University of Innsbruck

How social preferences shape incentives in (experimental) markets for credence goods

Rudolf Kerschbamer, Matthias Sutter, Uwe Dulleck

Working Papers in Economics and Statistics

2015-03

Research Platform eeecon
Empirical and Experimental Economics
University of Innsbruck
http://eeecon.uibk.ac.at/

University of Innsbruck
Working Papers in Economics and Statistics

The series is jointly edited and published by

- Department of Banking and Finance
- Department of Economics
- Department of Public Finance
- Department of Statistics

Contact address of the editor:
Research platform "Empirical and Experimental Economics"
University of Innsbruck
Universitaetsstrasse 15
A-6020 Innsbruck
Austria
Tel: + 43 512 507 7171
Fax: + 43 512 507 2970
E-mail: eeecon@uibk.ac.at

The most recent version of all working papers can be downloaded at
http://eeecon.uibk.ac.at/wopec/

For a list of recent papers see the backpages of this paper.

How Social Preferences Shape Incentives in (Experimental) Markets for Credence Goods

Rudolf Kerschbamer, Matthias Sutter and Uwe Dulleck*

This Version: February 2015

Abstract

Credence goods markets suffer from inefficiencies caused by superior information of sellers about the surplus-maximizing quality. While standard theory predicts that equal mark-up prices solve the credence goods problem if customers can verify the quality received, experimental evidence indicates the opposite. We identify a lack of robustness with respect to heterogeneity in social preferences as a possible cause of this and conduct new experiments that allow for parsimonious identification of sellers' social preference types. Our results indicate that less than a fourth of the subjects behave in accordance with the standard assumption on preferences, the rest behaving either in line with other forms of selfish or in accordance with different variants of non-selfish social preferences. We discuss consequences of our findings for institutional design and agent selection.

JEL Classifications: C72, C91, D82

Keywords: Credence Goods, Expert Services, Social Preferences, Distributional Preferences, Other-Regarding Preferences, Behavioral Economics, Experimental Economics

*Kerschbamer: Department of Economics, University of Innsbruck (e-mail: rudolf.kerschbamer@uibk.ac.at). Sutter: Department of Economics, University of Cologne; and Department of Public Finance, University of Innsbruck (e-mail: matthias.sutter@uni-koeln.de). Dulleck: School of Economics and Finance, Queensland University of Technology (e-mail: uwe.dulleck@qut.edu.au).

Acknowledgements: We are indebted to the editor, Martin Cripps, and two anonymous referees for their excellent comments which helped a lot to improve the paper. Financial support from the Austrian Science Fund (FWF; grant numbers P20796 and P22669), the Austrian Central Bank (OeNB Anniversary Fund; grant number 13602) and the Australian Research Council (ARC; grant number DP110103653) is gratefully acknowledged. Part of this research was conducted while the first author was visiting the Queensland University of Technology and he thanks its School of Economics and Finance for its great hospitality.

1 Introduction

A central topic in the field of information economics is the design of institutions or contracts that mitigate market inefficiencies resulting from the presence of asymmetric information. Almost all contributions to the literature build on the assumption of common knowledge that agents are rational own-money maximizers who behave as desired when kept indifferent in own-money terms – see Bolton and Dewatripont (2005) for a textbook coverage of this approach. In this paper we argue that while this assumption is harmless in some applications – because it results in institutions that are almost optimal if preferences are almost as assumed – it is misleading in others.

Specifically, we study markets for credence goods where inefficiencies result from superior information of sellers about the optimal quality for consumers. In such markets, standard theory predicts that equal-mark-up prices solve the problem if customers can verify the quality received (Dulleck and Kerschbamer, 2006). However, this prediction is refuted by existing experimental evidence which indicates that markets with verifiability perform no better than markets without (Dulleck *et al.*, 2011). We identify a lack of robustness of institutional design with respect to heterogeneity in social preferences as a possible cause. By social preferences we mean that subjects may not only care for their own material payoff, but may consider the payoffs of others as well, when making decisions.

To provide support for our explanation for the failure of verifiability to increase efficiency, we design a simple and intuitive test that allows for parsimonious identification of a seller's social preference type. The results obtained in an implementation of the test indicate that less than a fourth of the experimental sellers behave in accordance with the standard assumption on preferences. The rest behave either in line with other forms of selfish preferences or in accordance with different variants of non-selfish social preferences. Taken together our experimental findings provide strong support for heterogeneity in social preferences and for our explanation of the failure of verifiability to increase efficiency. Based on this observation, we argue that future research should search for an institutional design that is robust against preference heterogeneity. Such research seems especially important for markets for credence goods where inefficient institutions potentially cause huge economic costs.[1]

[1] Economically important credence goods markets include the market for medical care

The next subsection describes the main problems emerging from the asymmetric information in markets for credence goods and explains how verifiability helps to solve them in theory. Subsection 1.2 summarizes the experimental evidence showing that verifiability fails empirically and sketches our explanation for the failure.

1.1 Credence Goods Markets, Informational Asymmetries, and the Role of Verifiability

Credence goods markets are characterized by informational asymmetries between expert sellers and customers because customers are unable to identify the quality they need, whereas expert sellers are able to do so (Darby and Karni, 1973). Typical examples include (i) health care services, where the doctor is better informed than the patient on the disease the latter has and on the treatment he needs; (ii) car repair services, where the mechanic knows more about the type of service the vehicle needs than the owner; and (iii) taxicab rides in an unknown city, where the driver is better informed about the shortest route to the destination than the tourist. A second informational problem in markets for credence goods arises when the customer is unable to observe and verify the quality of service he has received. For example, in the market for medical treatments a patient might be unable to distinguish a cheap from an expensive drug infusion. In the car repair market the owner might be unable to observe whether a broken part has been repaired or replaced.

