish subject will never punish and, as a consequence, the punishment opportunity provides merely the possibility of incredible threats. Therefore, contribution decisions will be unaffected. Yet, in the presence of subjects motivated by negative reciprocity the punishment opportunity allows to make credible threats. *Homo reciprocans* is likely to interpret defection from g as a hostile act that deserves to be punished. Therefore, negative reciprocity is a key mechanism for the enforcement of g.

Fehr and Gächter (1996) have conducted public good experiments with and without punishment opportunities as described above. Each game was repeated ten times. Material payoffs and the fact that the game ends in period ten have been common knowledge. Fig. 4 shows the distribution of contributions to G in both treatment conditions in period ten.

As one can see there is a dramatic behavioral shift across conditions. While in the game without punishment 53% of the subjects free-ride *completely* and roughly two-thirds choose $g_i \leq 3$, almost 80% of the subjects in the punishment condition chose complete cooperation ($g_i = y = 20$). The analysis in Fehr and Gächter (1996) also shows that the punishment imposed on defectors was the

bigger the lower their contribution levels. Moreover, questionnaire evidence about subjects' motives strongly suggest that the deviation from the prescriptive norm of conditional cooperation causes resentment and the impulse to punish. The results thus lend support to the view that *homo reciprocans* is indeed a key player in the enforcement of social norms.

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