UNIVERSITÉ DE NEUCHÂTEL

Institut de recherches économiques

IRENE Working Paper 20-09

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First version: July 2020; this version: May 2022

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 gifts increase the frequency of consumer-friendly actions relative to no gift, but only conditional gifts translate into efficiency gains when the consumer faces a high-severity problem. This suggests that partial alignment of incentives via conditional gifts may outweigh kindness motives when reciprocal actions are not directly observed. Using further treatments with surprise gift exchange, we show that withholding a gift that is expected by expert-sellers significantly reduces the likelihood of consumer-friendly behavior whereas sending a gift to expert-sellers who do not expect one has no effect.

Keywords: Credence Goods; Expert-sellers; Gift Exchange; Reciprocity; 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 (Darby and Karni, 1973; 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, 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). Despite this, it is common in many markets and societies to gift expert-sellers, and for example in healthcare markets physicians often receive gifts from third-parties (King and Bearman, 2017; Brock et al., 2018) or directly from patients (Currie et al., 2013, 2014).

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

[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).

a high-quality service (undertreatment) and charge for the high-quality service (overcharging). 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 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 sufficiently strong preferences for reciprocity to engage in three types of consumer-friendly actions: abstaining from undertreatment, abstaining from overcharging, or engaging in undercharging (i.e., provide the high-quality service and charge 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 consumer-friendly 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 the context of the model by Falk and Fischbacher (2006), we show how conditional and unconditional gifts differ in terms of perceived kindness, and compare GE and

[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).

GEC treatments to document the role of reciprocity for the behavior of expert-sellers.

We further employ two additional treatments to study contexts where small gifts can be expected or come as a surprise, following related designs with repeated interactions and gift exchange in Cao et al. (2020) and DellaVigna et al. (2022). Specifically, we first consider a treatment in which, for the first eight periods, expert-sellers receive a gift whenever the consumer decides to interact. From period nine onward, consumers can choose not to send the gift, so that not receiving a gift when the consumer decides to interact could come as a negative surprise. We label this treatment GEN. The second surprise treatment instead starts with eight periods during which gifting is not possible (akin to BASE), and introduces the possibility of gifting in period nine. Thus in the second part of the experiment, expert-sellers could perceive a gift as a positive surprise, and we label this treatment GEP. Differences between the first eight and last eight periods of the experiment provide evidence about the effect of withholding or introducing gifts on the behavior of expert-sellers.

Results from our experiment show that gifting induces expert-sellers to engage in more consumer-friendly behavior, even if this is not observable by the consumer. Specifically, an unconditional gift in GE increases consumer-friendly behavior (all kind) by 8.4 percentage points relative to no gift (within-treatment comparison). This includes a decline in the rate of undertreatment by about 11 percentage points and an increase in undercharging by about four percentage points. The impact of conditional gifts tend to be larger, with an increase of consumer-friendly behavior (all kind) by 19 percentage points, including a reduction of undertreatment by around 25 percentage points and an increase of undercharging by about ten percentage points. Moreover, the effect of conditional gifts is comparable in the first and second parts of the experiment, whereas the impact of unconditional gifts declines. In line with this, we show that consumers who face a high-severity problem and send a conditional gift to expert-sellers earn on average higher profits, whereas expert-sellers tend to appropriate the value of unconditional gifts. This suggests that partial alignment of incentives via conditional gifts may improve market outcomes when the share of consumers with high-severity problems is large, or when agents have private information about their own type.

Moreover, results from our surprise treatments show that a negative surprise (i.e., not gifting when it is expected) in the second part of the experiment is associated with a significant decrease

of consumer-friendly behavior by about 20 percentage points relative to observations in the first eight periods. By contrast, a positive surprise (i.e., gifting when it is not expected) has a small impact on consumer-friendly behavior by expert-sellers. This suggests that gifting in markets where expert-sellers hold a high reference (e.g., in societies where gifts are expected) might be beneficial for consumers and increase market efficiency, at least for consumers with high-severity problems, whereas gifting in societies where expert-sellers are not used to receiving gifts does not yield tangible benefits.

These results directly complement field evidence by Currie et al. (2013) on the role of gifting in a patient-physician setting. Based on an experiment with physicians in China, where patients commonly bring small gifts to their physicians, they show that physicians who do not receive a gift spend significantly less time and prescribe more unnecessary antibiotics compared to patients who gift a self-made bookmark (see also Currie et al., 2014). Our lab experiment allows us to disentangle the impact of gifting across possible observed and unobserved actions by expert-sellers. We further show that experimentally induced surprise confirm the effect of departures from local norms when consumers do not send a gift, and suggest that further research on this topic is worthwhile.[4]

Our paper also contributes to a growing literature that investigates how different characteristics of credence goods 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. (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

[4] A parallel literature in the health-care context studies the behavior of physicians who receive gifts from third parties other than patients (e.g., King and Bearman, 2017; Brock et al., 2018) or performance-based payments to health-care providers (Basinga et al., 2011; Miller et al., 2012).

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 gifts can potentially replace complicated selection mechanisms.

Lastly, our results 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 gifts with a range of observable and unobservable actions.

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 (BASE). We then introduce two experimental treatments in which the consumer is given the possibility to transfer a gift to the expert-seller, either unconditionally (GE treatment) or conditionally on receiving a service of sufficient quality (GEC treatment). Subsequently, we introduce another two treatments where a gift from the consumer comes as a surprise (GEN and GEP treatments). 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.

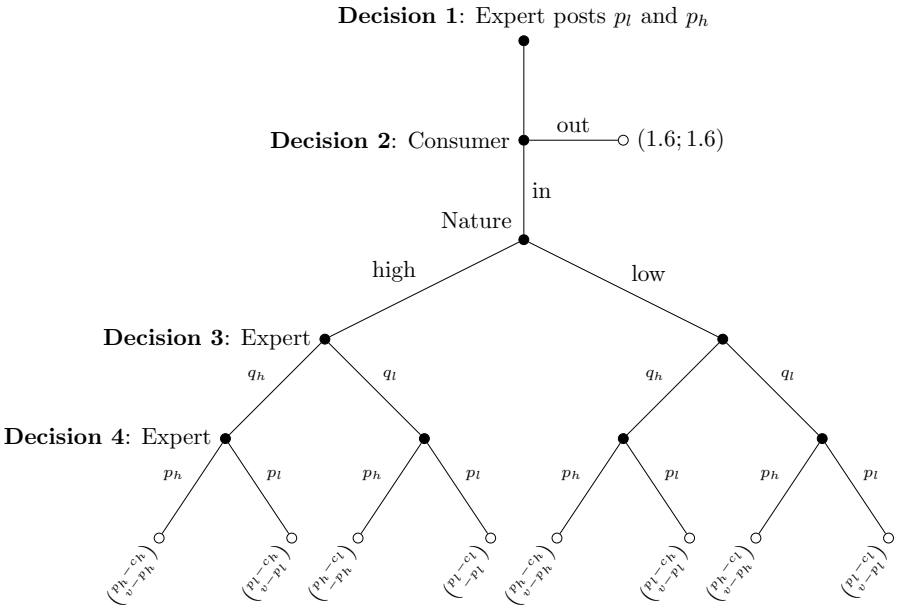
The extensive form of the game in BASE is depicted in Figure 1. The game comprises four decisions: decisions 1, 3 and 4 are made by the expert-seller, decision 2 is made by the consumer. At decision 1, the expert-seller announces prices p_h and p_l. Both prices must be integers between 1 and 11, with $p_h \geq p_l$.[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 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: $\pi_e = p_i - c_i$.