The informational asymmetries on credence goods markets may cause a variety of problems and inefficiencies. Expert sellers may provide unnecessarily high quality (a case referred to as "overtreatment"), or insufficiently low quality ("undertreatment"), or they may charge for a higher quality than provided ("overcharging"). Such cases are not only a theoretical possibility, but are well documented in the literature. Empirical evidence for considerable market inefficiencies is available, among others, for the health care sector (see, e.g. Hughes and Yule, 1992, Gruber and Owings, 1996, Gruber

and that for car repair services. For the former the data in the WHO World Health Statistics (2009) indicates that health care expenditures account for approximately 15% of GDP in the U.S. and are still rising. For the latter the online site researchandmarkets.com reports annual revenues of about $ 90 billion for the U.S. auto repair industry, of which 70% originate from mechanical repair.

et al., 1999, or Iizuka, 2007), for car repairs (e.g., Wolinsky, 1993, Hubbard, 1998, or Schneider, 2012), and for taxi rides (c.f. Balafoutas et al., 2013).

An important finding in the theoretical literature is that verifiability ensures efficiency on markets for credence goods.[2] Verifiability applies if consumers are able to observe and verify the quality they receive, so that expert sellers cannot charge for a quality that has not been provided. If verifiability applies, experts are predicted to choose equal-mark-up prices. With such prices an expert earns the same profit independently of the quality she provides. Thus, under the mentioned standard assumption on preferences, such prices induce the expert to provide the appropriate quality of the credence good. As a consequence, consumers – inferring experts' incentives from posted prices – are predicted to interact and the market is predicted to reach the maximal level of efficiency.

1.2 The Limits of Verifiability and a Potential Explanation for Its Failure

Experimental data in Dulleck *et al.* (2011) indicate that – contrary to theoretical prediction – verifiability fails to promote efficiency on credence goods markets. Indeed, the relative frequencies of market interaction, undertreatment and overtreatment do not differ significantly between two experimental treatments that are identical except that verifiability applies in one, but not in the other. The observed aggregate performance in both treatments is better in terms of efficiency than the standard prediction for a market without verifiability, but considerably worse than the prediction for a market with verifiability. These findings raise two questions whose answers are important for the understanding of – and the optimal design of institutions for – credence goods markets: Why is the performance of credence goods markets so poor in the presence of verifiability when all theoretical approaches predict verifiability to ensure efficiency? And why do markets without verifiability perform so much better than predicted?

In this paper, we argue that heterogeneity in the social preferences of credence goods sellers can provide an answer to both questions. Key to our argument are the following two observations: First, the standard solution

[2] See Emons (1997, 2001), Pesendorfer and Wolinsky (2003), Alger and Salanié (2006), and Dulleck and Kerschbamer (2009) for research articles on the role of verifiability and Dulleck and Kerschbamer (2006) for a unifying model and a survey of the literature.

to the credence goods problem for the case where the quality of the good is verifiable – equal-mark-up prices – is robust against the presence of sellers with pro-social other-regarding preferences, but non-robust against the presence of sellers with anti-social other-regarding concerns. By pro-social (anti-social) other-regarding preferences we mean a willingness to give up own material payoff to increase (decrease) the material payoff of the trading partner. Second, for the prediction for markets without verifiability the opposite is true – it is robust against the presence of sellers with anti-social other-regarding preferences, but non-robust against the presence of sellers with pro-social other-regarding concerns.

A key ingredient in our explanation in the previous paragraph is heterogeneity in social preferences in the (experimental) seller population. To provide support for heterogeneity we design new experiments intended to identify a seller's social preferences from her provision behavior. Our main theoretical innovation is the construction of a simple and intuitive test that allows us to identify a seller's social preference type without making any structural assumption on sellers' utility or motivation function. This distinguishes our approach from most of the rest of the literature on identification of type and intensity of social preferences, which uses identification procedures that rely on strong structural assumptions regarding the form of the utility or motivational function.[3,4]

We then implement our test for social preferences in new credence goods markets experiments. Our main findings are that (i) only a minority (of less than a fourth) of subjects behave according to the standard assumption of lexicographic maximization of first the own and then the other's material payoff; (ii) the behavior of a sizeable minority of subjects is consistent with other forms of selfish preferences; (iii) the behavior of a large majority of sellers is consistent with either a taste for efficiency (in the spirit of Andreoni and Miller, 2002, or Charness and Rabin, 2002) or inequality aversion (in the

[3] Typical assumptions made in the economic literature on social preferences are *linearity* (the ring-test – employed by Offerman *et al.*, 1996, and Brandts *et al.*, 2009, among others – is based on the assumption of linear preferences), *piecewise linearity* (the identification procedures employed by Cabrales *et al.*, 2010, Blanco *et al.*, 2011, and Iriberri and Rey-Biel, 2013 are based on a piecewise linear model of social preferences), or *specific forms of convexity* (Andreoni and Miller, 2002, and Fisman *et al.,* 2007 check consistency with – and estimate parameters of – standard or modified CES utility functions).

[4] An exception is Kerschbamer (2015) who develops a test for social preferences that shares many features with the one proposed here. We discuss the relationship further in Section 3.

tradition of Fehr and Schmidt, 1999, or Bolton and Ockenfels, 2000); and (iv) a minority of subjects behaves spitefully or competitive (à la Levine, 1998, or Charness and Rabin, 2002). Hence, our empirical findings provide strong support for heterogeneity in social preferences and therewith for our explanation for the surprisingly low level of efficiency on credence goods markets in the presence of – and the surprisingly high efficiency level in the absence of – verifiability.

The remainder of the paper is organized as follows. Section 2 first introduces a simple model of a credence goods market, then presents predictions based on standard assumptions and finally reports the results from two experimental treatments in Dulleck *et al.* (2011). Section 3 presents our explanation for the low level of efficiency in credence goods markets in the presence and the high level of efficiency in the absence of verifiability in the data of Dulleck *et al.* (2011). Section 4 develops the test for identifying social preferences in a credence goods experiment and Section 5 presents the results from an implementation of the test. Section 6 concludes with a discussion of our results and their implications for institutional design and for agent selection.

2 Verifiability in Credence Goods Markets: Model, Standard Predictions and Experimental Evidence

2.1 Basic Model

Consumers are ex ante identical. They need a high quality, q^1, of a particular (credence) good with probability h, and a low quality, q^0, with probability $1-h$. Each consumer (he) is randomly matched with one seller (she) who sets prices p^1 and p^0 for the high, respectively low, quality (with $p^1 \geq p^0$). The seller has costs c^1 (c^0, respectively) for the high (low) quality, with $c^1 > c^0$.

