Reciprocity and gift exchange in markets for credence goods*

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Abstract

We study the role of reciprocity in markets where expert-sellers have more information about the severity of a problem faced by a consumer. We employ a standard experimental credence goods market to introduce the possibility for consumers to gift the expert-seller before the diagnostic, where the gift is either transferred unconditionally or conditionally on solving the problem. We find that both types of gift reduce undertreatment, whereas unconditional gifts also reduce overcharging and increase undercharging, suggesting that unconditional gifts are perceived as more kind. For high-severity consumers gifting reduces market inefficiencies, although the presence of low-severity consumers mitigates overall efficiency gains.

Keywords: Credence Goods; Gift Exchange; Asymmetric Information; Lab Experiment

JEL Codes: D82; L14; C91.

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1 Introduction

Many people do not know how to repair a broken heater and therefore ask a repairman to diagnose and fix the problem. Since the repairman knows more about the severity of the problem, he may have an incentive to provide a service that maximizes own profits instead of meeting the consumer's needs (Emons, 1997; Dulleck and Kerschbamer, 2006). Knowing this, the consumer may naturally consider offering a cup of coffee to the repairman, hoping to establish a reciprocal relationship and secure consumer-friendly actions. This intuition is supported by a large literature showing that gifting by a principal increases the efforts of an agent, thereby also increasing the principal's profit.[1] In markets for goods with a credence component, however, consumers are able to observe if their problem is solved, but they cannot verify that the service provided and the price charged are adequate. In turn, actions by the agent are partially hidden from the principal, which reduces the scope for reciprocity (Güth et al., 1996; Andreoni and Bernheim, 2009; Hoppe and Schmitz, 2018).

In this paper we provide experimentally controlled evidence on how gift-exchange and reciprocal expert-sellers (e.g. Falk and Fischbacher, 2006) affect inefficiencies on markets for credence goods.[2] We employ the experimental framework of Dulleck et al. (2011) in which a consumer faces a problem of either high or low severity and needs the corresponding high- or low-quality service to fix it. After observing the price for each service, the consumer may decide to interact with the expert-seller. In this case, the expert-seller learns which service is needed by the consumer (akin to a diagnostic), supplies one of the two services, and subsequently charges one of the two prices independently of the service actually provided.

In the baseline condition (BASE), which allows us to document the behavior of consumers and expert-sellers without the possibility to gift, the parametrization of the experiment implies that expert-sellers have an incentive to provide the low-quality service to consumers in need of a high-quality service (undertreatment) and charge for the high-quality service (overcharging).

[1] Examples notably include paying more than the market wages to increase workers' efforts (Akerlof, 1982; Fehr et al., 1993, 1998; Abeler et al., 2010; Kube et al., 2012; Cohn et al., 2015) and granting small gifts to increase charity donations by potential donors (Falk, 2007; Carpenter, 2017).

[2] Related studies have shown that consumer-friendly actions are more likely to emerge in the presence of expert-sellers who are guilt averse (Beck et al., 2013), hold altruistic preferences (Hennig-Schmidt et al., 2011; Godager and Wiesen, 2013), or are inequality averse (Kerschbamer et al., 2017).

In turn, consumers are better off not interacting with expert-sellers. The standard prediction therefore implies that all consumers opt out of the market, leading to market collapse (akin to Akerlof, 1970).

In the gift-exchange (GE) treatment, we extend BASE by giving consumers the possibility to gift the expert-seller before the diagnostic takes place. More specifically, consumers can transfer part of their payoff as a bonus payment to the expert-seller. Importantly, we consider a "small" gift equal to the smallest integer of our experimental currency (see Malmendier and Schmidt, 2017, for a similar procedure).[3] Based on the reciprocity model of Falk and Fischbacher (2006), we first show that expert-sellers are expected to perceive the transfer as a kind action. In turn, gifting can induce expert-sellers with a preference for reciprocity to abstain from undertreatment and overcharging. More interestingly, when the consumer is of the high-severity type, expert-sellers can also reciprocate a gift by supplying the high-quality service and charging for the low-quality service. The possibility to *undercharge* is akin to offering a discount on performing the high-quality service and constitutes the strongest form of reciprocity in our context. Importantly, while consumers can observe whether the problem has been solved, they cannot verify the type of service provided and therefore reciprocal actions by the expert sellers are not observed by the consumer.

Next, we investigate the effects of a conditional gift (GEC treatment), whereby the consumer commits to sending a gift before the diagnostic and the gift is transferred only if the expert-seller supplies a service of sufficient quality. As in the GE treatment, the gift does not change the payoff-maximizing behavior of expert-sellers. However, it partially aligns incentives and is akin to a form of contracting over the gains from a sufficient treatment (see Bester and Dahm, 2017). At the same time, because the conditional gift imposes a minimum performance level on the expert-seller, it can be perceived as a sign of distrust (see e.g. Fehr and List, 2004; Falk and Kosfeld, 2006). In turn, if the conditional gift is perceived as less kind than an unconditional gift, the framework by Falk and Fischbacher (2006) suggests that the reciprocal response by expert-sellers in the GEC treatment will be lower.

[3] While small, the gift represents ten percent of the surplus associated with solving the problem of the consumer and is therefore not symbolic. Evidence suggests, however, that both material and immaterial gifts trigger reciprocal behavior (see e.g. Kirchler and Palan, 2018, in the context of experience goods).

Results from our experiment show that consumers who interact with expert-sellers gift in 35% of interactions in the GE treatment and 45% in the GEC treatment, and that gifting induces expert-sellers to perform reciprocal actions even if those are not observed by the consumer. More specifically, the likelihood of undertreatment declines by about 18 percentage points following an unconditional gift, and by around 14 percent after a conditional gift. In addition, an unconditional gift increases undercharging by around 18 percentage points and reduces overcharging by around eight percentage points, whereas undercharging and overcharging are not significantly affected by conditional gifts. This is consistent with the presence of expert-sellers with preferences for reciprocity, and suggests that a conditional gift is perceived as less kind than an unconditional gift.

In line with this, we find that consumers who face a high-severity problem and gift the expert-seller earn on average higher profits. In turn, for these consumers gift-exchange results in higher market efficiency (a measure of total profits by expert-sellers and consumers, see Dulleck et al., 2011). For consumers with a low-severity problem, gifting either does not produce efficiency gains (conditional gifts) or produces efficiency losses (unconditional gifts). In the latter case, we show that these can be attributed to an increase in overtreatment, which has been interpreted as a manifestation of preferences for equal payoffs (Kerschbamer et al., 2017).[4] Taken together, our results suggest that gift-exchange may improve market outcomes when the share of consumers with high-severity problems is large, or when agents have private information about own type.

This paper contributes to a growing literature that investigates how different characteristics of credence good markets affect the behavior of expert-sellers (see Balafoutas and Kerschbamer, 2020, for a recent overview). Examples include imposing liability and/or verifiability (Dulleck et al., 2011; Mimra et al., 2016a), enhancing competition and reputational concerns (Rasch and Waibel, 2018; Soraperra et al., 2019), manipulating the information available to consumers (Balafoutas et al., 2013; Agarwal et al., 2019; Mimra et al., 2016b), insurances and third party reimbursement (Kerschbamer et al., 2016; Huck et al., 2016; Balafoutas et al., 2017), or introducing non-binding promises (Beck et al., 2013). Related to our study, Kerschbamer et al.

[4] In our experiment, the expert-seller has the possibility to overtreat consumers who face a low-severity problem by supplying the high-quality treatment. However, given the standard parametrization of the experiment, overtreatment is strictly dominated by overcharging. We come back to this below.

(2017) use the experimental credence goods market of Dulleck et al. (2011) to show that less than a fourth of expert-sellers conform with canonical preferences for own material payoffs. Instead, there is significant heterogeneity among expert-sellers, with a majority displaying some form of aversion to inequality (as in Andreoni and Miller, 2002; Charness and Rabin, 2002; Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). Kerschbamer et al. (2017) also highlight that consumers face the tedious task of identifying prosocial expert-sellers so as to receive more consumer-friendly services, and our results suggest that gifting can potentially replace complicated selection mechanisms.

Our work is also closely related to the field study of Currie et al. (2013), which focuses on a specific patient-physician setting in China and shows that physicians who receive a "token" gift (a self-made bookmark) spend more time with gift-giving patients and prescribe fewer unnecessary drugs (see also Currie et al., 2014). Our experimentally controlled results disentangle the impact of gifting across possible actions by expert-sellers and provide novel evidence on market efficiency impacts. To the best of our knowledge, this paper is also the first to document the possibility of undercharging in an experimental credence goods market, suggesting that unconditional gift can also induce expert-sellers to offer a form of discount.

Our results also contribute to a wider literature on gift-exchange. First, our findings are in line with principal-agent experiments focusing on bonus payments (see for example Angelova and Regner, 2018; Soraperra et al., 2019). In these studies, bonus payments made after observing an agent's decisions change the agent's behavior such that it results in higher payoffs for principals. Relative to these studies, we show that gifts have a positive effect even when the agent has no reputational concerns and the principal cannot observe the behavior of the agent. Second, our work is related to studies showing that observability matters for reciprocity (see Bradley et al., 2018, for a review). For example, using the principal-agent game of Charness and Dufwenberg (2006), Hoppe and Schmitz (2018) report a large drop in reciprocity when the agent's action becomes unobservable (see also Rubin and Sheremeta, 2015; Davis et al., 2017). In our work, we show that expert-sellers reciprocate unconditional gifts with a range of unobservable actions, while conditional gifts only reduce undertreatment. This finding is also related to Falk and Kosfeld (2006) who shows that payments conditioned on a minimum performance reduce effort, and Newman and Jeremy Shen (2012) where charitable donations decline when a small material gift is offered conditional on a positive donation.

The remainder of this paper is organized as follows. Section 2 lays out the experimental design. In Section 3 we use the framework by Falk and Fischbacher (2006) to derive our main hypotheses. We present our results in Section 4. Section 5 concludes.