[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 for 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.

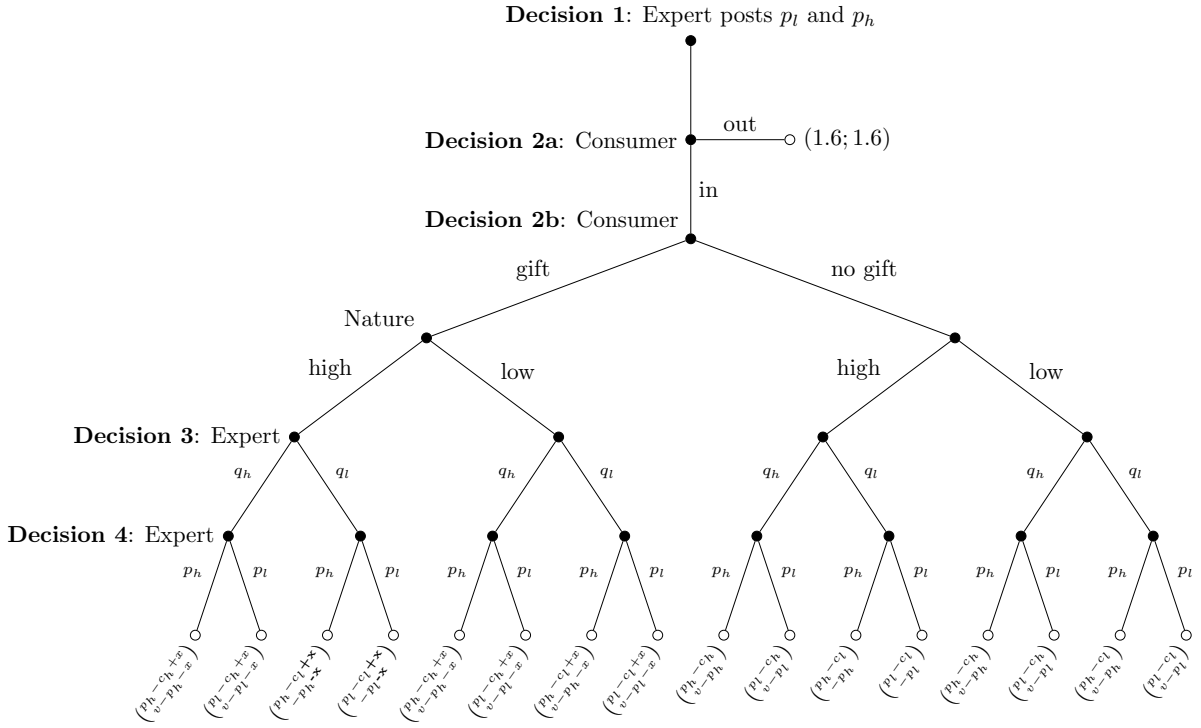
2.2 Unconditional gift exchange (GE treatment)

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 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

[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.

Figure 2: Extensive form game for gift exchange 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 not realized in the GEC treatment.

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.

2.4 Surprise gift exchange (GEN and GEP treatments)

The treatments labeled GEN and GEP consider unconditional gifts to the expert-sellers and study the role of negative or positive surprise. In the first eight periods of GEN, a gift ($x = 1$) is always transferred from consumers who decide to interact with expert-sellers. This means that, in GEN, the extensive form representation for the first half of the experiment is akin to Figure 2, although there is no alternative at decision node 2b other than to gift. In period nine, consumers and expert-sellers are informed that the decision to transfer a gift is now endogenous, implying that GEN becomes identical to GE (Figure 2).[10] In the GEP treatment, the first eight periods are identical to BASE, so that no gifting is possible. In period nine, consumers and expert-sellers are informed that consumers can thereafter decide whether to transfer a gift, so that the second half of the experiment in treatment GEP is identical to GE (Figure 2).

In the first eight periods of the GEN treatment, expert-sellers receive a transfer every period in which the consumer decides to interact, so that receiving no gift in the second part of the experiment may come as a negative surprise. This setting is related to Currie et al. (2013) which studies the case of Chinese physicians who commonly receive small gifts from patients,

[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.

[10] Note that the instructions for *all* treatments indicate that the "sequence of decisions" of the experiment may change during the game, and that all the participants will receive the same information if this occurs.

and shows that token gifts lead to significantly better outcomes for patients compared to no gift. By contrast, in the GEP treatment, expert-sellers receive no gifts in the first eight periods, so that a gift in the second part of the experiment may come as a positive surprise. Surprise gift exchange may have a large effect on behavior (see for example Malmendier and Schmidt, 2017), and comparing the first and second half of the experiment can shed light on the role of (withholding) a gift in markets/societies that differ in the outcome expected by expert-sellers. We come back to this below.

2.5 Experimental Procedure

The experiment was run in the laboratory of the University of Zürich in October and November 2021 and implemented in z-Tree (Fischbacher, 2007). We recruited a total of 544 participants via the software hroot (Bock et al., 2014). There were 20 experimental sessions out of which 11 were conducted with 32 participants, six were conducted with 24 participants and 3 were conducted with 16 participants.[11]

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. Our experiment includes 14 matching groups for treatments BASE, GE and GEC and 13 matching groups in GEN and GEP with eight participants in each (see Table 1). 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

[11] 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 15 ($\approx$ US$ 15) and dismissed.

[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. Due to a technical issue, one session in BASE with 16 participants has crashed in period four of the game, but continued smoothly afterward. Observations for this period are treated as missing values.

Table 1: Distribution of subjects across treatments

Treatment	BASE	GE	GEC	GEN	GEP	Total
Subjects	112	112	112	104	104	544
Matching groups	14	14	14	13	13	68

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 15, participants earned on average CHF 32.4 and sessions lasted approximately 80 minutes.

3 Behavioral 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.

Consumer therefore anticipate undertreatment if q_h is needed and overcharging if q_l is

[13] This equilibrium assumes that agents play each of the 16 periods 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.

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 treatments with gifts, 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 the presence of both conditional and unconditional gifts.

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 by 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 break-

[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 $\pi_e = p_h - c_h + 1$.

down. 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 $\overline{\pi}_e$. 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 ($\overline{\pi}_e = \overline{\pi}_c = 1.6$).[15] In turn, any action by the consumer allowing the expert-seller to earn more than the outside option is perceived as 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.[16]

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;

[15] 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.