The consumer only knows the prices for the different qualities, but not the quality he needs, when he makes his decision whether or not to interact with the seller. In case of interaction, the seller gets to know which quality the customer needs. Then she provides one of the two qualities and charges one of the two prices.

Customers in need of the low quality are sufficiently treated in either case, both if the seller chooses q^0 and if she chooses q^1. However, if the customer needs the high quality, then only q^1 is sufficient. A sufficient quality yields a value $v > 0$ for the customer, an insufficient quality yields a value of zero. If the customer decides against interaction then both, the customer and the seller, receive an outside option of $o \geq 0$. In case of an interaction, the monetary payoff for the consumer is the value from the quality received minus the price to be paid. The seller receives the monetary payoff of the price charged minus the costs of the quality provided. More formally, let $\theta \in \{0, 1\}$ be the index of a customer's need in terms of quality, $\mu \in \{0, 1\}$ the index of the quality provided, and $\kappa \in \{0, 1\}$ the index of the quality charged for. Then the material payoff of the seller under price-vector (p^0, p^1) is

$$\pi_s(p^0, p^1, \mu, \kappa) = p^\kappa - c^\mu, \tag{1}$$

while the customer receives

$$\pi_c(p^0, p^1, \theta, \mu, \kappa) = v - p^\kappa, \text{ if } \theta \leq \mu, \text{ and } -p^\kappa \text{ otherwise.} \tag{2}$$

<Insert FIGURE 1 about here>

Figure 1 presents this game. Note that this simple game captures all the idiosyncratic problems of credence goods markets discussed in the introduction. If a customer needs q^1 and the seller provides q^0, we have *undertreatment*; if the customer needs q^0 and the seller provides q^1, we have *overtreatment*; and if the seller charges p^1 when q^0 is provided, we have *overcharging.*

2.2 Experimental Design

In the following we introduce the experimental parameterization of the basic model used in Dulleck *et al.* (2011) which will also be used in our new experiments below.[5] We refer to two treatments in Dulleck *et al.* (2011), one

[5] Dulleck *et al.* (2013) address in a similar framework the question whether a seller's price-posting behavior is indicative of her intentions regarding provision and charging behavior. Huck *et al.* (2007, 2010, 2012) have interesting experiments on the effect of prices and opportunities to build up a reputation on the performance of markets for experience (rather than credence) goods.

without verifiability (treatment *N-Endo*), and one with verifiability (treatment *V-Endo*).[6] Treatment *N-Endo* corresponds to the game shown in Figure 1. Implementing verifiability means that consumers are able to observe and verify *ex post* the quality of the provided good (without knowing, however, whether this quality is the appropriate one). Therefore, in treatment *V-Endo* the last stage in Figure 1 is degenerate because the expert has to charge the price for the provided quality. Hence, with verifiability overcharging is precluded, while over- and undertreatment are still possible.

In both treatments the customer's probability of needing the high quality is $h = 0.5$, and the value of a sufficient quality is $v = 10$. The costs of providing the low, respectively high, quality are $c^0 = 2$, and $c^1 = 6$. The prices posted by the sellers, p^0 and p^1 (with $p^0 \leq p^1$), have to be chosen in integer numbers from the interval $\{1, ..., 11\}$. The outside option if no trade takes place between the seller and the customer is set to $o = 1.6$.

Matching groups of eight subjects each were implemented, with four subjects as customers and four subjects as sellers. Role assignment was random at the beginning and fixed for all 16 periods in the experiment. In order to prevent attempts to build up a reputation as a reliable seller, there was random re-matching of customers and sellers within each matching group after each period. All experimental sessions were run computerized using zTree (Fischbacher, 2007) and recruiting was done via ORSEE (Greiner, 2004). A total of 184 subjects participated in treatments *N-Endo* and *V-Endo*.

2.3 Standard Prediction for the Role of Verifiability

Prediction 1 (Standard Prediction for the Role of Verifiability) *Under the assumption that subjects have standard preferences, in treatment* N-Endo *no interaction will take place, yielding no efficiency gains in the market. By contrast, in treatment* V-Endo *the expert will post* $p^0 = 6$ *and* $p^1 = 10$ *and the consumer will choose to enter the market and he will get the*

[6] Dulleck *et al.* (2011) have a total of 16 experimental treatments (on the role of liability, verifiability, competition and reputation) of which we discuss only two here (and add two new ones). The main difference in experimental design between the new treatments and those in Dulleck *et al.* (2011) is our reliance on (carefully designed) exogenously given prices for different qualities of the good rather than letting sellers endogenously decide on prices. To emphasize this difference we refer to the treatments *B/N* and *B/V* in Dulleck *et al.* (2011) as treatments *N-Endo* and *V-Endo* here, while the new treatments have names ending in *-Exo.*

appropriate quality, yielding full efficiency in the market.

The following considerations lead to this prediction. Consider treatment *N-Endo* first. Under the standard assumption of common knowledge that all agents are rational, risk-neutral and exclusively interested in their own material payoff, the expert will always charge the higher price p^1 and always provide the cheaper quality q^0. Anticipating this, a consumer will then only accept if $p^1 \leq (1-h)v - o = 3.4$. But with such a p^1 the seller earns less than the value of her outside option (because $(1-h)v - c^0 < 2o$). Thus, no interaction is predicted for *N-Endo.* In treatment *V-Endo* the expert cannot charge for a quality other than the provided one, and the provided quality depends on the mark-up $p^{\mu} - c^{\mu}$, $\mu \in \{0,1\}$. An equal-mark-up price-vector is defined as one that satisfies $p^1 - c^1 = p^0 - c^0$. Under the mentioned standard assumption on preferences (that if indifferent in own-money terms the expert will provide in the best interest of the customer) an equal-mark-up price-vector is predicted to induce provision of appropriate quality. An undertreatment (overtreatment, respectively) price-vector satisfies $p^1 - c^1 < p^0 - c^0$ ($p^1 - c^1 > p^0 - c^0$, respectively) and is predicted to induce provision of low (high) quality independently of the customer's need.