2 Experimental Design

This section first presents the experimental credence goods market of Dulleck et al. (2011), which represents the baseline treatment in our study. We then introduce two experimental treatments in which the consumer is given the possibility to gift the expert-seller, either unconditionally (GE treatment) or conditionally on receiving a service of sufficient quality (GEC treatment). Lastly, we provide details about implementation and data collection.

2.1 Baseline experimental credence goods market (BASE treatment)

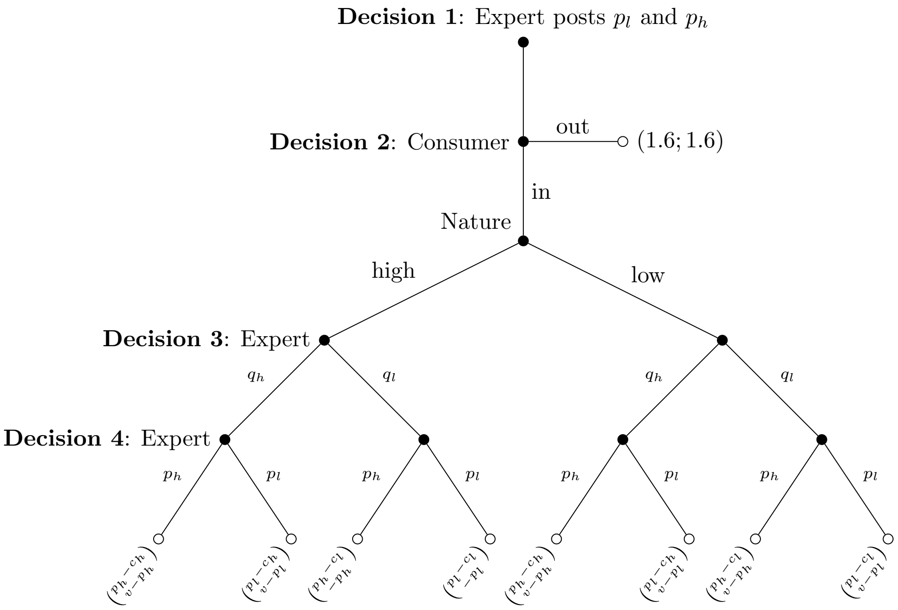
Consider a consumer with a problem that is of either high or low severity. The consumer, however, only knows that a high-quality service q_h is needed with probability h and a low-quality service q_l is needed with probability $(1-h)$, where $h = 0.5$.[5] The expert-seller can provide q_h, which solves both the high- and low-severity problems, at cost $c_h = 6$. Alternatively, supplying q_l only solves the low-severity problem ($c_l = 2$). Both c_h and c_l are known by consumers.

The extensive form of the game in BASE is depicted in Figure 1. The game comprises four decisions: decisions 1, 3 and 4 are made by the expert-seller, decision 2 is made by the consumer. At decision 1, the expert-seller announces prices p_h and p_l. Both prices must be integers between 1 and 11, with $p_h \geq p_l$.[6] At decision 2, the consumer observes p_h and p_l, and decides whether to interact with the expert-seller. If the consumer opts out of the market, the game stops and both players receive the outside option $o = 1.6$. If the consumer opts in, the game moves on to a third stage in which the expert-seller learns about the severity of the consumer's problem (diagnostic

[5] All the parameters we use in the experiment are identical to those in the baseline treatment (B/N) of Dulleck et al. (2011).

[6] Related laboratory experiments set prices exogenously, thereby creating incentives for particular supply side inefficiencies (e.g. overtreatment in Mimra et al., 2016b; Huck et al., 2016). Instead, we retain the original procedure of Dulleck et al. (2011) to provide a general account of market inefficiencies in this context before introducing the possibility for gift-exchange.

Figure 1: Extensive form game of the BASE treatment

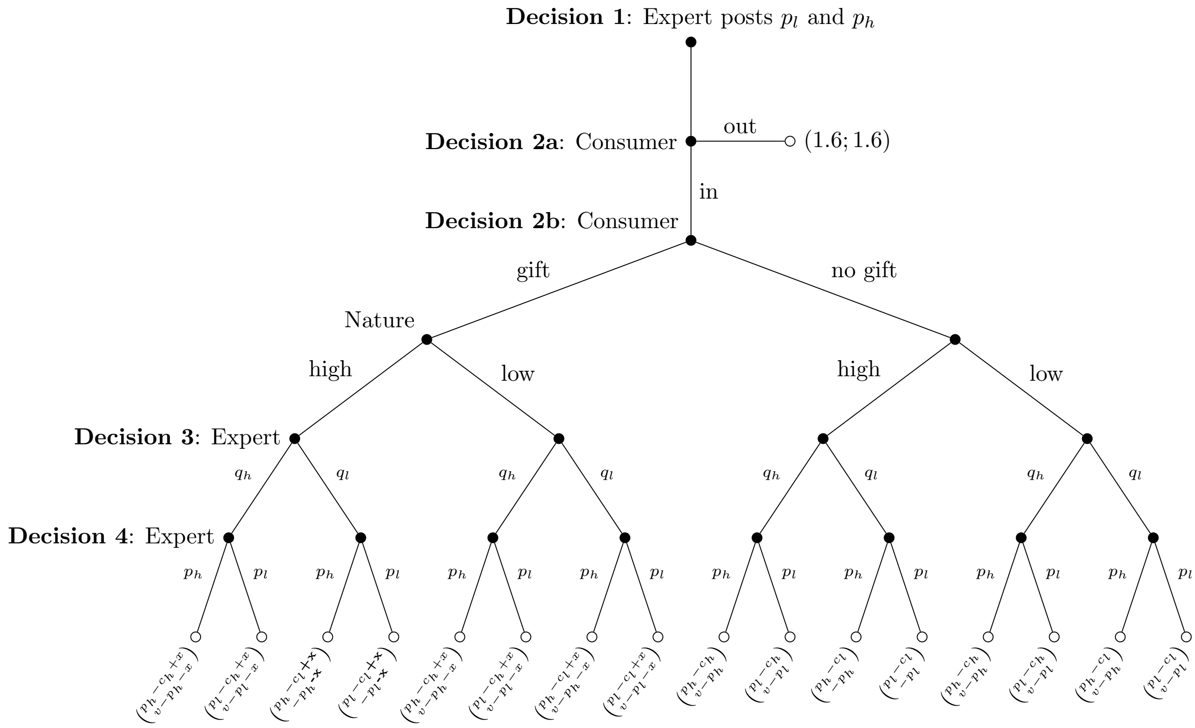


Notes: Payoffs are shown in vectors at the end nodes. The first row of the payoff vector denotes the expert-seller's profit, the second row is the consumer's profit.

stage). Based on this, in decision 3 the expert-seller supplies either q_h or q_l, and in decision 4 either p_h or p_l is charged. Importantly, the expert-seller can charge p_h or p_l independently of the service provided, and the consumer is not able to verify whether q_h or q_l is supplied.

At the end of the game, the payoffs are determined as follows. If the problem is solved (i.e. the consumer needs q_l and receives either q_l or q_h, or the consumer needs q_h and receives q_h), the consumer receives $v = 10$ points and pays the price charged by the expert-seller. The payoff of the consumer is therefore: $\pi_c = v - p_i$ ($i \in \{h, l\}$). If the problem is not solved (the consumer needs q_h but receives q_l), $v = 0$ and hence $\pi_c = -p_i$. One implication is that consumers observe when they have been undertreated, whereas they do not know if they have been overcharged, undercharged or overtreated. The payoff of the expert-seller is simply the difference between the price charged and the cost of the treatment supplied: $\pi_e = p_i - c_i$.

Figure 2: Extensive form game of the GE and GEC treatments



Notes: Payoffs are shown in vectors at the end nodes. The first row of the payoff vector denotes the expert-seller's profit, the second row is the consumer's profit. Payoffs reported in end nodes three and four are marked in bold because the transfer is only realized in the GE treatment, not in the GEC treatment.

2.2 Unconditional gift exchange (GE treatment)

This treatment extends BASE by giving consumers the possibility to unconditionally gift the expert-seller before the diagnostic. As shown in Figure 2, after the decision to interact with the expert-seller (decision 2a), the consumer can transfer $x \in \{0; 1\}$ to the expert-seller (decision 2b). The expert-seller is then informed about whether or not the consumer has decided to send a gift, learns about the problem faced by the consumer, and selects the service performed (decision 3) and the price charged (decision 4). Accordingly the payoff for the consumer is $\pi_c = v - p_i - x$ if the problem is solved and $\pi_c = -p_i - x$ if it is not, and the expert-seller receives $\pi_e = p_i - c_i + x$.

As mentioned above, the objective of this treatment is to study the effects of a small gift, and we therefore exogenously set the size of the gift to the smallest integer unit $x = 1$ (as in

Malmendier and Schmidt, 2017).[7] Moreover, as the gift represents a transfer from the consumer to the expert-seller, the gift has no direct impact on total market surplus. In turn, this mitigates efficiency-seeking motives for a consumer to send the gift.

2.3 Conditional gift exchange (GEC treatment)

The GEC treatment is identical to the GE treatment except that the transfer is realized only if the expert-seller solves the consumer's problem. More specifically, after having decided to interact with the expert-seller in decision 2a, in decision 2b the consumer commits to a transfer of $x = 1$ if q_l is needed (either q_l or q_h can be provided) or if q_h is needed and the expert-seller provides q_h (i.e. no undertreatment). As shown in the extensive form game (Figure 2), only the payoffs in the third and fourth end nodes are affected. Note that conditioning the gift on the provision of sufficient quality is possible because the consumer observes whether the problem is solved or not.