[16] In Falk and Fischbacher (2006), the kindness term is further multiplied with the intention term to reflect the availability of choice alternatives. We treat an action as fully intentional (intention term equals one) whenever a player has an alternative option. This concerns the consumer's decision to interact in all the experimental conditions and the decision to gift in GE, GEC, and in the second half of GEN and GEP. Instead, we set the intention term to zero when a player does not have a choice whether to send a gift or not (i.e., in BASE and in the first eight periods of GEN and GEP).

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 consumer-friendly actions 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 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 the effect of a gift on reciprocal behavior of the expert-seller. Defining consumer-friendly actions by expert-sellers as those without undertreatment or overcharging, and potentially with undercharging,[18] the first hypothesis follows from the presence of expert-sellers with a positive and sufficiently large sensitivity parameter ρ_e.

Hypothesis 1a. *Sending the gift increases the frequency of consumer-friendly actions relative to both i) not sending the gift and ii) BASE.*

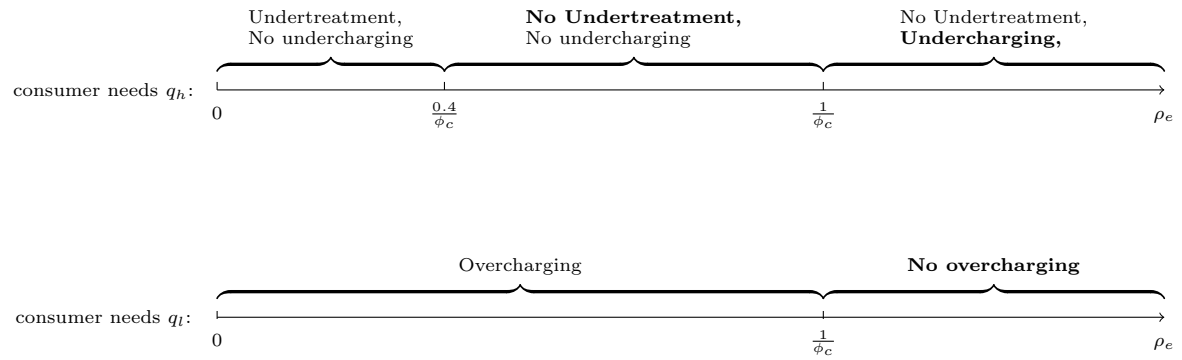
Note that a within-treatment comparison between gift and no gift keeps the environment constant and evaluates the effect of a specific action by the consumer, whereas a comparison with BASE allows us to explore the role of intentionality of consumers' actions for reciprocal response of the expert-seller (Fehr et al., 1998).

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

[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.

[18] Formally, we say that expert-sellers take consumer-friendly actions (all kind) when the consumer needs q_h and the expert-seller supplies q_h, or if q_l is needed and the expert-seller supplies either q_h or q_l, but charges p_l.

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.

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.*

The effect of gifts specified in Hypotheses 1a and 1b depends on the sensitivity parameter ρ_e, which is likely heterogeneous in the population (see, e.g., Tang, 2020). A change in the frequency of consumer-friendly actions is expected only in the presence of sufficiently reciprocal expert-sellers for whom the gains associated with a reciprocal response outweigh pecuniary costs. In Figure 3, we depict how the different reciprocal, consumer-friendly actions of expert-sellers (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 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.

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 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.*

To formulate hypotheses for GEN and GEP, we assume that exogenous transfers in the first eight periods of the experiment change expert-sellers' reference point. This assumption borrows from a literature on reference-dependent preferences, where previous payoffs contribute to the formation of a reference point against which subsequent outcomes are compared (e.g., Kőszegi and Rabin, 2006; Crawford and Meng, 2011). See Cao et al. (2020) for a discussion in a gift exchange context.[19] We therefore hypothesize that expert-sellers evaluate the surprise gifts introduced in the second half of the experiment against the reference payoff established in the first half. For GEN, not receiving a gift in period nine onward is a negative deviation from the reference and therefore:

Hypothesis 5a. *Withholding a gift in the last eight periods of GEN negatively affects consumer-friendly behavior relative to the first eight periods.*

By contrast, receiving a gift in GEP is a surprise positive deviation from the reference payoff, and therefore:

Hypothesis 5b. *Sending a gift in the last eight periods of GEP positively affects consumer-friendly behavior relative to the first eight periods.*

Finally, many experimental studies have shown that the utility decrease from a loss is larger than the utility increase from equal-sized gain (see Kahneman and Tversky, 1979, for the first proposition of loss aversion and Kahneman et al., 1990, for experimental evidence). In our context, withholding a gift in GEN (Hypothesis 5a) should thus have a stronger effect on consumer-friendly behavior than sending a gift in GEP (Hypothesis 5b).

[19] In these studies, the change in reference points is achieved through exposure to different levels of endogenous gifting (intentional decisions of others) or exogenous manipulation of payoffs (purely outcome-based change). Although intention-based manipulations might have a stronger effect on reference points, they can only provide evidence in relation to an unexpected change in size of the gift (sudden change in payoffs, with already known possibility of gifting). Using an outcome-based approach instead allows us to study the effect of a surprise extension in the choice set of the consumers (new possibility of gifting in GEP or not gifting in GEN).

4 Results

This section reports experimental results. First, we focus on unconditional and conditional gifts in GE and GEC treatments, and quantify the effects on (i) consumer-friendly actions, analyzing the rate of undertreatment, overcharging, and undercharging, and (ii) on the dynamics of interaction and gifting decisions. Second, we quantify how profits and market efficiency differ in GE and GEC treatments relative to BASE. Finally, we compare consumer-friendly behavior in the first and the last eight periods of the experiment and investigate the role of surprise gift exchange in GEN and GEP treatments.

The discussion of experimental results is based on non-parametric tests and a set of random effects panel regressions. More specifically, non-parametric comparisons across treatments are based on two-tailed Mann-Whitney U test (MWU), or two-tailed Fligner-Policello robust rank order test (RRO) when we condition on gifting,[20] and within-treatment comparisons are based on two-tailed Wilcoxon sign-rank test (WSR). For these tests, each matching group is treated as one independent observation. Panel regressions allow us to control for dynamic effects (e.g., learning) and prices:[21]

$$\mathrm{Y}_{it} = \beta_0 + \beta_1 \,\mathrm{Treatment}_i + \beta_2 \,\mathrm{Treatment}_i \times \mathrm{Gift}_{it} \tag{2}$$