Figure 2 shows in the space of price-vectors the set of equal-mark-up price-vectors as a straight line with slope 1. The set of undertreatment price-vectors is indicated as the dark area below the equal-mark-up line, and the set of overtreatment vectors is shown as the light area above the equal-mark-up line. Anticipating how an expert's provision behavior depends on the price-vector under which the transaction takes place, a consumer will accept an equal-mark-up vector iff $p^1 \leq 10$, an undertreatment vector iff $p^0 \leq 3$, and an overtreatment vector iff $p^1 \leq 8$. Thus, to maximize profits, the expert will post the equal-mark-up vector $(p^0, p^1) = (6, 10)$, which will be accepted by an own-money-maximizing, risk-neutral consumer.

<Insert FIGURE 2 about here>

2.4 Experimental Results of Dulleck *et al.* (2011)

Observation 1 (Experimental Results for the Role of Verifiability) *Compared to treatment* N-Endo*, verifiability has no significant impact on the frequency of interaction, the undertreatment rate, the overtreatment rate and* *overall efficiency. The overall performance in both treatments is better than the standard prediction for treatment* N-Endo*, but worse than the standard prediction for treatment* V-Endo*.*

Table 1, Figure 3 and Figure 4 support this observation, leading us to reject both parts of Prediction 1: Contrary to the prediction efficiency gains and interaction rates are not significantly different between the two treatments and they are significantly higher than 0 and significantly lower than 1 in both.

<Insert TABLES 1 and 2, as well as FIGURES 3 and 4 about here>

A possible explanation for the relatively high interaction rate and the relatively low undertreatment rate in *N-Endo* is experts having a taste for efficiency. Another possible explanation is that experts care for equitable payoffs. Support for the latter hypothesis comes from the analysis of price-posting behavior. Contrary to the theoretical prediction, equal-mark-up prices are very rare in *V-Endo*. They are chosen in less than 5% of all transactions. Table 2 reports the frequencies of the five most popular price-vectors posted by sellers in the two treatments. It is interesting to note that in treatment *V-Endo* only one equal-mark-up vector is among the top 5 price-vectors, but it is not the predicted one. In both treatments the price-vector $(6, 8)$ is by far the most frequently posted price-vector. If the seller always provided the appropriate quality and charged for it, then this price-vector would split the gains from trade equally between the consumer and the seller both when the consumer needs the low and when he needs the high quality. The prominence of this price-vector therefore suggests that a concern for relative payoffs plays a role for aggregate behavior in the experiment.

Of course, these observations provide only a rough indication that social preferences may shape sellers' behavior. In Section 4 we are going to develop a simple parsimonious test for social preferences within the framework of a credence goods market which is then implemented in new experiments in Section 5. Before doing so we argue (in Section 3) that heterogeneity in social preferences can explain why markets with verifiability perform worse than in the standard prediction and why markets without verifiability perform better.

3 Heterogeneity in Social Preferences and Robustness of Institutions

In this section we explain in more detail how heterogeneity in social preferences of sellers can explain the relatively bad performance of credence goods markets with verifiability and the relatively good performance of markets without verifiability. Our discussion here and in the next section relies on the assumption that (experimental) credence goods sellers are heterogeneous and that the preferences of each seller can be represented by a utility or motivation function $U(\pi_s, \pi_c)$ satisfying the following three conditions:

- $\partial U / \partial \pi_s > 0$;
- $sign(\partial U / \partial \pi_c)$ depends (only) on whether $\pi_s \geq \pi_c$, or $\pi_s < \pi_c$; and
- $\partial U / \partial \pi_s > \partial U / \partial \pi_c$.

The first condition requires that – holding the material payoff of the customer constant – the seller's utility increases in own material payoff. This assumption is quite innocuous and it is satisfied by all empirically relevant social preference types discussed in the economics literature.

The second assumption states that whether a seller is selfish, pro-social or anti-social depends only on whether the customer has more or less material payoff than the seller. This assumption is both permissive and restrictive, depending on the perspective taken. It is permissive because it allows for all major types of social preferences that have been discussed in the economics literature. It is also restrictive because it implies (i) that preferences only depend on outcomes, not on the way they are achieved; and (ii) that the reference point for the evaluation of allocations (if one is used) is an equal-material-payoffs allocation.[7]

The third assumption states that a seller values changes in own material payoff more than equivalent or smaller changes in the customer's payoff. This assumption is fairly innocent for allocations with $\pi_s < \pi_c$, but might be regarded as somewhat restrictive for allocations with $\pi_s > \pi_c$; its main purpose is to get a unique "switching point" in the test proposed below, though, and it can be relaxed without changing results qualitatively.[8]

[7] See Kerschbamer (2015) for a more detailed discussion on this assumption.

[8] The test proposed by Kerschbamer (2015) relies on the somewhat weaker assumption $dU(z,z)/dz > 0$ for all $z > 0$. This assumption only rules out more extreme variants of spite

<Insert TABLE 3 about here>

Given our three assumptions on the utility or motivational function $U(\pi_s, \pi_c)$, it seems natural to distinguish between the five archetypes of social preferences defined in Table 3.[9] What can we say about the market behavior of credence goods sellers exhibiting those types of social concerns?

Consider *markets without verifiability* (N-markets) first. For such markets the standard prediction – undertreatment and overcharging under each price-vector – is already a worst case scenario that leaves no room for deterioration. This follows from the observation that by behaving according to the standard prediction a seller not only maximizes her material payoff but also minimizes the payoff of the customer. An immediate consequence is that anti-social other-regarding preferences do not manifest themselves in a worse outcome than predicted under standard preferences. On the other hand, pro-social other-regarding preferences easily manifest themselves in a better market outcome than predicted. To see this consider an **EL** expert who finds out that the customer needs q^1. By providing q^0 instead of q^1 she increases her material payoff by $c^1 - c^0$ at a cost of $v > c^1 - c^0$ to the customer. Thus, if the additional profit the seller receives from providing q^0 instead of q^1 (i.e., $c^1 - c^0$) is small compared to the loss arising from undertreatment (i.e., v), and if the weight on π_c in her utility function is sufficiently high relative to the weight on π_s, she will refrain from undertreatment. The same is true for **IA** experts in the domain of advantageous inequality and for **IL** experts in the domain of disadvantageous inequality.