A conditional gift partially aligns the incentives of the expert-seller and the consumer and can be interpreted as a form of contracting where an expert-seller who performs a service of sufficient quality is entitled to a share of the surplus.[8] Bester and Dahm (2017) for example argue that physicians could be paid conditionally on the patient's satisfaction and further show that contracting generally increases efficiency in markets for credence goods. However, conditioning the transfer of the gift on a minimum performance requirement might backfire because the expert-seller could understand it as a sign of distrust (Fehr and List, 2004; Falk and Kosfeld, 2006).[9] As we discuss below, comparing GE and GEC treatments can therefore provide evidence about the reciprocity motive underlying the behavior of the expert-seller.

[7] As we discuss below, fixing the size of the gift to $x = 1$ ensures that the payoff maximizing strategies are not altered. However, evidence from the literature suggests that the intentions behind gift-giving matter more than the size of the gift (Hannan et al., 2002; Newman and Jeremy Shen, 2012; Kube et al., 2012), and this design choice is unlikely to affect our conclusions.

[8] The size of the gift $x = 1$ ensures that the conditional gift does not completely align the incentives of the expert-seller and the consumer, as undertreatment still increases the profits of the expert-seller.

[9] The conditional gift also provides the expert-seller with monetary incentives to abstain from undertreatment. Monetary incentives have shown to crowd out intrinsic motivation to fulfill a task (Frey and Oberholzer-Gee, 1997; Gneezy and Rustichini, 2000; Mellström and Johannesson, 2008; Chao, 2017) which could ultimately lead the expert-seller to provide less consumer-friendly services.

2.4 Experimental Procedure

The experiment was run in the laboratory of the University of Neuchâtel in October 2019 and implemented in z-Tree (Fischbacher, 2007). We recruited a total of 168 participants via invitation emails sent to all students which were allocated equally to the three experimental treatments. There were four experimental sessions per treatment, out of which 3 sessions were conducted with 16 participants and one session was conducted with 8.[10]

The following relevant procedural factors were adopted from Dulleck et al. (2011). The framing of the instructions was neutral, we did for example not talk about expert-sellers and consumers but about "role A" and "role B." Participants were randomly assigned to one of the roles at the beginning of the experiment and stayed in that role throughout the experiment. Matching groups of eight subjects were randomly formed at the beginning of the experiment, bringing together four consumers and four expert-sellers. [11] The stage game in each treatment (see Figures 1 and 2) was repeated for 16 periods, and each consumer was randomly matched with one expert-seller at the beginning of each period.[12]

Upon arrival, each participant was randomly allocated to a cabin and started reading the instructions which were also read aloud 10 minutes after all participants were seated. Before the stage game started for the first time, participants had to correctly answer a set of control questions. In the first period, each participant received an initial endowment of 6 points. The participant's earnings were summed up over the 16 periods and then converted at an exchange rate of 2 points = 1 CHF ($\approx$ US$ 1). Together with a show up fee of CHF 10, participants earned on average about CHF 30 and sessions lasted approximately 80 minutes.

[10] For each session we invited more participants than required and once the targeted number was reached the remaining participants were paid a show up fee of CHF 10 ($\approx$ US$ 10) and dismissed.

[11] Thus our experiment includes seven matching groups per treatment with eight participants in each, which is comparable to other applications of the experimental credence goods markets, such as Dulleck et al. (2011), between six and 12 matching groups, seven in Huck et al. (2016), and eight in Mimra et al. (2016a) and Beck et al. (2014).

[12] We employed a stranger matching protocol to avoid reputational concerns. Over the course of the game, each consumer interacted with each expert-seller four times but could not know in which period it would happen.

3 Theoretical predictions and hypotheses

This section discusses predictions for the stage games shown in Figures 1 and 2. We first describe standard predictions for self-interested players. We then use the general theory of reciprocity by Falk and Fischbacher (2006) to derive implications of introducing gift-exchange in the experimental market for credence goods.

3.1 Self-interested expert-sellers

Standard predictions for the experimental credence goods markets are derived from the equilibrium characterized in Dulleck et al. (2011) and are based on self-interested agents who maximize own payoffs.[13] This implies that expert-sellers always supply the low-quality service q_l and charges for the high-quality one p_h. Moreover, expert-sellers always post prices such that $\pi_e = p_h - c_l \geq o$, which implies $p_h \geq 4$ since only integers are allowed.

The consumer therefore anticipates undertreatment if q_h is needed and overcharging if q_l is needed, so that his expected payoff is $\pi_c = h \cdot (-p_h) + (1 - h) \cdot (v - p_h)$. Given expectations about prices, the payoff from interacting with an expert-seller is strictly lower than the outside option ($\pi_c < o$), and it is optimal for consumers to stay out of the market. In turn, the standard prediction implies that the market in BASE collapses.

The possibility to receive a gift does not affect the payoff maximizing strategy (q_l, p_h) of the expert-seller (since $c_h - c_l > 1$). In both GE and GEC, it is therefore always optimal to undertreat consumers even if it implies not receiving the conditional gift.[14] For the consumer, this implies that (i) sending a gift always decreases the expected payoff and (ii) opting out of the market is the payoff maximizing strategy. In turn, the standard prediction also implies market collapse in both GE and GEC.

[13] This equilibrium assumes that agents play each of the 16 rounds as a one-shot interaction, which is consistent with random re-matching in every period. See Dulleck et al. (2011) for a discussion of reputation equilibria.

[14] In the GEC treatment, if a gift-giving consumer needs q_h, the profit-maximizing strategy (q_l, p_h) yields $\pi_e = p_h - c_l$ whereas playing (q_h, p_h) yields $\pi_e = p_h - c_h + 1$.

3.2 Reciprocal expert-sellers

The predictions change considerably if expert-sellers have a disposition for reciprocity and are willing to sacrifice part of their material payoff to reciprocate a kind action of the consumer. Formally, we follow Falk and Fischbacher (2006) and write the utility function of a reciprocal expert-seller e as:

$$U_e(a_e, a_c) = \underbrace{\pi_e(a_e, a_c)}_{\text{material payoff}} + \underbrace{\rho_e \cdot \phi_c(a_c) \cdot \sigma_e(a_e)}_{\text{reciprocity utility}} \tag{1}$$

where both the material payoff and reciprocity utility depend on the actions of the expert-seller a_e and those of the consumer a_c. In this framework, reciprocity utility is driven by three parameters: the reciprocity parameter ρ_e, the kindness term $\phi_c(a_c)$ and the reciprocation term $\sigma_e(a_e)$. We now discuss these in turn.

The first component, $\rho_e \geq 0$, reflects the sensitivity to reciprocity utility. The higher ρ_e, the larger the importance of reciprocity utility relative to material utility. If $\rho_e = 0$, an expert-seller only considers his own material payoff, and we are trivially back to the standard prediction: the expert-seller always undertreats or overcharges the consumer, which leads to market breakdown. If $\rho_e > 0$, reciprocity utility becomes relevant.

Second, $\phi_c(a_c)$ quantifies the extent to which the expert-seller perceives a_c as a kind action. As discussed in Falk and Fischbacher (2006), this is the case if a_c increases the expected material payoff of the expert-seller $\pi_e(a_e, a_c)$ relative to a reference payoff $\overline{\pi}_e$.[15] In our setting, a natural reference for expert-sellers to evaluate the kindness of a_c is the equitable payoff which occurs when the consumer opts out of the market ($\overline{\pi}_e = \overline{\pi}_c = 1.6$).[16] In turn, any action by the consumer allowing the expert-seller to earn more than the outside option is perceived as

[15] In Falk and Fischbacher (2006), an action by the consumer could be unintentional, which affects perceived kindness. In our experiment, all actions are treated as intentional, so that that we do not discuss the intention factor and focus on the material consequences action a_c by the consumer.

[16] Many papers investigating reciprocity assume that the equitable payoff serves as a reference to assess the kindness of one's action (see e.g. Fehr and Schmidt, 1999; Charness and Rabin, 2002; Cox et al., 2007; Charness and Shmidov, 2014). Apart from the outside option, equitable payoffs are for example generated if an expert-seller is honest and always supplies the adequate service, posts the price vector $(p_h, p_l) = (4, 8)$ and the consumer chooses to interact. In contrast to this special case, the outside option serves as a more natural reference point in our context. The implications of our model, however, do not depend on the choice of the outside option as a reference payoff because the decision to interact always allows the expert-seller to choose actions to increase their payoff over that of the consumer.

kind. For example, if a consumer decides to interact with the expert-seller, and the expert-seller applies payoff-maximizing strategy (q_l, p_h), the corresponding kindness term is given by: $\phi_c(a_c = \textit{interaction}) = p_h - c_l - o$. Since a self-interested expert-seller is expected to post $p_h \geq 4$ the kindness term is positive. Instead, if a consumer decides not to interact, the kindness term is zero, and reciprocity utility becomes irrelevant.

In treatments GE and GEC, conditionally on the decision to interact, the consumer further decides whether to gift the expert-seller. In GE, an unconditional gift increases the maximum expected payoff of the expert-seller by $x = 1$. Under the assumption that the expert-seller applies payoff-maximizing strategy (q_l, p_h), the kindness term is given by: $\phi_c(a_c = \textit{gift in GE}) = p_h - c_l + x - o > 0$. By contrast, in the GEC treatment the gift is transferred only when sufficient quality is provided, so that: $\phi_c(a_c = \textit{gift in GEC}) = p_h - c_l + (1 - h) \cdot x - o > 0$. Sending a gift is therefore unambiguously perceived as kind in both GE and GEC, although the kindness term is lower in GEC. This is consistent with experimental evidence on backfiring sanctions or minimum performance requirements in a broader principal-agent context (Fehr and Rockenbach, 2003; Fehr and List, 2004; Falk and Kosfeld, 2006).[17]

The third component of the model, the reciprocation term $\sigma_e(a_e)$, measures how much the expert-seller increases the payoff of the consumer in response to a kind action. Relative to profit maximizing strategy (q_l, p_h), for which $\sigma_e = 0$, the expert-seller can engage in three types of behavior to increase the consumer's payoff. First, if the consumer needs q_h, the expert-seller can abstain from undertreatment and provide q_h. This increases the consumer's payoff by $\sigma_e(a_e = \textit{no undertreatment}) = v$. Second, for a consumer who needs and receives q_h, the expert-seller may charge p_l instead of p_h. This implies an increase in the consumer's payoff by $\sigma_e(a_e = \textit{undercharging}) = v + (p_h - p_l)$. In our context, undercharging is akin to a discount and is the strongest form of reciprocal behavior by the expert-seller. Lastly, if the consumer needs q_l, the expert-seller can abstain from overcharging by applying p_l rather than p_h. The reciprocation term is given by $\sigma_e(a_e = \textit{no overcharging}\ ) = p_h - p_l$.