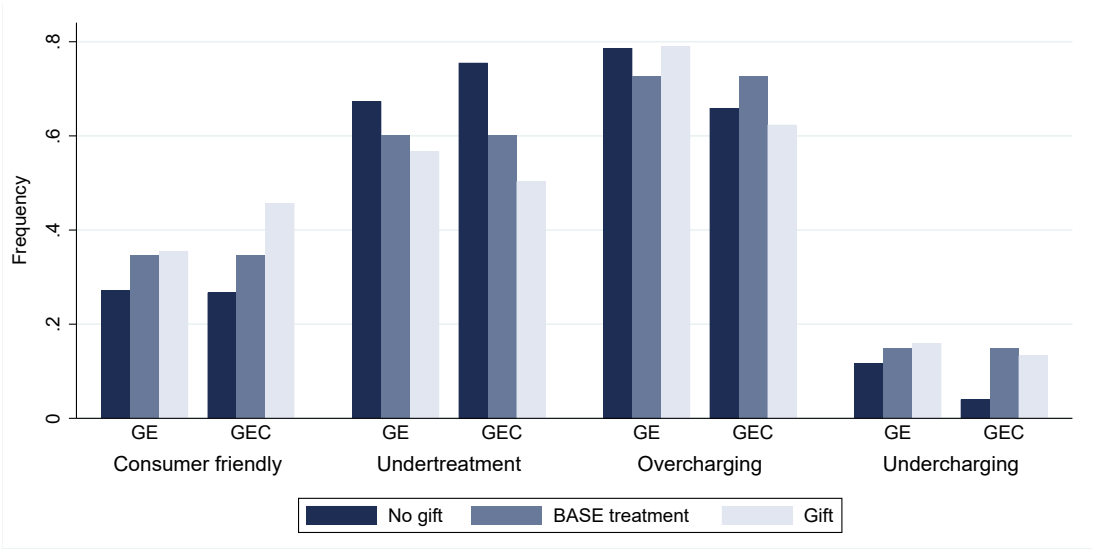
$$+ \gamma \,\mathrm{X}_{it} + a_i + u_{it}, \tag{3}$$

where Y_{it} is the outcome for subject i in period t, $\mathrm{Treatment}_i$ is a binary treatment indicator, Gift_{it} is an indicator variable equal to one if the consumer transferred a gift in period t (zero otherwise), X_{it} is a vector that includes time fixed effects and posted prices, a_i are random effects for each pair of consumer and expert-seller, and u_{it} is a random error term. In equation 3, β_2 quantifies within-treatment difference for gift vs. no gift, and we report a set of Wald tests for $\beta_1 + \beta_2$ which measure the difference in average outcomes between interactions with a gift and BASE. We cluster standard errors at the level of matching groups throughout.

[20] This accounts for the fact that restricting comparisons to interactions in which a gift was transferred implies that the variance is different across populations.

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

Figure 4: Consumer-friendly behavior across treatments



Notes: Frequency of interactions in which we observe (i) consumer-friendly actions (all kinds) by expert-sellers, (ii) undertreatment, (iii) overcharging, and (iv) undercharging. We report results for period 1 to 16 of the experiment, and condition on treatments BASE, gift exchange (GE) and gift exchange conditional on sufficient quality provision (GEC).

4.1 The effect of the gift on consumer-friendly actions

Figure 4 reports results for the impact of gifts by consumers on a range of consumer-friendly actions by expert-sellers, comparing BASE against GE and GEC treatments. Specifically, we report the proportion of interactions in which expert-sellers take consumer-friendly actions (all kind), as well as the rate of undertreatment, overcharging and undercharging. In the GE treatment, transferring a gift increases consumer-friendly behavior by 8.4 percentage points relative to no gift, although the difference is not statistically significant (WSR, p.value=0.583). We further observe that undertreatment declines by 10.6 percentage points and undercharging increases by 4.4 percentage points, whereas overcharging is not affected. None of the observed differences for unconditional gifts reach statistical significance at conventional levels.

Table 2 provides further evidence on these effects with regression results for equation (3). The outcome variable is an indicator for consumer-friendly behavior (all kinds) in columns (1) and (2), undertreatment in columns (3) and (4), overcharging in columns (5) and (6), and undercharging in columns (7) and (8). All columns include period fixed effects and columns (2), (4), (6) and (8), further control for posted prices. We report standard errors clustered

Table 2: Random effects regressions for consumer-friendly behavior

	Consumer friendly=1		Undertreatment=1		Overcharging=1		Undercharging=1	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel a: coefficient estimates								
GE treatment	-0.08	-0.07	0.06	0.07	0.12*	0.08	-0.03	-0.02
	(0.06)	(0.05)	(0.09)	(0.07)	(0.07)	(0.06)	(0.06)	(0.07)
GE x Gift	0.12***	0.14***	-0.16**	-0.17**	-0.09***	-0.11***	0.04	0.03
	(0.04)	(0.04)	(0.08)	(0.08)	(0.03)	(0.03)	(0.08)	(0.08)
GEC treatment	-0.07	-0.05	0.14*	0.14**	-0.02	-0.04	-0.12**	-0.11*
	(0.06)	(0.05)	(0.07)	(0.06)	(0.09)	(0.07)	(0.05)	(0.06)
GEC x Gift	0.18***	0.20***	-0.27***	-0.30***	-0.05	-0.06	0.11***	0.10***
	(0.04)	(0.04)	(0.06)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes	No	Yes
Constant	0.46***	0.02	0.46***	1.17***	0.52***	0.53***	0.22**	0.27
	(0.07)	(0.11)	(0.08)	(0.14)	(0.08)	(0.14)	(0.10)	(0.20)
Panel b: Wald tests against BASE								
GE+GE x Gift vs. BASE	0.04	0.07	-0.10	-0.10	0.03	-0.03	0.01	0.01
	(0.07)	(0.06)	(0.09)	(0.09)	(0.08)	(0.06)	(0.08)	(0.09)
GEC+GEC x Gift vs. BASE	0.11	0.15***	-0.16**	-0.16**	-0.07	-0.10	-0.02	-0.01
	(0.07)	(0.06)	(0.07)	(0.07)	(0.09)	(0.06)	(0.06)	(0.07)
# Observations	1,351	1,351	717	717	1,028	1,028	311	311

Notes: Random effects panel regressions for all kinds of consumer-friendly behavior (columns 1 and 2), undertreatment (columns 3 and 4), overcharging (columns 5 and 6) and undercharging (columns 7 and 8). The variable Gift equals to one if the consumer transfers a gift in period t, zero otherwise. All specifications include period fixed effects. In columns (2), (4), (6) and (8), we control for posted prices. Robust standard errors clustered at the matching group level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

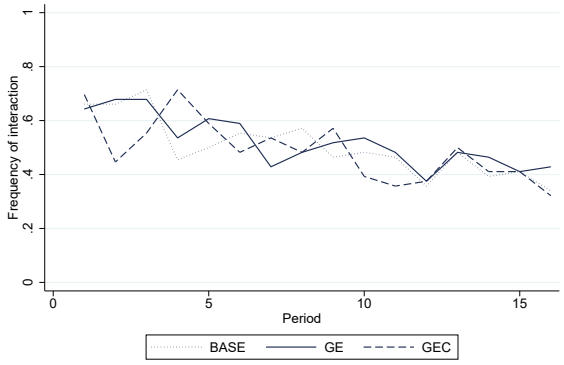
at the level of matching groups in parentheses. Coefficient estimates for the interaction term $GE \times Gift$ (panel a) are highly statistically significant for consumer-friendly behavior, suggesting a significant decline in undertreatment and overcharging. However, results for Wald tests (panel b) show small and statistically insignificant difference relative to BASE.[22] Therefore, Hypotheses 1a is only partially confirmed.