In sum, in N-markets experts with anti-social other-regarding preferences behave exactly like experts with standard preferences while experts with pro-social other-regarding preferences tend to behave better than predicted by standard theory.

For the standard solution for *markets with verifiability* (V-markets), by contrast, we get the opposite result. To see this, note that the standard

while the condition in the text excludes both extreme variants of altruism and extreme variants of spite.

[9]In Part A of the Online Appendix we discuss those archetypes and their relation to different variants of social preferences discussed in the literature in some detail. There we also present a figure that displays typical indifference curves for the five archetypes in (π_s, π_c) space. By focusing on the five 'pure' types defined in Table 3 we omit preference types that are selfish in one of the two domains and pro- or anti-social in the other. In the experimental section (Section 5) we allow for such hybrid types. In Part A of the Online Appendix we explain how this is done.

prediction for equal-mark-up prices – appropriate quality independent of the level of the mark-up – is already a best-case scenario that leaves no room for improvement. Consider an **EL** expert, for instance. Since the material payoff of the customer enters positively in her utility function, she will act in the interest of the consumer along the equal-mark-up line, where helping the customer involves no cost. Furthermore, since $\partial U/\partial \pi_c > 0$ in both domains (i.e., in the domain of advantageous inequality and in the domain of disadvantageous inequality) the **EL** expert will provide the appropriate quality even under price-vectors that deviate (slightly) from the equal-mark-up rule. Thus, **EL** experts necessarily provide appropriate quality in a corridor along the equal-mark-up line – as shown in Figure 5 – but they do not perform better than **SE** experts at the equal-mark-up line.[10] The same is true for other experts with pro-social other-regarding preferences – under equal-mark-up prices they behave as predicted but do not behave better than predicted. However, anti-social other-regarding preferences easily manifest themselves in a worse market outcome than predicted under standard preferences because hurting the customer involves no cost under equal-mark-up prices. Consider a **SP** expert, for instance. Since the material payoff of the customer enters negatively in her utility function, she necessarily provides q^1 to a consumer who needs q^0, and q^0 to a consumer who needs q^1, along the equal-mark-up line where hurting the customer involves no cost. Furthermore, since $\partial U/\partial \pi_c < 0$ in both domains the **SP** expert will always provide the wrong quality even under price-vectors that deviate (slightly) from the equal-mark-up rule. The same is true for other experts with negative attitudes towards customers – most importantly for **IA** experts in the domain of disadvantageous inequality.

Together these observations do not only explain the poor performance of equal-mark-up prices in *V-Endo*, they also explain why equal-mark-up prices are very rarely chosen in this treatment. More importantly, there is no cheap repair for this problem in the sense that there is simply no price-vector that induces a **SP** expert, for instance, to provide the appropriate quality in a *V*-market. Her provision behavior is rather (qualitatively) like the one shown in Figure 5 with the important difference that she will necessarily always provide the wrong (instead of the appropriate) quality in a corridor along the equal-mark-up line.

[10] Point Ω and the other price-vectors indicated by bullet points in Figure 5 are not important for the arguments in this section – we will refer to them in the next section.

<Insert FIGURE 5 about here>

4 Identification of Social Preferences in Markets for Credence Goods

The discussion in the previous section assumes that there is heterogeneity in social preferences in the (experimental) expert population. The challenge is, of course, to show that empirically. Based on the three primitive assumptions on preferences introduced in the previous section we now derive a parsimonious test for the identification of social preferences in the framework of a credence goods market with verifiability. Our starting point in deriving the test is the following observation: In the space of possible price-vectors there is exactly one (and only one) that allows for a neat discrimination between the above defined preference types from the provision behavior in a credence goods market. Looking at Figure 5 it is the price-vector referred to as 'Point Ω'. It is defined as follows:

Definition 1: *The price-vector* $\Omega = (p^0_\Omega, p^1_\Omega)$ *has* $p^0_\Omega = (v + c^1)/2 - (c^1 - c^0)$ *and* $p^1_\Omega = (v + c^1)/2$.

To discuss the properties of this price-vector we have first to define and discuss the location of the three dashed lines in Figure 5:

- The *upward sloping* dashed line is the equal-mark-up line. It connects all price-vectors with $p^1 - p^0 = c^1 - c^0$, implying that the expert receives exactly the same material payoff independently of whether she provides q^0 or q^1 at points on this line.

- The *horizontal* dashed line connects all price-vectors where the expert and the customer receive exactly the same material payoff if the expert (correctly or incorrectly) provides q^1. Thus, this line is defined by $\pi_s(p^0, p^1, \mu = 1, \kappa = 1) = \pi_c(p^0, p^1, \theta = 1, \mu = 1, \kappa = 1) = \pi_c(p^0, p^1, \theta = 0, \mu = 1, \kappa = 1) \Longleftrightarrow p^1 = (v + c^1)/2$.

- The *vertical* dashed line connects all price-vectors where the expert and the customer receive exactly the same material payoff if the expert correctly provides q^0. Thus, this line is defined by $\pi_s(p^0, p^1, \mu = 0, \kappa = 0) = \pi_c(p^0, p^1, \theta = 0, \mu = 0, \kappa = 0) \Longleftrightarrow p^0 = (v + c^0)/2$.

Since Point Ω is at the intersection of the upward sloping and the horizontal dashed line it has $p^0 = (v + c^0)/2 - (c^1 - c^0)/2$, implying that this point is necessarily to the left of the vertical dashed line – where we have $p^0 = (v + c^0)/2$.

Now suppose we (as the experimentalists) impose the price-vector in Point Ω and look at an expert's provision behavior. First assume the *customer needs the cheaper quality,* q^0. If the expert provides the appropriate quality, she induces a payoff allocation (π_s, π_c) with disadvantageous inequality. This is so because Point Ω is strictly to the left of the vertical dashed line along which both parties get exactly the same material payoff if the expert correctly provides q^0. If the expert provides the expensive quality instead, she induces an equal-material-payoffs allocation – that is, an allocation with $\pi_s = \pi_c$. This follows from the fact that Point Ω is on the horizontal dashed line. Furthermore, since Point Ω is on the equal-mark-up line, the expert's own material payoff is the same in both allocations!