Based on this framework, we now formulate the implications as a set of hypotheses about

[17] Several mechanisms behind the backfiring effect of imposing conditions on agents have been discussed, inter alia signaling lower trust or communicating lower expectations. Without excluding these channels, we model that conditional gifts are perceived less kind due to a lower impact on the payoff of the expert-seller.

the effect of a gift on reciprocal behavior of the expert-seller. The first immediately follows from the presence of reciprocal expert-sellers.

Hypothesis 1a. *Sending the gift increases the fraction of expert-sellers who behave in a consumer-friendly manner.*

The second hypothesis is implied by the fact that an unconditional gift has a higher impact on the expected payoff of the expert-seller relative to a conditional gift, so that the kindness term is larger for a gift in the GE treatment as compared to GEC.

Hypothesis 1b. *An unconditional gift in the GE treatment induces a larger reciprocal response by expert-sellers relative to a conditional gift in the GEC treatment.*

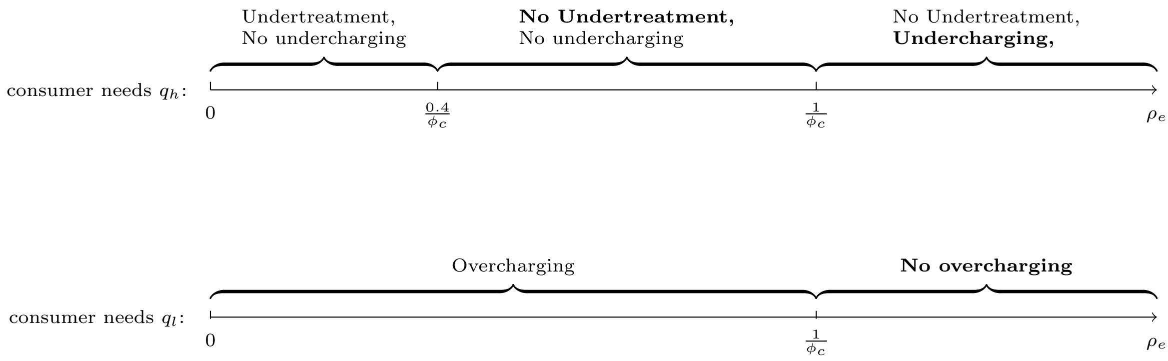
Next, how the expert-seller reciprocates to a kind action by the consumer depends on the sensitivity parameter ρ_e, which is likely heterogeneous in the population (see e.g. Tang, 2020). In Figure 3, we depict how the different reciprocal actions of the expert-seller (abstaining from undertreatment, undercharging, and abstaining from overcharging) depend on ρ_e, for a given action a_c and associated kindness term ϕ_c. Formally, when a consumer needs q_h, the expert-seller abstains from undertreatment whenever $p_h - c_h + \rho_e \cdot \phi_c \cdot v > p_h - c_l \Leftrightarrow \rho_e > \frac{0.4}{\phi_c}$, and further undercharges if $p_l - c_h + \rho_e \cdot \phi_c \cdot (v + (p_h - p_l)) > p_h - c_h + \rho_e \cdot \phi_c \cdot v \Leftrightarrow \rho_e > \frac{1}{\phi_c}$. Similarly, when a consumer needs q_l, the expert-seller abstains from overcharging if $p_l - c_l + \rho_e \cdot \phi_c \cdot (p_h - p_l) > p_h - c_l \Leftrightarrow \rho_e > \frac{1}{\phi_c}$.

As an implication of Figure 3, we formulate a hypothesis on the frequency of specific actions by expert-sellers.

Hypothesis 2. *In the presence of reciprocating expert-sellers, kind actions by consumers have the largest impact on the rate of undertreatment, followed by overcharging and undercharging.*

This hypothesis is in line with experimental evidence showing that agents reciprocate more if their action has a higher relevance for the principal's outcome (Gneezy, 2005; Hennig-Schmidt et al., 2010; Montinari et al., 2016; Englmaier and Leider, 2020). Moreover, undertreatment can be observed by consumers (the problem is not solved), and this can also affect the extent

Figure 3: Reciprocal response by expert-sellers as a function of ρ_e



Notes: The reciprocity parameter ρ_e measures the expert-seller's sensitivity to reciprocity utility. The kindness term ϕ_c measures the kindness of the consumer's action as perceived by the expert-seller. The gift increases ϕ_c and shifts the respective thresholds leftwards, therefore reducing the likelihood of undertreatment and overcharging and increasing that of undercharging.

of reciprocity (Güth et al., 1996; Andreoni and Bernheim, 2009; Hoppe and Schmitz, 2018). Results from Dulleck et al. (2011) show that undertreatment occurs less often than overcharging. We note, however, that the possibility of undercharging is not discussed in previous studies on credence goods.

Turning to the consumers, if they anticipate that the expert-seller will reciprocate a kind action a_c, this can be expected to motivate both market participation and gifting.

Hypothesis 3a. *The possibility to gift increases interactions in GE and GEC treatments as compared to BASE.*

Hypothesis 3b. *In GE and GEC treatments, a positive fraction of consumers gifts the expert-seller.*

In addition, if consumers expect a higher reciprocal response when they transfer an unconditional gift (GE treatment), they will interact and gift more in GE. However, since the conditional gift in the GEC treatment may not be transferred, the expected cost for consumers is lower. In turn, the difference in gifting between GE and GEC treatments is indeterminate.

Lastly, if the GE and GEC treatments lead to more consumer-friendly behavior and more interactions (Hypotheses 1a, 3a, and 3b), the payoffs of consumers and expert-sellers would be on average larger in GE and GEC treatments relative to BASE. Defining market efficiency as the sum of profits of consumers and expert-sellers (divided by the sum of maximum potential payoff, both normalized by the outside option, see Dulleck et al., 2011), the possibility to gift can be expected to mitigate market inefficiencies associated with asymmetric information.

Hypothesis 4. Conditional on Hypotheses 1a, 3a, and 3b, profits of consumers and expert-sellers are higher in GE and GEC relative to BASE. In turn, the possibility to gift increases market efficiency relative to BASE.

We close this section by noting that overtreatment is a dominated strategy for expert-sellers regardless of their preferences for reciprocity ρ_e. In particular, expert-sellers who overtreat supply q_h when the consumer needs q_l, and thereby reduce their own payoff by $c_h - c_l = 4$. Moreover, overtreatment does not increase the payoff of the consumer, so that it does not represent a reciprocal action. Instead, Kerschbamer et al. (2017) suggests that overtreatment is consistent with inequality aversion by expert-sellers (see also Beck et al., 2014, for further discussion of overtreatment).

4 Results

Experimental results aggregated at the level of matching groups are reported in Table 1. Following Dulleck et al. (2011), we complement these with a set of random effects panel regressions specified at the level of individual subjects, which notably allows us to control for dynamic effects (e.g. learning).[18] Formally, the specification we consider can be written as:

$$\mathrm{Y}_{it} = \beta_0 + \beta_1\,\mathrm{GE}_i + \beta_2\,\mathrm{GEC}_i + \beta_3\,\mathrm{GE}_i\ \mathrm{x}\ \mathrm{Gift}_{it} + \beta_4\,\mathrm{GEC}_i\ \mathrm{x}\ \mathrm{Gift}_{it} + \beta_5'\mathrm{X}_{it} + a_i + u_{it}, \qquad (2)$$

where Y_{it} is the dependent variable for subject i in period t, GE_i and GEC_i are binary treatment indicators, and Gift_{it} is an indicator variable equal to one if the consumer transferred a gift in period t, zero otherwise. The vector of control variables, denoted X_{it}, includes time period fixed

[18] Note that some of the outcome variables we consider are binary, and for ease of interpretation we apply a linear probability model. Results are consistent for non-linear models (e.g. probit).

Table 1: Overview of experimental results across treatments

	BASE	Gift exchange (GE)			Conditional gift exchange (GEC)		
		Total	Gift	No gift	Total	Gift	No gift
Undertreatment [1,2]	0.47	0.49	0.36	0.54	0.48	0.40 [a]	0.54 [a]
Overcharging [1,3]	0.63	0.48	0.43	0.51	0.57	0.59	0.55
Undercharging [1,4]	0.09	0.09	0.22	0.04	0.12	0.15	0.09
Overtreatment [1,5]	0.19	0.25	0.41 [a]	0.17 [a]	0.24	0.25	0.23
Interaction [1]	0.56	0.60	1.00	1.00	0.65	1.00	1.00
Gift [1]	0.00	0.21	1.00	0.00	0.29	1.00	0.00
Profit expert-sellers [6]	2.73	2.95	3.05	2.93	2.83	2.84	2.93
Profit consumers [6]	1.12	0.78	0.57	0.88	1.14	1.22	1.03
Efficiency [7]	0.23	0.19	0.15	0.22	0.28	0.31	0.27
p_l posted [6]	4.40	4.84	4.23 [a]	4.65 [a]	4.39	3.89 [a]	4.38 [a]
p_h posted [6]	8.02	7.98	7.61	7.67	7.56	6.84 [a]	7.42 [a]
Participants in markets	56	56	56	56	56	56	56

Notes: 1) relative frequency; 2) consumer needs q_h, but expert-seller provides q_l; 3) consumer needs q_l, receives q_l but is charged p_h and $p_h > p_l$; 4) consumer needs q_h, receives q_h but is charged p_l and $p_h > p_l$; 5) consumer needs q_l and receives q_h; 6) in experimental currency units (1 point= CHF 0.5) and 7) calculated as: *(actual average profit-outside option)/(maximum average profit - outside option)*. For columns BASE, GE (Total) and GEC (Total), Mann-Whitney U-tests for pairwise differences between treatments show no statistical significance at $p<0.05$ (matching groups of eight subjects are treated as independent observations). For columns GE (Gift), GE (No gift), GEC (Gift) and GEC (No gift), two-tailed Wilcoxon signed-rank tests for pairwise differences with $p<0.05$ are denoted with superscript *a* (matching groups of eight subjects are treated as independent observations).

effects and we also check for the sensitivity of our results to the inclusion of prices posted by the expert sellers. Lastly a_i are random effects and u_{it} is a random error term. Throughout we report standard errors clustered at the session level.