Interestingly, results for gifting in the GEC treatment tend to suggest larger effects on reciprocal behavior of expert-sellers, which goes against Hypothesis 1b. First, the proportion of consumer-friendly behavior (all kinds) increases from 26.7% to 45.7% percent of all interactions, a difference of 19 percentage points (WSR, p.value=0.043). This large difference is driven by a reduction of undertreatment by 25.2 percentage points (WSR, p.value=0.035) and

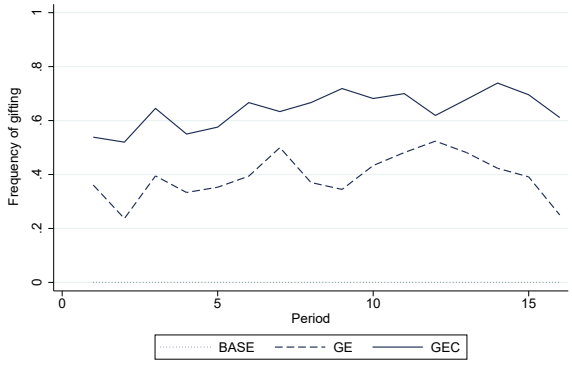
[22] Note that we do not find evidence that consumer-friendly behavior differs across treatments on average (i.e., without conditioning on gifting behavior). See Appendix A, Table A1, for regression results documenting average treatment effects.

Figure 5: Dynamics of interactions and gifting across treatments

(a) Interactions rate



(b) Gifting rate



Notes: Per period frequency of interactions between consumers and expert-sellers (panel a) and of gifting conditional on interaction (panel b).

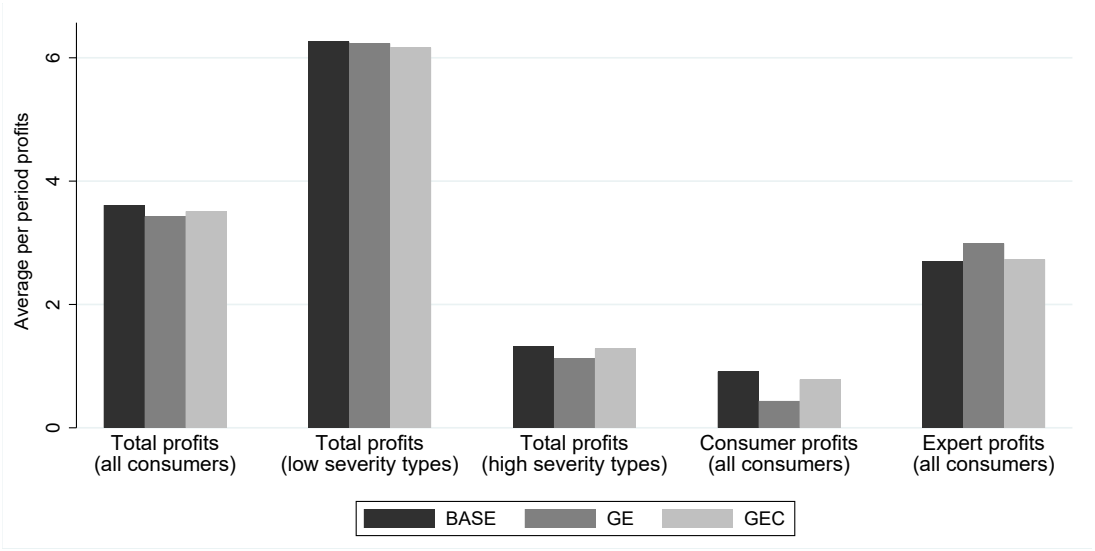
an increase of undercharging by 9.7 percentage points (WSR, p.value=0.063). These results are confirmed by regression results in Table 2, which further show highly statistically significant impacts of gifting on consumer-friendly behavior (all kinds) and undertreatment relative to BASE. Therefore, Hypothesis 2 about the largest impact of gifts on undertreatment is largely corroborated for conditional gifts.

In Figure 5, panel b, we report the rate of interactions across periods for BASE, GE and GEC treatments. It shows that the pattern of interaction is the same across treatments, with a slight negative time trend, and suggests that, contrary to Hypothesis 3a, the possibility to gift does not increase interactions. In panel b, we report the proportion of gifting (conditional on interaction), showing that it is significantly higher in GEC relative to GE (MWU, p.value = 0.014). A positive fraction of gifting consumers supports Hypothesis 3b. A higher fraction of gifting in GEC than in GE suggests that lower expected cost of conditional gifts plays a more important role as compared to reciprocity motives.

4.2 Profits and market efficiency

In Figure 6, we report average per-period profits across treatments for all interactions and types of consumers, conditioning on whether the consumer needs q_l (low severity type) or q_h (high

Figure 6: Per period profits across treatments



Notes: Average per period results for the sum of consumers' and expert-sellers' profits (market efficiency) reported across severity types, and profits consumers and expert-sellers reported for all consumer types. Averages are computed over periods 1 to 16 and conditioned on treatments baseline (BASE), gift exchange (GE) and gift exchange conditional on sufficient quality provision (GEC).

severity type). The sum of profits for consumers and expert-sellers is a measure of market efficiency, and in the bars on the right of the figure we also report profits separately for consumers and expert-sellers. Given the possibility to undertreat when consumers need q_h, total profits are significantly lower when the consumer is of the high-severity type. However, results across treatments suggest that the option to gift does not markedly increase market efficiency.

For consumers, we find that average profits in the GE treatment are on average lower as compared to BASE (MWU, p.value = 0.027). Conversely, average profits earned by expert-sellers in the GE treatment are higher in GE relative to BASE, although the difference is only marginally statistically significant (MWU, p.value = 0.104). These differences are confirmed by corresponding regression results reported in Appendix A, Table A2. By contrast, there is no statistically significant difference between profits in GEC and BASE.

The impact of gifting on profits is documented in Tables 3 and 4 for consumers and expert-sellers, respectively. In each table, we report results for equation (3) with per-period profits as the outcome variable, and estimate the impact of gifting for all consumers (both severity types q_l and q_h) in columns (1) and (2), as well as conditional on the consumer needing q_l (columns 3