What does this imply for provision behavior? An **EL** expert and an **IL** expert will necessarily decide for the asymmetric allocation – by providing q^0 to a customer who needs q^0. By contrast, a **SP** and an **IA** expert necessarily decide for the symmetric allocation – by providing q^1 to a customer who needs q^0. This is so because the own material payoff is the same in both allocations, while the customer's payoff is higher in the asymmetric than in the symmetric allocation (relevant for **EL** and **SP**), respectively because disadvantageous inequality is present in the asymmetric, but absent in the symmetric allocation (relevant for **IA** and **IL**).

Now assume that the *customer needs the expensive quality,* q^1. If the expert provides q^1, then she induces the equal-material-payoffs allocation discussed in the previous paragraph. This follows from the fact that the material payoff of both parties is independent of the quality needed by the customer when the expensive quality is provided. If the expert provides q^0 instead, she induces a payoff allocation (π_s, π_c) with advantageous inequality. This follows from the fact that Point Ω has $p^0 = (v + c^0)/2 - (c^1 - c^0)/2$ which exceeds $c^0/2$ because $v > (c^1 - c^0)$. Furthermore, since Point Ω is on the equal-mark-up line, the expert's own material payoff is the same in both allocations.

From these considerations it follows that an **EL** expert and an **IA** expert will necessarily decide for the symmetric allocation – by providing q^1 to a customer who needs q^1 – while a **SP** and an **IL** expert necessarily decide for the asymmetric allocation – by providing q^0 to a customer who needs q^1.

This is so because the own material payoff is the same in both allocations while the customer's payoff is higher in the symmetric than in the asymmetric allocation (relevant for **EL** and **SP**), respectively because advantageous inequality is present in the asymmetric, but absent in the symmetric allocation (relevant for **IA** and **IL**).

In sum, if we observe the decision of an expert under the price-vector located at Point Ω in Figure 5 twice, once combined with the consumer needing the low quality and once combined with the consumer needing the high quality, then we can infer her social preference type with some precision – see Table 3. To formulate a more precise statement we call the strategy of providing the appropriate quality in both cases '*always appropriate quality*', and the strategy of providing the expensive quality in both cases '*always high quality*'; moreover, we denote the strategy of providing the cheap quality in both cases '*always low quality*', and the strategy of providing the expensive quality when the cheap quality is needed and the cheap quality when the expensive one is needed '*always wrong quality*'. Using those terms, we can state the following proposition:

Proposition 1 (Impartial Social Preferences) *Consider the price-vector Ω as defined in Definition 1. Under this price-vector: a)* always appropriate quality *is consistent with SE and* **EL** *preferences, but inconsistent with IA, SP and IL; b)* always high quality *is consistent with SE and* **IA** *preferences, but inconsistent with EL, SP and IL; c)* always low quality *is consistent with SE and* **IL** *preferences, but inconsistent with IA, SP and EL; d)* always wrong quality *is consistent with SE and* **SP** *preferences, but inconsistent with IA, EL and IL.*

Proof. Follows immediately from the text preceding the result. ■

Testing the provision behavior under the price-vector Ω is like eliciting impartial social preferences, because under this price-vector a seller compares two allocations that yield the same material payoff for her, but different payoffs for the customer. Thus, deciding for the "fair" allocation (whatever is considered fair) does not involve any costs here. Based on the predictions for Point Ω we now change p^0 slightly, while keeping p^1 constant, in order to test whether (experimental) sellers are willing to give up own material payoff to help or hurt the customer. Referring back to Figure 5 an increase (decrease) in p^0 corresponds to a move along the horizontal dashed line to the right (left, respectively) of Point Ω implying that we increase (decrease) the expert's payoff from providing q^0 at the cost (for the benefit) of the consumer's payoff. At the same time, the payoffs for both parties from providing q^1 remain constant at the equal-material-payoffs allocation $(\pi_s, \pi_c) = ((v - c^1)/2, (v - c^1)/2)$.

Given our three assumptions on the utility or motivational function, what are the implications of changing p^0 for the provision behavior of sellers with different types of social preferences? First, we get the following monotonicity result:

Lemma 1 (Monotonicity) *Consider two price-vectors, the price-vector* Ω *from Definition 1 and a second vector,* Ψ*, which has the same* p^1 *as* Ω *(i.e.,* $p^1_\Psi = p^1_\Omega$*) but a different* p^0 *(i.e.,* $p^0_\Omega \neq p^0_\Psi$*). If* $p^0_\Omega < p^0_\Psi$ *(*$p^0_\Omega > p^0_\Psi$*, respectively,) then – keeping the consumer's need with respect to quality constant – an expert who provides* q^0 *(*q^1*, respectively) under* Ω *must provide* q^0 *(*q^1*, respectively) under* Ψ*.*

Proof. See Online Appendix Part B. ■

Proposition 1 and Lemma 1 together imply:

Proposition 2 (Partial Social Preferences) *Consider the price-vectors* Ω *and* Ψ *from Lemma 1. Then observing a)* always appropriate quality *under* Ω *and* Ψ *is only consistent with* **EL** *preferences (but inconsistent with SE, IA, SP and IL); b)* always high quality *under* Ω *and 'always high quality', 'always appropriate quality' or 'always wrong quality' under* Ψ *with* $p^0_\Omega < p^0_\Psi$ *is only consistent with* **IA** *preferences (but inconsistent with SE, EL, SP and IL); c)* always low quality *under* Ω *and 'always low quality', 'always appropriate quality' or 'always wrong quality' under* Ψ *with* $p^0_\Omega > p^0_\Psi$ *is only consistent with* **IL** *preferences (but inconsistent with SE, IA, SP and EL); d)* always wrong quality *under* Ω *and 'always wrong quality' under* Ψ *is only consistent with* **SP** *preferences (but inconsistent with SE, IA, EL and IL).*

To understand Proposition 2, the test to be applied in the next section, and the term 'partial social preferences', consider an **IA** seller, for instance. From the arguments above we know that such an expert will always provide the high quality under price-vector Ω. Increasing p^0 slightly, while keeping p^1 constant, creates a tension between a higher own monetary payoff and more inequality. By deciding for *always high quality* or switching to *always appropriate quality* (or *always wrong quality*) the seller reveals a positive willingness to pay for reducing inequality, because own-money-maximization would ask for *always low quality.* The argument for sellers with other kinds of social preferences is similar.