In the following, we identify six key results and sequentially discuss evidence pertaining to undertreatment, undercharging, overcharging, market interactions, gifting behavior, as well as profits and market efficiency.

Result 1. A gift in both GE and GEC treatments reduces the likelihood of undertreatment.

Undertreatment. Table 1, row 1, reports aggregate undertreatment measured as the share of interactions in which expert-sellers provide q_l to consumers in need of q_h.[19] In all three treatments, the undertreatment rate is approximately 50%. When expert-sellers receive an unconditional gift (GE treatment) undertreatment declines to 36%, which is 18 percentage points

[19] As in Dulleck et al. (2011), we restrict the analysis to observations for which undertreatment could potentially occur, that is when consumers interact and need q_h.

Table 2: Random effects regressions for undertreatment

	Outcome: undertreatment=1			
	(1)	(2)	(3)	(4)
Main effects:				
GE treatment	−0.038	−0.030	0.029	0.039
	(0.059)	(0.053)	(0.049)	(0.043)
GEC treatment	−0.018	−0.028	0.027	0.032
	(0.108)	(0.100)	(0.110)	(0.102)
GE x Gift	–	–	−0.180*	−0.183*
			(0.102)	(0.096)
GEC x Gift	–	–	−0.102**	−0.147***
			(0.048)	(0.055)
Controls:				
Period FEs	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes
# Observations	393	393	393	393

Notes: Random effects panel regressions for expert-sellers reported. The outcome variable is a binary indicator equal to one if an expert-seller undertreats the consumer, zero otherwise. Column (1) identifies the average treatment effect for GE and GEC treatments. In column (2), we extend the first column controlling for prices. In column (3), we introduce interaction terms for treatments with a variable Gift_{it} equal to one if the consumer transferred a gift in period t, zero otherwise. Column (4) extends column (3) by controlling for prices. All specifications include period fixed effects. Robust standard errors clustered at the session level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

lower than when no gift is transferred. When a conditional gift is offered (GEC treatment), undertreatment occurs in 40% of interactions, which is 14 percentage points lower than in the absence of a gift.

Table 2 reports regression results for equation (2), where the outcome variable is equal to 1 if the expert-seller undertreats the consumer, zero otherwise. Columns (1) and (2) confirm that the likelihood of undertreatment is not significantly different across treatments. Column (3) further shows that gifting significantly reduces undertreatment, albeit at a slightly higher rate in GE. This is in line with Hypotheses 1a and 1b. Controlling for prices (column 4) does not affect our conclusions.

Result 2. An unconditional gift by consumers in GE decreases the likelihood of overcharging and increases the likelihood of undercharging.

Overcharging. The rate of overcharging is defined as the share of interactions in which con-

Table 3: Random effects regressions for overcharging

	Outcome: overcharging=1			
	(1)	(2)	(3)	(4)
Main effects:				
GE treatment	−0.112	−0.100	−0.092	−0.071
	(0.138)	(0.143)	(0.135)	(0.137)
GEC treatment	−0.063	−0.055	−0.069	−0.064
	(0.089)	(0.093)	(0.081)	(0.085)
GE x Gift	–	–	−0.063***	−0.089***
			(0.018)	(0.019)
GEC x Gift	–	–	0.013	0.017
			(0.062)	(0.070)
Controls:				
Period FEs	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes
# Observations	393	393	393	393

Notes: Random effects panel regressions for expert-sellers reported. The outcome variable is a binary indicator equal to one if an expert-seller overcharges the consumer, zero otherwise. Column (1) identifies the average treatment effect for GE and GEC treatments. In column (2), we extend the first column controlling for prices. In column (3), we introduce interaction terms for treatments with a variable Gift_{it} equal to one if the consumer transferred a gift in period t, zero otherwise. Column (4) extends column (3) by controlling for prices. All specifications include period fixed effects. Robust standard errors clustered at the session level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

sumers need and receive q_l, but are charged p_h.[20] The third row of Table 1 shows that the overcharging rate is 63% in BASE, 48% in GE, and 57% in GEC, although the differences are not statistically significantly different from zero. Estimates based on equation 2 for a binary outcome variable equal to one if overcharging occurs confirm this (Table 3, columns 1 and 2).

More interestingly, our results provide some evidence that an unconditional gift (GE treatment) reduces the likelihood that consumers are charged for a service they did not receive, as the aggregate overcharging rate declines by eight percentage points. In regression results both interaction terms are statistically significantly different from zero and suggest that the decline in the probability of overcharging induced by the gift is between six and nine percentage points (Table 3, columns 3 and 4). By contrast, results for the GEC treatment suggest that the impact of a conditional gift is close to zero. These results are consistent with Hypotheses 1b and 2.

[20] We only consider observations for which overcharging can occur, that is when the consumer interacts, needs q_l and the price vector implies $p_h > p_l$ (see Dulleck et al., 2011). We discard 25 observations with $p_h = p_l$.

Table 4: Random effects regressions undercharging

	Outcome: undercharging=1			
	(1)	(2)	(3)	(4)
Main effects:				
GE treatment	0.005	−0.001	−0.059**	−0.064**
	(0.027)	(0.026)	(0.024)	(0.028)
GEC treatment	0.039	0.025	0.028	0.018
	(0.030)	(0.035)	(0.037)	(0.042)
GE x Gift	–	–	0.172***	0.168***
			(0.062)	(0.064)
GEC x Gift	–	–	0.024	0.018
			(0.025)	(0.034)
Controls:				
Period FEs	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes
# Observations	381	381	381	381

Notes: Random effects panel regressions for expert-sellers reported. The outcome variable is a binary indicator equal to one if an expert-seller undercharges the consumer, zero otherwise. Column (1) identifies the average treatment effect for GE and GEC treatments. In column (2), we extend the first column controlling for prices. In column (3), we introduce interaction terms for treatments with a variable Gift_{it} equal to one if the consumer transferred a gift in period t, zero otherwise. Column (4) extends column (3) by controlling for prices. All specifications include period fixed effects. Robust standard errors clustered at the session level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

Undercharging. The rate of undercharging, defined as the proportion of interactions in which consumers need and receive q_h, but are charged the price of the low-quality service p_l, is around 10% in all three treatments (Table 1, row 2).[21] In the GE treatment, a gift by consumers increases undercharging by about 18 percentage points. In the GEC treatment, sending a conditional gift only increases undercharging by six percentage points.

Table 4 shows corresponding regression results for a binary outcome variable equal to one if undercharging occurs, zero otherwise. Results confirm that unconditional gifting (GE treatment) significantly increases undercharging (columns 3 and 4). Specifically, when an unconditional gift is transferred the likelihood of undercharging increases by around 17 percentage points. By contrast, the coefficient associated with a gift in the GEC treatment is small and statistically

[21] We again consider observations for which undercharging can occur, that is when the consumer interacts, needs q_h and the price vector implies $p_h > p_l$ (Dulleck et al., 2011). We drop 12 observations with $p_h = p_l$.

Table 5: Random effects regressions for interaction and gifting

	Outcome: interaction=1		Outcome: gift=1	
	(1)	(2)	(3)	(4)
Main effects:				
GE treatment	0.042	0.049	0.214***	0.219***
	(0.048)	(0.072)	(0.049)	(0.054)
GEC treatment	0.087	0.048	0.286***	0.269***
	(0.056)	(0.084)	(0.019)	(0.023)
Controls:				
Period FEs	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes
# Observations	1,344	1,344	1,344	1,344

Notes: Random effects panel regressions for consumers reported. In columns (1) and (2) the outcome variable is a binary indicator equal to one if the consumer interacts, zero otherwise. In columns (3) and (4) the outcome variable is a binary indicator equal to one if the consumer gifts the expert-seller, zero otherwise. Columns (2) and (4) include prices as control variables. All specifications include period fixed effects. Robust standard errors clustered at the session level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

insignificant. This is again in line with Hypotheses 1b and 2.

Result 3. The share of consumers who choose to interact in the credence goods market is similar in all three treatments.

Interactions. The fifth row of Table 1 shows that consumers decide to interact in 56% of the cases in BASE, 60% in GE, and 65% GEC. While the possibility to gift is therefore associated with an increase in interactions, both non-parametric tests and regression results reported in Table 5, columns (1) and (2), suggest that the differences across treatments are not statistically significant. This result goes against Hypothesis 3a.

Result 4. The proportion of consumers who send the gift is similar in GE and GEC treatments.

Gifting. The frequency of gifting is reported in the sixth row of Table 1, and indicates that 21% of consumers send a gift in the GE treatment, 29% in the GEC treatment. Conditional on interaction, this corresponds to 35% and 45% for GE and GEC respectively. A positive propensity to gift is in line with Hypothesis 3b. Regression results reported in Table 5, columns (3) and (4), suggest that differences in the probability to send the gift are not statistically different in GE and GEC (Wald test for the equality of GE and GEC estimates in column 3: $p = 0.178$).