Table 3: Random effects regressions for consumers' profits

	All consumers		Consumer needs q_l		Consumer needs q_h	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel a: coefficient estimates						
GE treatment	-0.72*	-0.66	-0.33	-0.26	-0.91	-0.90
	(0.42)	(0.45)	(0.25)	(0.16)	(0.75)	(0.75)
GE x Gift	-0.23	-0.29	-0.34*	-0.65***	0.98	0.99
	(0.54)	(0.56)	(0.20)	(0.13)	(0.80)	(0.80)
GEC treatment	-1.22***	-1.22***	0.16	0.06	-1.30**	-1.27**
	(0.46)	(0.45)	(0.33)	(0.24)	(0.60)	(0.59)
GEC x Gift	1.62***	1.54***	-0.62***	-0.73***	2.43***	2.43***
	(0.45)	(0.47)	(0.23)	(0.15)	(0.38)	(0.39)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes
Constant	0.96**	3.38***	3.55***	9.76***	-1.26*	-1.61
	(0.48)	(0.98)	(0.38)	(0.39)	(0.76)	(1.41)
Panel b: Wald tests against BASE						
GE+GE x Gift vs. BASE	-0.96*	-0.95*	-0.67**	-0.91***	0.07	0.09
	(0.53)	(0.56)	(0.31)	(0.20)	(0.94)	(0.95)
GEC+GEC x Gift vs. BASE	0.40	0.33	-0.46*	-0.67***	1.13*	1.16*
	(0.41)	(0.41)	(0.27)	(0.19)	(0.67)	(0.65)
# Observations	1,351	1,351	634	634	717	717

Notes: Random effects panel regressions for consumers' profits in columns (1) and (2), consumers' profits conditional on the consumer needing q_h in columns (3) and (4), and consumers' profits conditional on the consumer needing q_l in columns (5) and (6). The variable Gift equals to one if the consumer transfers a gift in period t, zero otherwise. All specifications include period fixed effects. In columns (2), (4), and (6), we control for posted prices. Robust standard errors clustered at the matching group level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

and 4) or q_h (columns 5 and 6). All specifications include period fixed effects and columns (2), (4), and (6) further include posted prices as control variables. In Panel (a) we report coefficient estimates for the regressions and in panel (b) we provide results for Wald tests for the impact of gifts on profits as compared to BASE. Standard errors clustered at the matching group level are reported in parentheses.

Results for the GE treatment suggest that consumers who need q_l and transfer a gift to expert-sellers (Table 3, columns 3 and 4) earn significantly lower profits relative to no gift (panel a) and relative to BASE (panel b). On average, regardless of the severity of the problem, consumers who send an unconditional gift lose approximately one unit relative to BASE, as shown by the (marginally significant) result for *GE+GE x Gift vs. BASE* in panel (b) of Table 3, columns 1 and 2. This corresponds to the size of the gift. By contrast, expert-sellers who receive a gift earn

Table 4: Random effects regressions for expert-sellers' profits

	All consumers		Consumer needs q_l		Consumer needs q_h	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel a: coefficient estimates						
GE treatment	0.42**	0.35	0.28	0.23	0.56**	0.46
	(0.18)	(0.21)	(0.26)	(0.23)	(0.24)	(0.31)
GE x Gift	0.21	0.34*	0.36	0.66***	0.03	0.05
	(0.22)	(0.20)	(0.30)	(0.22)	(0.36)	(0.35)
GEC treatment	0.19	0.22	0.00	0.10	0.45*	0.44*
	(0.24)	(0.25)	(0.32)	(0.27)	(0.24)	(0.26)
GEC x Gift	-0.07	0.10	0.57***	0.69***	-0.82***	-0.67***
	(0.14)	(0.14)	(0.22)	(0.18)	(0.13)	(0.14)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes
Constant	3.30***	-1.24***	4.10***	-1.55***	2.49***	-1.20**
	(0.26)	(0.48)	(0.37)	(0.45)	(0.33)	(0.60)
Panel b: Wald tests against BASE						
GE+GE x Gift vs. BASE	0.63**	0.69**	0.64	0.89***	0.58	0.51
	(0.26)	(0.27)	(0.40)	(0.31)	(0.38)	(0.41)
GEC+GEC x Gift vs. BASE	0.12	0.32	0.58*	0.79***	-0.37*	-0.23
	(0.25)	(0.25)	(0.31)	(0.29)	(0.22)	(0.25)
# Observations	1,351	1,351	634	634	717	717

Notes: Random effects panel regressions for expert-seller profits in columns (1) and (2), expert-seller profits conditional on the consumer needing q_h in columns (3) and (4), and expert-seller profits conditional on the consumer needing q_l in columns (5) and (6). The variable Gift equals to one if the consumer transfers a gift in period t, zero otherwise. All specifications include period fixed effects. In columns (2), (4), and (6), we control for posted prices. Robust standard errors clustered at the matching group level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

higher profits relative to BASE, as shown in panel (b) of Table 4, columns 1 and 2.

Results for the GEC treatment instead reveal that consumers tend to benefit from transferring a gift, especially so when they need q_h. As shown in Table 3, columns (5) and (6), this is true both relative to no gift (panel a) and relative to BASE (panel b), although the latter effect is only statistically significant at 10%. This is consistent with the relatively large impact of conditional gifts on the rate of undertreatment (Table 2), which changes the payoff of consumers who need q_h by $v = 10$. For consumers who need q_l (columns 3 and 4), transferring a conditional gift tends to reduce profits both relative to no gift (panel a) and relative to BASE (panel b). On average across severity types (columns 1 and 2), a conditional gift still implies higher profits relative to no gift, but not relative to BASE as the effects for q_l and q_h cancel out.

Results for expert-sellers are largely symmetrical, as shown in Table 4. In particular, con-

ditional gifts are associated with higher expert-sellers' profits when the consumer needs q_l (columns 3 and 4), and lower profits when q_h is needed (columns 5 and 6). This is true both within treatment (panel a) and as compared to BASE (panel b), although statistical significance of the latter effects is weaker. Overall, across consumer types, these effects cancel each other, so that the effect of conditional gifts on expert-sellers' profits is small and not statistically significantly different from zero.

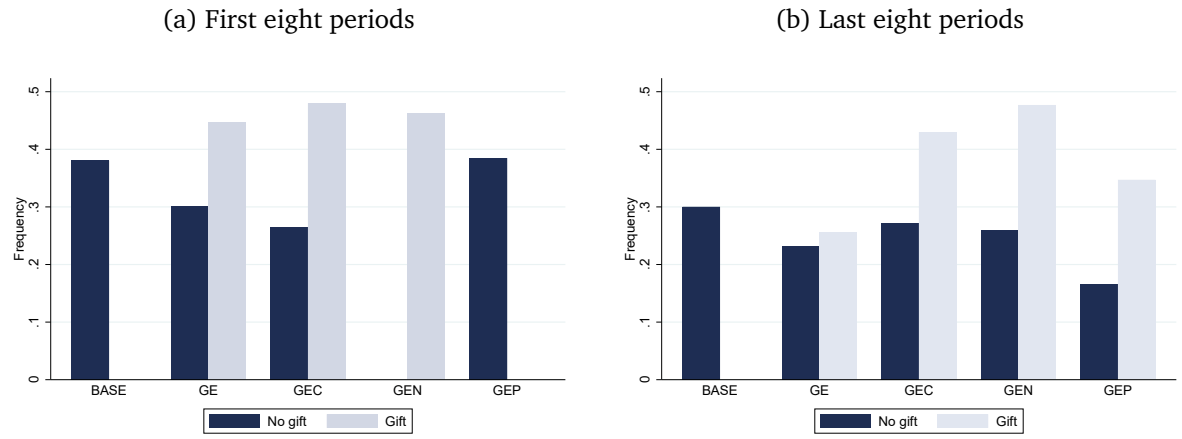
We conclude that gift exchange does not improve overall market efficiency as postulated by Hypothesis 4. However, while unconditional gifts tend to harm consumers' profits, unconditional gifts benefits those with a severe problem, with no average effect across consumers' types.