5 Implementing the Test in Lab Experiments

5.1 Experimental Parameters and Procedures

To test for and classify the social preferences of sellers, we ran new experiments using a design based on the theoretical results derived in the previous section. The timing of the game was exactly the same as in the game described in Section 2, except for the first stage: Instead of letting sellers post their prices themselves, the price-vector in a given period was chosen exogenously – through the software – with equal probability from the set {(3,8), (4,8), (5,8), (6,8), (7,8)}. This set of vectors has two characteristics:

First and foremost, it includes the equal-mark-up vector Ω characterized in Proposition 1 – it is the vector (4,8). Starting from this price-vector it then varies p^0 as described in Lemma 1 and Proposition 2. The allocations implied by the equal-mark-up vector Ω and by the other price-vectors in the set are displayed in Figure 6.

Second, this set of price-vectors includes the four most frequently chosen price-vectors in treatment *V-Endo* (see Table 2). We call the experimental treatment with this (exogenously given) set of price-vectors *V-Exo1*. In order to check whether the inclusion of the price-vector $(3, 8)$ – which was not among the most frequently posted price-vectors in treatment *V-Endo* – has any impact on behavior, we also ran an experimental treatment where the exogenously determined price-vector was chosen with equal probability only from the four most frequently chosen price-vectors (4,8), (5,8), (6,8), and (7,8). We call this treatment *V-Exo2*.

We ran four sessions with 16 subjects each both for *V-Exo1* and for *V-Exo2*, yielding 8 independent matching groups per treatment. Overall, a total of 128 subjects participated in the new experiments (with no subject having participated in the experiment reported in Section 2). Sessions lasted less than 1.5 hours.

<Insert FIGURE 6 about here>

5.2 Experimental Results

Tables 4 and 5 present the data for the two new treatments with exogenously imposed price-vectors, i.e., for *V-Exo1* and for *V-Exo2*. From Table 4 it gets clear that – except for overtreatment – there are no significant differences between those treatments (using the overall average for a particular variable within a matching group of eight subjects as the level of independent observations, yielding eight independent observations per treatment). For overtreatment, the table indicates significantly higher rates in *V-Exo1* than in *V-Exo2.* A closer look at the data reveals that the difference is entirely due to the provision behavior under the price-vector (3,8), which is present in *V-Exo1*, but absent in *V-Exo2.* In fact, Table 5 shows that – controlling for price-vectors – there is no significant difference between *V-Exo1* and *V-Exo2*, both with respect to overtreatment and undertreatment. This also implies that, conditional on the price-vector and the quality needed by the consumer, there is no difference in the likelihood of appropriate treatment across treatments.[11] These results allow us to pool the data from the two treatments in the following analysis of social preference types.

<Insert TABLES 4 and 5 about here>

In order to classify sellers according to their social preferences, we first look at violations of monotonicity according to Lemma 1. It turns out that 45 out of 64 sellers (70%) behave in line with the statement over all 16 periods of the experiment. Taking into account that some learning may go on in early periods, we decided to focus on the final 12 periods only (i.e., on periods 5 to 16). In those periods the behavior of 56 out of 64 sellers (88%) respects the monotonicity condition. This high degree of consistent behavior is encouraging, because it suggests that stable (non-standard) preferences, rather than noise or any kind of confusion of subjects, drives our findings. Of the 56 sellers whose behavior is consistent with Lemma 1, we had to exclude 3 from further analysis due to lack of data caused by customers' opting out.[12] Our data analysis is therefore based on 53 sellers.

[11] Table 5 includes data for the equal-mark-up price-vector (4,8). In treatment *V-Endo,* where prices are chosen by sellers, this price-vector is observed extremely rarely – specifically in only 17 of the 704 possible cases. In 2 of the 17 cases, no interaction took place. The overtreatment rate in the remaining cases is 37.5%, which is in the range that is observed in *V-Exo1* and *V-Exo2.* The undertreatment rate is zero in *V-Endo* under this price-vector, but it is based on only 7 cases, which prevents meaningful testing whether the provision behavior under equal-mark-up price-vectors depends on whether the price-vector has been chosen endogenously or determined exogenously.

[12] We included all experts who had treated under price vector Ω at least one customer needing q^0 AND at least one customer needing q^1; 50 of the 56 sellers were included under this rule. From the remaining 6 sellers, we included those where the data was consistent with exactly one of the social preference types introduced in Section 3.

Observation 2 (Identification of Social Preferences) *(a) Less than a fourth of the experimental sellers act in accordance with the standard assumption on preferences – they provide appropriate quality if and only if they are held indifferent in own-money terms. (b) About a fourth of the seller population displays behavior that is consistent with a strong taste for efficiency. They provide appropriate quality even if own-money maximization calls for over- or undertreatment. (c) About a fifth of sellers shows behavior that is consistent with strong inequality aversion. They over- or undertreat customers if this behavior reduces inequality (or turns disadvantageous into advantageous inequality) even if it also reduces their own monetary payoff. (d) Adding up strong and weak forms of social preferences indicates that about half of the sellers display behavior that is consistent with a taste for efficiency, while little more than a fourth of the sellers display behavior consistent with (strong or weak) inequality aversion.*

Table 6 provides a summary of the data.[13] To read it properly, note that sellers who are classified as either weak **EL**, weak **IA**, weak **SP**, or weak **IL** are also classified as weak **SE**. This has to be the case because weak **EL**, **IA**, **SP** and **IL** behave exactly as the strong version of the respective type as 'impartial spectators' (that is, when there is no trade-off between own material payoff and a fairness standard), i.e. at price-vector $(4, 8)$ in Figure 6. Once p^0 varies, weak **EL**, **IA**, **SP** and **IL** act exactly like (strong) **SE**, because their own material payoff is at stake.[14] It follows that for relative frequencies (given in parentheses in Table 6) to add up to 100%, one has to add up either the strong non-SE types and the total number of **SE** types or the total number of non-SE types and the number of strong **SE** types.