Result 5. The possibility to gift in GE and GEC treatments does not significantly increase market efficiency relative to BASE.

Result 6. For consumers who need q_h, sending a gift significantly reduces market inefficiencies.

Profits and Market efficiency. The seventh and eighth rows in Table 1 show that profits of expert-sellers are on average very similar across treatments. The profits of expert-sellers are also not significantly affected when consumers send a gift. Similarly, while the profits for consumers tend to be lower than those earned by expert sellers, there are no significant differences across treatments. In line with this, market efficiency reported in row eight shows no significant differences across columns. This result contradicts Hypothesis 4.

To provide further evidence on how gifting and reciprocity affect profits and market efficiency, we focus on periods in which the consumer participates in the market and distinguish cases in which either q_h or q_l is needed.[22] Starting with profits for expert-sellers, panel regression results reported in Table 6 confirm that treatment effects for GE and GEC are not statistically significantly different from zero (columns 1 and 2 for q_h, 5 and 6 for q_l).

More importantly, both conditional and unconditional gifts by a consumer who needs q_h do not significantly increase expert-sellers' average profits (columns 3 and 4), even though expert-sellers receive one additional currency unit (Wald test that interaction terms are equal to one: $p < 0.01$). This is in line with the observation that expert-sellers abstain from undertreating consumers and also undercharge, thereby giving up some of their own profits to reciprocate the gift. By contrast, when the consumer needs q_l (Table 6, columns 7 and 8), both types of gift have a positive impact on the profits of expert-sellers. We note, however, that an unconditional gift has a smaller impact on expert-seller's profits relative to a conditional gift (Wald test for the equality of coefficients is rejected with $p < 0.01$). This corresponds to the observation that overcharging declines only for an unconditional gift.

[22] As should be clear from above, observations for consumers who need q_h are those for which undertreatment and undercharging are possible (respectively Table 2 and Table 4), except for cases with $p_h = p_l$. Similarly, results for q_h correspond to the sample where overcharging is possible (Table 3) except for observations with $p_h = p_l$.

Table 6: Random effects regressions for expert-sellers' profits

	Consumer needs q_h				Consumer needs q_l			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Main effects:								
GE treatment	0.193	0.198	0.314	0.282*	0.340	0.068	0.253	−0.014
	(0.188)	(0.154)	(0.201)	(0.152)	(0.542)	(0.487)	(0.572)	(0.477)
GEC treatment	−0.180	0.087	0.024	0.072	−0.086	0.179	−0.603*	−0.466*
	(0.217)	(0.387)	(0.252)	(0.435)	(0.301)	(0.311)	(0.312)	(0.269)
GE x Gift	–	–	−0.320	−0.221	–	–	0.273**	0.212*
			(0.314)	(0.376)			(0.128)	(0.128)
GEC x Gift	–	–	−0.473*	0.038	–	–	1.130***	1.419***
			(0.286)	(0.324)			(0.099)	(0.280)
Controls:								
Period FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes	No	Yes
# Observations	393	393	393	393	418	418	418	418

Notes: Random effects panel regressions for expert-sellers reported. The outcome variable is the profits of the expert-sellers conditional on consumer needing q_h (columns 1-4) or q_l (columns 5-8). Columns (1) and (5) identify the average treatment effect for GE and GEC treatments. Columns (2) and (6) additionally control for prices. In columns (3) and (7), we extend columns (1) and (5) respectively adding interaction terms for treatments with a variable Gift_{it} equal to one if the consumer transferred a gift in period t, zero otherwise. In columns (4) and (8) we additionally control for prices. All specifications include period fixed effects. Robust standard errors clustered at the session level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

Turning to consumers' profits, Table 7 columns 1-2 and 5-6 show that GE and GEC treatments tend to be detrimental to consumers on average. However, columns 3 and 4 show that, if the consumer needs q_h, sending either type of gifts has a positive impact on consumer's profits. This suggests that the direct cost of the gift for consumers is more than compensated by an increase in consumer-friendly behavior by expert-sellers. When the consumer needs q_l, however, columns 7 and 8 show that sending the gift has a significant negative impact on profits. In other words, the decline in overcharging is not sufficient to compensate the cost of the gift.

Lastly, regression results for market efficiency are reported in Table 8, confirming that the treatment effect of GE and GEC are small and not statistically significant (columns 1-2 and 5-6). When consumers need q_h, however, sending both types of gift significantly increases market efficiency (columns 3 and 4). Since undercharging is a transfer and therefore does not directly affect market efficiency, this effect can instead be attributed to the observed decline in under-treatment.

Table 7: Random effects regressions for consumers' profits

	Consumer needs q_h				Consumer needs q_l			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Main effects:								
GE treatment	-0.568^{*}	-0.691^{**}	-1.042^{***}	-1.100^{***}	-0.443	-0.140	-0.083	0.139
	(0.339)	(0.314)	(0.393)	(0.380)	(0.368)	(0.263)	(0.473)	(0.308)
GEC treatment	-0.018	-0.327	-0.558	-0.637	-0.106	-0.475^{**}	0.319	0.152
	(0.820)	(0.916)	(0.821)	(0.983)	(0.286)	(0.185)	(0.330)	(0.171)
GE x Gift	–	–	1.240^{*}	1.088	–	–	-1.064^{***}	-0.751^{***}
			(0.674)	(0.688)			(0.302)	(0.169)
GEC x Gift	–	–	1.274^{***}	0.778	–	–	-0.964^{***}	-1.407^{***}
			(0.432)	(0.490)			(0.150)	(0.157)
Controls:								
Period FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes	No	Yes
# Observations	393	393	393	393	418	418	418	418

Notes: Random effects panel regressions for consumers reported. The outcome variable is the profits of the consumer conditional on needing q_h (columns 1-4) or q_l (columns 5-8). Columns (1) and (5) identify the average treatment effect for GE and GEC treatments. Columns (2) and (6) additionally control for prices. In columns (3) and (7), we extend columns (1) and (5) respectively adding interaction terms for treatments with a variable Gift_{it} equal to one if the consumer transferred a gift in period t, zero otherwise. In columns (4) and (8) we additionally control for prices. All specifications include period fixed effects. Robust standard errors clustered at the session level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

Table 8: Random effects regressions for market efficiency

	Consumer needs q_h				Consumer needs q_l			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Main effects:								
GE treatment	-0.241	-0.273	-0.703^{**}	-0.733^{**}	-0.052	-0.067	0.018	-0.004
	(0.342)	(0.325)	(0.329)	(0.331)	(0.068)	(0.071)	(0.048)	(0.060)
GEC treatment	-0.138	-0.072	-0.426	-0.541	-0.060	-0.068^{*}	-0.065^{*}	-0.077^{**}
	(0.791)	(0.732)	(0.749)	(0.696)	(0.051)	(0.041)	(0.039)	(0.035)
GE x Gift	–	–	1.221^{**}	1.223^{**}	–	–	-0.209^{***}	-0.183^{***}
			(0.490)	(0.486)			(0.049)	(0.046)
GEC x Gift	–	–	0.683^{***}	1.170^{***}	–	–	0.011	0.022
			(0.182)	(0.268)			(0.049)	(0.045)
Controls:								
Period FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes	No	Yes
# Observations	393	393	393	393	418	418	418	418

Notes: Random effects panel regressions for consumers reported. The outcome variable is total market efficiency conditional on consumers needing q_h (columns 1-4) or q_l (columns 5-8). Efficiency is calculated as the sum of profits of interacting expert-sellers and consumers, divided by the maximum average profit (=2 in condition h and =4 in condition l), both normalized by the outside option. Columns (1) and (5) identify the average treatment effect for GE and GEC treatments. Columns (2) and (6) additionally control for prices. In columns (3) and (7), we extend columns (1) and (5) respectively adding interaction terms for treatments with a variable Gift_{it} equal to one if the consumer transferred a gift in period t, zero otherwise. In columns (4) and (8) we additionally control for prices. All specifications include period fixed effects. Robust standard errors clustered at the session level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

Table 9: Random effects regressions for overtreatment

	Outcome: overtreatment=1			
	(1)	(2)	(3)	(4)
Main effects:				
GE treatment	0.039	0.049	−0.017	−0.004
	(0.094)	(0.097)	(0.076)	(0.085)
GEC treatment	0.070	0.076	0.083	0.088*
	(0.060)	(0.049)	(0.053)	(0.049)
GE x Gift	–	–	0.176***	0.165***
			(0.050)	(0.049)
GEC x Gift	–	–	−0.025	−0.026
			(0.053)	(0.047)
Controls:				
Period FEs	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes
# Observations	418	418	418	418

Notes: Random effects panel regressions for expert-sellers reported. The outcome variable is a binary indicator equal to one if an expert-sellers overtreats the consumer, zero otherwise. Column (1) identifies the average treatment effect for GE and GEC treatments. In column (2), we extend the first column controlling for prices. In column (3), we introduce interaction terms for treatments with a variable Gift_{it} equal to one if the consumer transferred a gift in period t, zero otherwise. In column (4) we extend the third column controlling for prices. All specifications include period fixed effects. Robust standard errors clustered at the session level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

When the consumer needs q_l, sending an unconditional gift (GE treatment) has a negative and statistically significant impact on market efficiency (Table 8, columns 7 and 8), whereas a conditional gift (GEC treatment) has a small and statistically insignificant impact. This change in market efficiency is not driven by the change in overcharging, which represents a transfer. Instead, we show in Table 9 that the decline in market efficiency can be explained by an increase in overtreatment when an unconditional gift is sent (GE treatment, columns 3 and 4).[23] As discussed previously, overtreatment reduces the payoff of the expert-seller, but it does not affect consumers' payoff. This response to a gift is therefore not consistent with the model by Falk and Fischbacher (2006), and suggests the presence of inequality averse expert-sellers as discussed by Kerschbamer et al. (2017).

[23] The analysis focuses on observations for which overtreatment can occur, that is when the consumer chooses to interact and needs q_l.