4.3 First eight periods vs. last eight periods: surprise gift exchange

Figure 7 reports the share of periods with consumers-friendly actions (all kinds) by expert-sellers across treatments, with results for the first eight periods in panel (a) and the last eight periods in panel (b). For each treatment, we further condition the results on whether a gift is transferred by the consumer. Recall that gifting is never possible in the BASE treatment, whereas in GEP it is also not possible to gift in the first eight periods, and in GEN one point is transferred in all interactions of the first eight periods. In the last eight periods, in GEN and GEP consumers can choose to transfer unconditional gifts, which is similar to the GE treatment.

In the first eight periods, gifts transferred in GE and GEC are associated with a comparable share consumer-friendly actions (respectively 44.7% and 48%; RRO, p.value=0.891). In the last eight periods, gifting in the GE treatment is associated with a lower share of consumer-friendly interactions compared to GEC (25.6% vs. 42.3%; RRO, p.value=0.020). The decline in the effect of gifting between the first and last eight periods is statistically significant in GE (44.7% vs 25.6%; RRO, p.value=0.005) but not in GEC (48% vs. 42.3%; RRO, p.value=0.473), suggesting that the effect of conditional gifts in GEC is more stable over time than the effect of unconditional gifts in GE. One implication is that partial alignment of incentives may secure similar levels of reciprocity triggered by unconditional gifts for early market interactions and circumvent expert-sellers' tendency to exploit consumers as the total number of interactions increases.

Figure 7: Consumer-friendly behavior in first eight vs. last eight periods



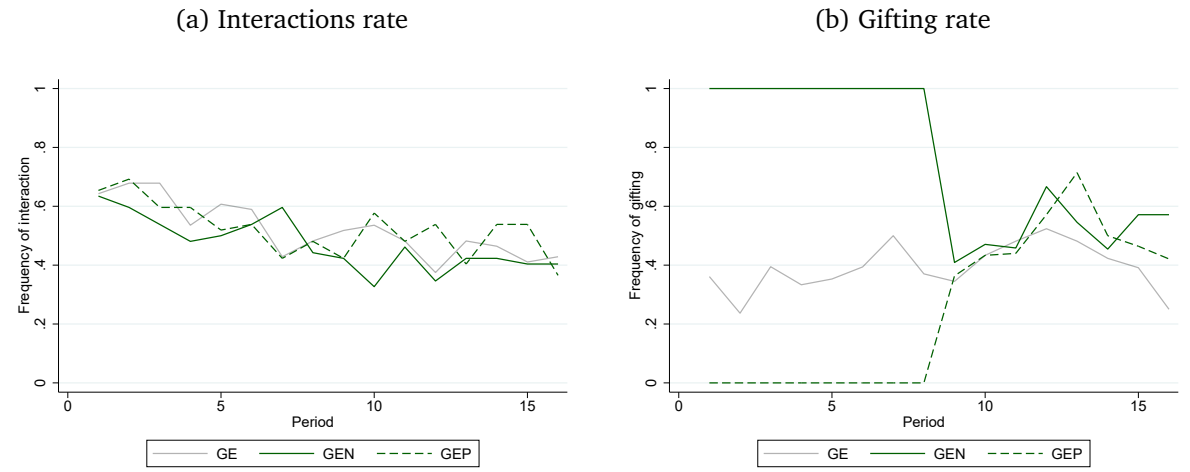
Notes: Frequency of consumer-friendly behavior by expert-sellers across treatment conditional on gifting. Panel (a) reports results for the first eight periods and panel (b) for the last eight periods.

To study the effect of a surprise introduction of gift exchange, we compare the first and the second half of the experiment in GEN and GEP treatments respectively. Starting with GEN, the decision to gift in the last eight periods sustains the same level of reciprocity from expert-sellers observed in the GEN during the first eight periods (46.2% vs. 47.7%; RRO, p.value = 0.671). When consumers instead decide to withhold the gift, this results in a significant decline in the share of consumer-friendly actions as compared to the first eight periods (46.2% vs. 25.9%; RRO, p.value = 0.022). This finding supports Hypothesis 5a.

In GEP, expert-sellers never receive a gift in the first eight periods, and in the second eight periods the decision by consumers to gift does not increase the share of consumer-friendly actions (38.5% vs. 34.7%; RRO, p.value = 0.768). This finding suggests that consumers fail to positively surprise expert-sellers who never received the gifts before, a finding that is in line with DellaVigna et al. (2022). We therefore find no support for Hypothesis 5b.

Despite these differences, the frequency of interactions between consumers and expert-sellers are very similar across GEN and GEP treatments. This is shown in Figure 8, panel (a), which provides interaction rates for GEN and GEP together with GE treatment as a benchmark. Non-parametric tests do not show any statistically significant differences across treatments. Similarly, while the first eight periods imply a gifting rate of one in GEN and zero in GEP, panel (b)

Figure 8: Dynamics of interactions and gift for GEN and GEP



Notes: Per period frequency of interactions between consumers and expert-sellers (panel a) and of gifting conditional on interaction (panel b).

of Figure 8 show that the gifting rate in both treatments immediately converge to the level observed in GE from period nine onward. There is again no statistically significant difference across treatments.

We finish this section with a brief analysis of efficiency in markets with surprise gift exchange. Specifically, Table 5 documents the role of gifting in GEN and GEP treatments in the last eight periods, focusing on total profits (market efficiency) relative to BASE. In panel (a) we report regression estimates for equation (3) with data for all consumers (both severity types q_l and q_h) in columns (1) and (2), conditional on the consumer needing q_l (columns 3 and 4) or q_h (columns 5 and 6). All specifications include period fixed effects and columns (2), (4) and (6) further include posted prices as control variables. Panel (b) provides the corresponding Wald tests for gifting in GEN and GEP relative to BASE and for a comparison between GEN and GEP.

Results for market efficiency largely follow the observations on consumer-friendly behavior. For low-severity consumers (columns 3 and 4), gifting has no significant impact on efficiency in both GEN and GEP. When consumers need q_h and large efficiency losses might occur because of undertreatment (columns 5 and 6), gifting in GEN has a positive impact on market efficiency. This effect holds relative to no gift (panel a) and BASE (panel b). By contrast, gifting has no effect in the GEP treatment. Interestingly, we observe marginally significant evidence that the

Table 5: Random effects regressions for total profits (market efficiency) in the last eight periods

	All consumers		Consumer needs q_l		Consumer needs q_h	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel a: coefficient estimates						
GEN treatment	-0.34	-0.39	0.12	0.13	-0.36	-0.22
	(0.69)	(0.60)	(0.18)	(0.18)	(0.80)	(0.65)
GEN x Gift	0.74	0.85	-0.43	-0.45	1.26*	1.36**
	(0.80)	(0.71)	(0.36)	(0.35)	(0.71)	(0.60)
GEP treatment	-0.56	-0.78	0.10	0.14	-0.66	-0.94*
	(0.60)	(0.59)	(0.12)	(0.14)	(0.63)	(0.55)
GEP x Gift	0.59	0.76	-0.14	-0.17	0.79	1.01
	(0.67)	(0.69)	(0.11)	(0.11)	(0.67)	(0.70)
Controls:						
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes
Constant	3.35***	-0.55	7.56***	7.79***	0.07	-6.07***
	(0.49)	(1.39)	(0.22)	(0.30)	(0.41)	(1.14)
Panel b: Wald tests against BASE						
GEN+GEN x Gift vs. BASE	0.40	0.46	-0.31	-0.32	0.91	1.14***
	(0.58)	(0.51)	(0.28)	(0.28)	(0.61)	(0.36)
GEP+GEP x Gift vs. BASE	0.04	-0.02	-0.03	-0.04	0.13	0.07
	(0.53)	(0.53)	(0.19)	(0.19)	(0.62)	(0.54)
GEN+GEN x Gift vs. GEP+GEP x Gift	0.36	0.48	-0.27	-0.28	0.78	1.06*
	(0.68)	(0.60)	(0.28)	(0.28)	(0.76)	(0.58)
# Observations	558	558	282	282	276	276

Notes: Random effects panel regressions for total profits (columns 1 and 2) and total profits conditional on consumers needing q_l (columns 3 and 4) or q_h (columns 5 and 6). The variable Gift equals to one if the consumer transfers a gift in period t, zero otherwise. All specifications include period fixed effects. In columns (2), (4) and (6) we control for posted prices. Robust standard errors clustered at the matching group level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

impact of a gift is larger in GEP relative to GEN (panel b, GEN+GEN x Gift vs. GEP+GEP x Gift). This is in line with the discussion of reference points associated Hypotheses 5a and 5b, and could suggest that gifting in markets where expert-sellers hold a high reference (e.g., in societies where expert-sellers are used to receive gifts, as in Currie et al., 2013) might be beneficial, at least for consumers facing a high-severity problem.

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 gifts triggers more consumer-friendly behavior by expert-sellers, as the rate of undertreatment declines relative to no gift, and some evidence that overcharging declines (for unconditional gifts) and undercharging increases (for conditional gifts). Contrary to our expectations, conditional gifts outperform unconditional gifts in triggering consumer-friendly behavior by expert-sellers. One possible interpretation of this finding is that conditioning the gift on sufficient treatment reduces the opportunity cost of reciprocity, and thereby outweigh the fact that conditional gifts are perceived as less kind.

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 increases when high-severity consumer send a conditional gift to expert-sellers. Because interaction rates remain at around 50% and consumers need q_h in only 50 percent of the cases, in our experiment 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.

Finally, our work explores the effect of surprise gift exchange in markets where expert-sellers are either used to receive (exogenous) gifts or not. Our results suggest that withholding a gift from expert-sellers who experienced the gifts in the past significantly dampens consumer-friendly behavior, whereas sending a gift to expert-sellers who did not receive gifts previously leaves the level of reciprocity unaffected. While these results bear some relation to existing evidence from the field, one important limitation of our design is that the manipulation of reference payoffs for expert-seller is achieved through a sequence of exogenous transfers carried

out during the first half of the experiment. Future research could investigate how alternative manipulations triggering a shift in reference points (e.g., prior exposure to endogenous gifting by consumers) affect the reciprocity and resulting efficiency in credence goods markets.

Acknowledgments

We thank Jordi Brandts, Marco Casari, Winand Emons, Timo Goeschl, Holger Herz, Ting Liu, François Maréchal, Wanda Mimra, John Moore, Klaus Schmidt, Marco Schwarz, Octavian Strimbu, Jörgen Weibull and Christian Zehnder, as well as participants in the 6th CUSO workshop in Experimental Research, 2020 conference of the Society for the Advancement of Behavioral Economics, and Webinar Series on Credence Goods and Expert Markets for useful comments and discussions. We also thank the authors of Dulleck et al. (2011) for sharing the instructions for the experiment. This study is registered in the AEA RCT Registry under identification number AEARCTR-0004213 and was reviewed by the Ethics Commission of the University of Neuchâtel (#30-2018-8). Financial support from the Swiss National Science Foundation under grant PYAPP1_173650 is gratefully acknowledged. Any errors are ours.

Appendix A Regression results for average treatment effects

Table A1: Random effects regressions for consumer-friendly behavior (average treatment effects)

	Consumer-friendly=1		Undertreatment=1		Overcharging=1		Undercharging=1	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GE treatment	-0.04	-0.02	-0.01	0.01	0.09	0.05	-0.01	-0.01
	(0.06)	(0.05)	(0.09)	(0.07)	(0.07)	(0.06)	(0.06)	(0.07)
GEC treatment	0.04	0.07	-0.02	-0.03	-0.05	-0.08	-0.04	-0.04
	(0.07)	(0.06)	(0.08)	(0.07)	(0.08)	(0.06)	(0.06)	(0.07)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes	No	Yes
Constant	0.45***	0.06	0.47***	1.11***	0.53***	0.50***	0.22**	0.30
	(0.07)	(0.11)	(0.08)	(0.15)	(0.08)	(0.14)	(0.10)	(0.20)
# Observations	1,351	1,351	717	717	1,028	1,028	311	311

Notes: Random effects panel regressions for consumer friendly behavior (columns 1 and 2), undertreatment (columns 3 and 4), overcharging (column 5 and 6) and undercharging (columns 7 and 8). The variable Gift equals to one if the consumer transfers a gift in period t, zero otherwise. All specifications include period fixed effects. In columns 2, 4, 6 and 8, we control for prices. Robust standard errors clustered at the matching group level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

Table A2: Random effects regressions for profits and market efficiency

	Consumers		Experts		Total	
	(1)	(2)	(3)	(4)	(5)	(6)
GE treatment	-0.81**	-0.77*	0.50***	0.48**	-0.34	-0.32
	(0.38)	(0.42)	(0.18)	(0.21)	(0.34)	(0.33)
GEC treatment	-0.21	-0.25	0.14	0.28	-0.10	-0.01
	(0.38)	(0.37)	(0.24)	(0.24)	(0.32)	(0.31)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Prices	No	Yes	No	Yes	No	Yes
Constant	0.92*	3.48***	3.30***	-1.17**	4.24***	1.99**
	(0.48)	(0.99)	(0.26)	(0.47)	(0.38)	(0.83)
# Observations	1,351	1,351	1,351	1,351	1,351	1,351

Notes: Random effects panel regressions for total profits (market efficiency), columns 1-2, conditional on consumers needing q_h, columns 3-4, or q_l, columns 5-6. All specifications include period fixed effects. In columns 2, 4, and 6, we control for prices. Robust standard errors clustered at the matching group level reported in parentheses. *, ** and *** denote statistical significance at 10%, 5% and 1% respectively.

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