Taken together, these results indicate that sending a gift has a positive impact on consumers's profits and efficiency in markets where consumers face a severe problem and need q_h. By contrast, when q_l is needed gifting reduces the consumer's profit and can also reduce market efficiency. These effects cancel each other, so that introducing a possibility to gift expert-sellers does not affect overall market efficiency.

5 Discussion and conclusion

Using a canonical experimental market for credence goods, this paper has introduced the possibility for consumers to send conditional and unconditional gifts to expert-sellers, and quantified implications for the behavior of expert-sellers as well as for overall market efficiency. Our results confirm that sending an unconditional gift triggers more consumer-friendly behavior by expert-sellers, as the rate of undertreatment and overcharging decline, while undercharging increases. We also find that conditional gifts only reduce undertreatment, which suggests that expert-sellers perceive these as less kind. Conditioning a gift, which is akin to minimum performance contracts, can therefore backfire, as it fails to trigger reciprocal actions that cannot be observed by consumers.

While our results provide novel evidence on the importance of reciprocity for credence goods markets, they also suggest that the possibility to gift expert-sellers does not significantly increase overall market efficiency. However, we show that the benefit of gifting depends on the severity of the problem faced by the consumer, as market efficiency improves for high-severity consumers. We also note that, in our experiment, interaction rates in all treatments remain relatively low, and consumers need q_h in only 50 percent of the cases, which implies that the scope for gift-exchange to significantly increase market efficiency is limited.

In light of this, we emphasize one critical feature of the credence goods market in our study: the severity of the problem faced by consumers is manipulated experimentally. In other words, the consumers we consider have no private information about their own type. In settings where consumers have some information about the severity of the problem they face, offering the expert-seller a gift may be beneficial. Investigating the impact of such strategies constitutes an interesting area for future research.

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Referee Appendix (not for publication)

NOTE: Instructions for the BASE treatment. Parts that changed in the GE treatment are marked in yellow and in light blue for the GEC treatment.

INSTRUCTIONS

Welcome and thank you for your participation in this experiment. We ask you to turn off your mobile phones and to not talk to any other participant. If you have a question, raise your hand and an assistant will come to respond to your question in person.

During this experiment, your payoff depends on your decisions and those of the other participants, as well as of luck. Below you find the rules for this experiment which determine your payoffs.

2 roles and 16 rounds

This experiment consists of **16 rounds**, each of which consists of the same sequence of decisions. This sequence is explained in detail below.
There are two kinds of roles in this experiment: **player A and player B**. At the beginning of this experiment, you are randomly assigned to one of the two roles. You will see which role is assigned to you on the first screen of the experiment. Your role remains the same throughout the experiment.

A player A always interacts with a player B. However, the pair of players changes after every round. Thus, you interact with a new player at every round.

All participants get the same information on the rules of the game, including the costs and payoffs of both roles, player A and player B.

Overview of the Sequence of Decisions in a round

Each round consists of a maximum of 4 decisions which are made consecutively. Decisions 1, 3 and 4 are made by player A, decision 2 is made by player B.

Sequence of decisions in a round (summary)

1. Player A chooses one price for action 1 and one price for action 2
2. Player B gets to know the prices chosen by player A. Then player B decides whether he wants to interact with player A. If player B does not want to interact, this round ends for both players.

If player B decides to interact with Player A :

3. Player A (but **not** player B) is informed about the type of player B. There are two possible types of player B : type 1 or type 2. Based on this, player A chooses an action for player B, either action 1 or action 2.
4. Player A charges player B one of the two prices specified at the first decision. It is not obligatory that the price charged refers to the action chosen at decision 3, player A can also charge the price for the other action.

Detailed Illustration of the Decisions and Their Consequences Regarding Payoffs

Decision 1

At decision 3, player A chooses between two actions (action 1 and action 2Each chosen action causes costs :
Action 1 costs player A **2 points** (= currency of the experiment).
Action 2 costs player A **6 points**.
Player A can charge prices for these actions from player B. At **decision 1** each Player A **sets the prices for both actions**. Only (strictly) positive integer numbers are possible, i.e., only 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11 are valid prices. Note that the price for action 1 must not exceed the price for action 2.

Decision 2

Player B gets to know the prices set by player A for the two actions at decision 1. Then, player B decides whether he wants to interact with the players A.
If player B wants to interact, player A chooses an action at decision 3 and charges a price for that action at decision 4 (see below).
If player B does not want to interact, this round stops and both players receive 1.6 points for this round.

Decision 3

Before decision 3 is made (in case player B chose to interact at decision 2) a type is randomly assigned to player B. Player B can be one of the two types: **type 1 or type 2**. This type is redetermined randomly in **every new round**. With a probability of 50% player B is of type 1, and with a probability of 50% he is of type 2. Imagine that a coin is tossed for each player B in each round. If the result is e.g. “heads”, player B is of type 1, if the result is “tails” he/she is of type 2.

Player A gets to know the type of player B before he makes his decision 3. Then player A chooses an action for player B, either action 1 or action 2.

An action is **sufficient** under the following conditions :

a) Player B is of type 1 and player A chooses action 1 or action 2.
b) Player B is of type 2 and player A chooses action 2.

An action is **insufficient** if player B is of type 2 and player A chooses action 1.

Player B receives **10 points** if the action chosen by player A is **sufficient**. Player B receives **0 points** if the action chosen by player A is **insufficient**.

Player B is **at no time** informed of his type in this round (type 1 or type 2) nor about the action (action 1 or action 2) chosen by player A.

Before player A chooses an action for player B, player B has the possibility to transfer one additional point of his payoffs to player A who is immediately informed about the outcome of this decision.

Before player A chooses an action for player B, player B has the possibility to transfer one additional point of his payoffs to player A who is immediately informed about the outcome of this decision. The transfer is only realized if the action chosen by player A is **sufficient**. If the action is insufficient, the transfer is not realized.

Decision 4

Player A charges player B a price (which he set at decision 1) for one of the actions. It is not obligatory that the price charged refers to the action chosen at decision 3, player A can also charge the price for the other action.

Payoffs

If player B chooses not to interact with player A at decision 2, both players receive **1.6 points** for this round.

If player B decides to interact at decision 2, the payoffs are as follows :

Player A receives the price (in points) which he charged at decision 4 **less** the costs for the action chosen at decision 3, and one additional point if player B has chosen to transfer an additional point to player A, and one additional point if player B has chosen to transfer an additional point to player A and player A choses a sufficient action.

For player B, the payoffs depend on **whether the action chosen by player A at decision 3 is sufficient**.

a) The action chosen by player A is **sufficient**. Player B receives 10 points less the prices charged by player A at decision 4, less 1 point if he choses to transfer an additional point to player A, less 1 point if he choses to transfer an additional point to player A.
b) The action chosen by player A is **insufficient**. Player B receives 0 points less the price charged by player A at decision 4, less 1 point if he choses to transfer an additional point to player A the transfer of the additional point is not realized.

At the beginning of the experiment you receive an initial endowment of **6 points**. With this endowment, you are able to cover losses that might occur in some rounds. Losses can also be compensated by gains in other rounds. If your total payoff after 16 rounds is negative, we ask you to perform an extra task to compensate your losses. Please notes that there is **always** a possibility to avoid losses in this experiment.

To calculate the final payoff the initial endowment and the profits of all rounds are added up.
This sum is then converted into cash using the following exchange rate::

1 point = 0.5 CHF
(i.e. 2 points = 1CHF)

Examples of decisions takes in one round

Example1 : Player A has set the following prices : price for action 1 : 2points, price for action 2 : 8 points. Player B decides not to interact at decision 2.

Payoffs for player A: 1.6
Payoffs for player B : 1.6

Example 2 :: Player A has set the following prices : price for action 1: 3 points, price for action 2: 7 points. Player B decides to interact at decision 2 and to transfer an additional point to player A and to transfer an additional point to player A. Player B is of type 2. Player A chooses action 2 and charges the price for action 2.

Payoffs for player A: 7 (the price charged by player A) – 6 (the cost of action 2)+1 (the additional point transferred by player B))+1 (the additional point transferred by player B) =1 2 2
Payoffs for player B : 10 (the value of a sufficient action) – 7 (the price paid to player A) – 1 (the additional point transferred by player B) – 1 (the additional point transferred by player B) = 3 2 2

Sequence of decisions in each round :

Decision 1 → Decision 2 → Decision 3 → Decision 4

Decision 1

- **Player A**
- Sets the prices for action 1 and action 2.
- Player A chooses between one of the two prices at decisison 4.

Decision 2

- **Player B**
- Is informed about the two prices set by player A and decides whether he wants to interact or not.
- Has the possibility to transfer an additional point of his payoffs to player A.
- Has the possibility to tranfer an additional point of his payoffs to player A.

Decision 3

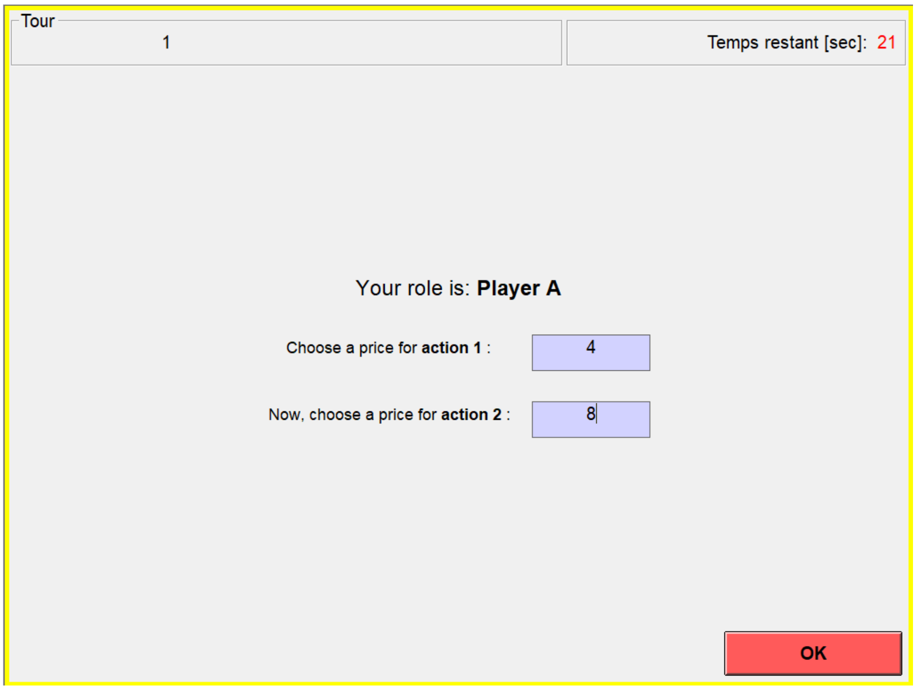
- **Player A**
- Is informed about the type of player B.
- Player A is informed whether he receives an additional point of player B before he chooses an action for player B.
- Player A is informed whether he receives an additional point of player B before he chooses an action for player B. The transfer is only realized if the action of player A is sufficient. If the action is insufficient, the transfer is not relaized.
- Chooses action 1 or action 2.

Decision 4

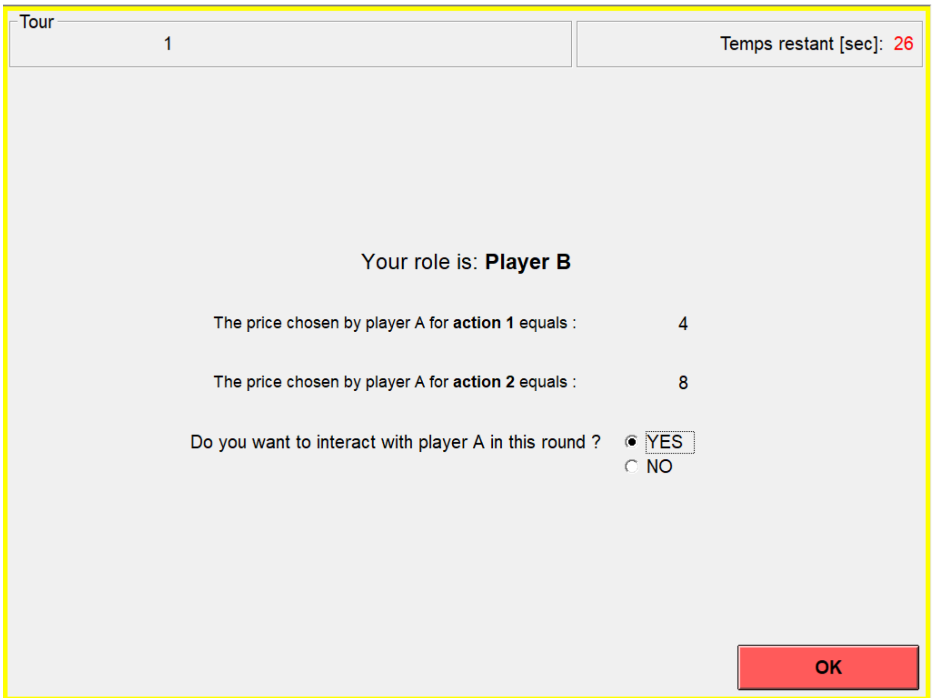
- **Player A**
- Charges a prices for one of the two actions.
- The prices are set at decision 1.
- It is not obilgatory that the price charged corresponds to the action chosen at decision 3.

If player B decides to interact, the two players continue with decisions 3 and 4. If player B decides not to interact, the round ends at decision 2.

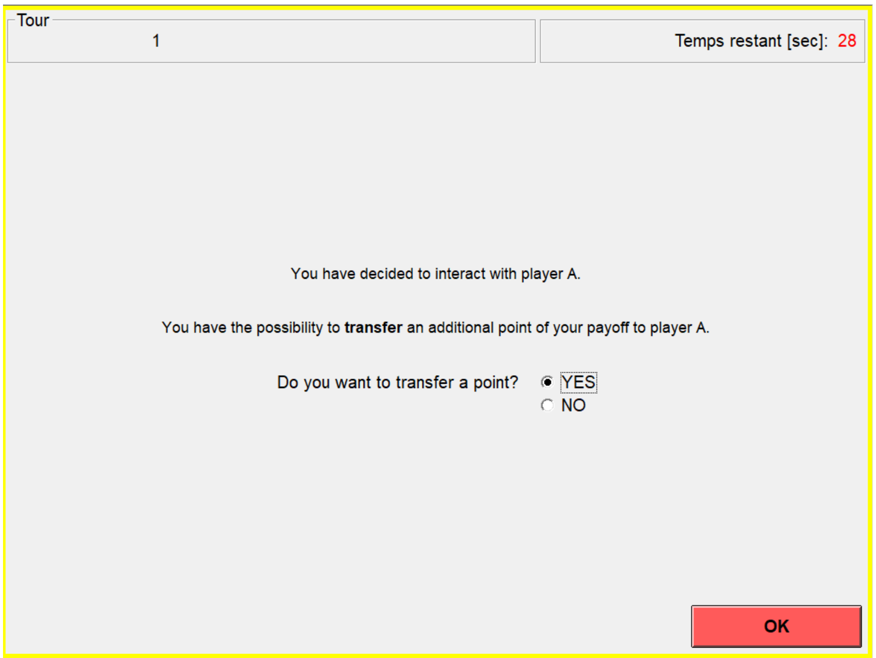
Screen 1 (Player A)



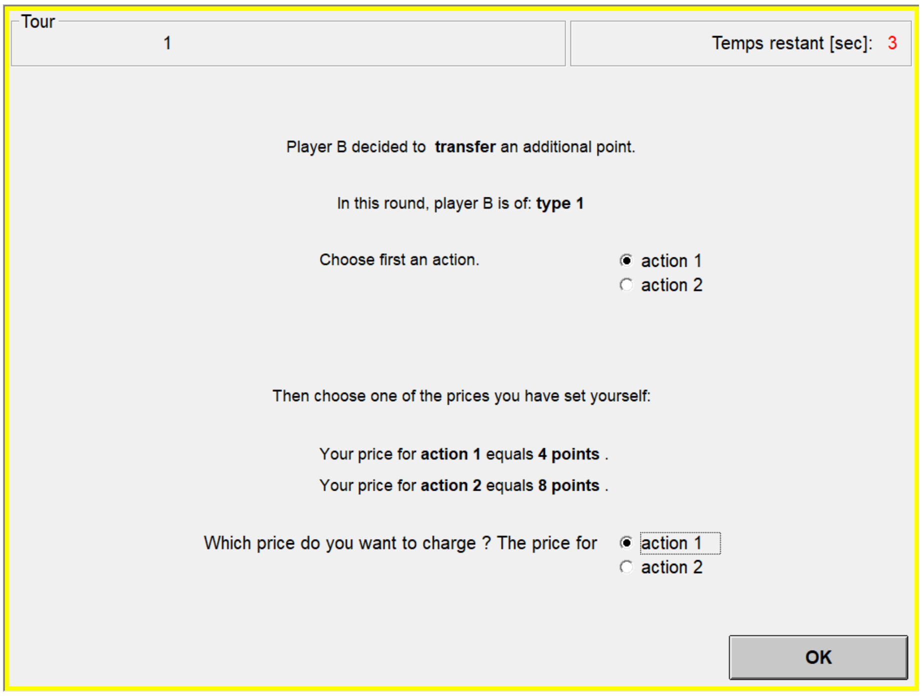
Screen 2 (Player B)



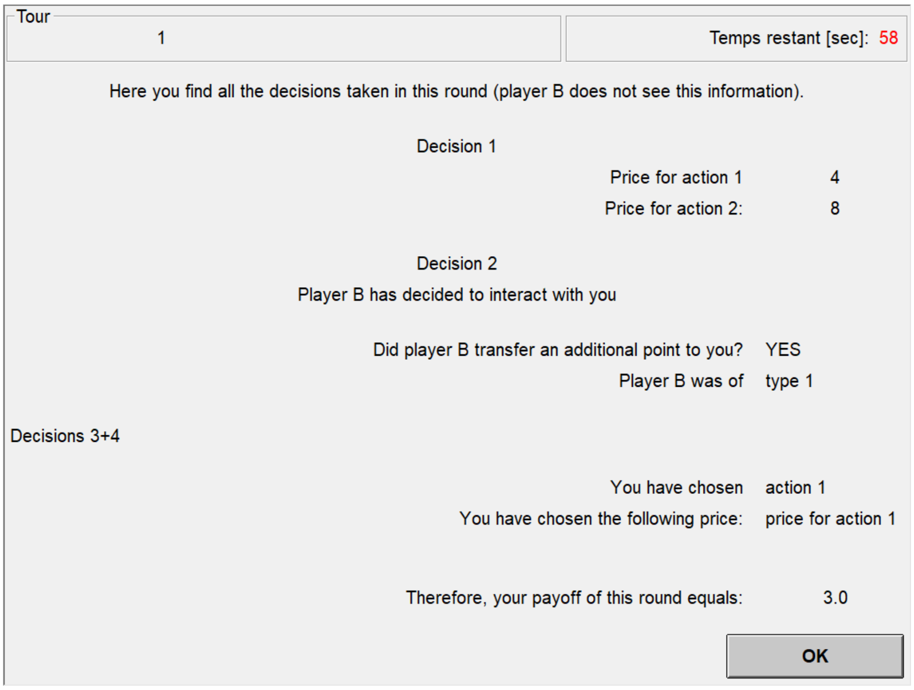
Screen 3 (Player B, only in GE and GEC)



Screen 4 (Player A)



Screen 5 (Feedback forPlayer A)



Screen 5 (Feedback forPlayer B)