<Insert TABLE 6 about here>

It is important to recall that the results displayed in Table 6 allow for 'mistakes' in early rounds. If we do not allow for learning in early periods then we lose 8 of the 53 observations. Interestingly, we do not lose a single

[13]Again, we pool the data from *V-Exo1* and *V-Exo2*, because a Fisher exact test reveals that there are no significant differences in the distribution of social preference types between the two treatments (with $p > 0.5$).

[14]Formally, the reason is that the weak **SE** type is the limit of all kinds of social preference types when the weight on the distributional part of the utility function approaches zero. Note, however, that the limiting behavior is different for the four non-SE types!

experimental seller who reveals a willingness to give up own material payoff to change the material payoff of the customer.[15] This suggests that selfish sellers do need some time to find out the own-money-maximizing strategy while strong **EL** and strong **IA** 'know how they want to behave' from the beginning. Since strong **EL** and strong **IA** reveal a willingness to give up own material payoff to change the material payoff of the customer, while the other types appearing with non-zero entries in Table 6 do not, one would expect that the former two types earn less – on average – than the rest. This is indeed what we find in the data. Tables A4 and A5 in Part C of the Online Appendix display – for the seller types in Table 6 – the average profits per period conditional on an interaction having taken place. While the entries for strong **EL** and strong **IA** are 2.37 and 2.22, respectively, the other types earn 2.48, on average. If we put strong **EL** and strong **IA** sellers in one tub and all the other sellers in a second tub then the difference across tubs in average profits per period (conditional on an interaction having taken place) is significant at the 5% level ($p = 0.03$, Mann-Whitney U-test, $N = 53$).

5.3 Discussion of Heterogeneity of Preferences

An important insight from our experimental results is that the behavior of only a minority of individuals (those in the category "weak EL") is consistent with the standard assumption on preferences – i.e., that sellers always follow their monetary incentives and in case of indifference they act in the interest of customers. This insight is important for several reasons. First, it is important for the current application –institutional design for credence goods markets under verifiability– because it provides an explanation for both, why equal-mark-up price-vectors do not work as predicted by theory, and why such vectors were not chosen in the endogenous pricing conditions of Dulleck *et al.* (2011). And secondly, it is important for institutional design for markets plagued by asymmetric information more generally, because it suggests that institutional design based on the standard assumption on preferences might yield bad incentives for some or even many agents. The results reported in Table 6 also confirm the heterogeneity in social preferences on which our discussion in Section 3 was based. Some sellers care for efficiency, some for

[15] Table A3 in Part C of the Online Appendix displays a table equal to Table 6 but based only on the 45 sellers who respect the monotonicity condition throughout the 16 periods of play.

equality of payoffs, and some do not care for the well-being of others (or for efficiency) at all.

Heterogeneity in preferences and behavior is a well-established finding, of course. Indeed, it has been observed in many other games, for instance in public goods games (Fischbacher *et al.,* 2001, Fischbacher and Gächter, 2010) or in gift-exchange games (Fehr *et al.,* 1993 and 1997). Also, in the literature on identification of the type and intensity of social preferences, heterogeneity is well known (see, e.g. Andreoni and Miller, 2002, Charness and Rabin, 2002, Engelmann and Strobel, 2004, or Fisman *et al.,* 2007). The current paper contributes to the existing literature in two important ways: (i) Our identification procedure depends only on a small set of primitive assumptions on preferences, which is in contrast to much of the previous literatures. (ii) Our test for social preferences is completely nested in a market for credence goods. This latter feature might help to alleviate the concern that the results of elicitation procedures based on dictator games are not robust and not easy to extend to other important economic situations.

6 Conclusions

This paper has argued that heterogeneity in social preferences provides an explanation for both, why credence goods markets with verifiability fail to reach efficient outcomes and why markets without verifiability perform considerably better than predicted by standard theory. Key to our argument are the following two observations: First, the standard prediction for markets without verifiability is non-robust against the presence of agents with pro-social other-regarding preferences. Second, the standard solution to the credence goods problem for the case where the quality of the goods is verifiable – equal-mark-up prices – is non-robust against the presence of agents with anti-social other-regarding preferences.

To provide support for our explanation we have designed a test that allows for a clean discrimination between different preference types from the provision behavior in an experimental market for credence goods. An important feature of our experimental design is that the discrimination does not depend on any structural assumptions on the utility or motivational function meant to represent preferences. The experimental design rather directly tests the key characteristics of different variants of social preferences that have been discussed in the economics literature. A second important design feature is that our test for social preferences is completely nested in a market for credence goods.

Important conclusions for credence goods markets and, more generally, for markets with asymmetric information can be drawn from our experimental results. Specifically, we have found in an implementation of our test that less than a fourth of the experimental sellers behave according to the standard assumption on preferences (that all agents are rational own-money maximizers who behave as desired if held indifferent in own-money terms). The rest behave either in line with other forms of selfish or in accordance with different variants of non-selfish other-regarding preferences. An immediate implication is that institutional design based on the standard assumption of lexicographically maximizing agents yields bad incentives for some or possibly many agents. Another implication of our experimental results is that there are agents that behave appropriately independently of the institutional design. Taken together these two observations have two important consequences, one for institutional design, the other for agent selection.

Designing the Right Institutions: What is needed for a well-performing market is not a perfect institution for one type of agent, but rather an institution that is robust against the coexistence of different types of agents. Our results indicate that verifiability is not such an institution (nor is a market where verifiability does not apply). By contrast, as Dulleck *et al.* (2011) have shown, 'liability' is a quite robust institution in markets for credence goods. 'Liability' requires verifiability of 'outcomes', while 'verifiability' requires only verifiability of 'inputs'. Thus, securing verifiability of outcomes, where possible, might solve credence goods problems more effectively in some markets.

Selecting the Right Agents: Designing robust institutions might be difficult, especially for markets for credence goods. Imposing liability, for instance, generates other problems or may be impossible to achieve.[16] As

[16] On the one hand, liability requires a form of verifiability of success. Especially in the medical realm success is often impossible or very costly to measure for a court, while still being observed by the consumer. On the other hand, even in cases where success is verifiable strict liability might pose problems. For instance, an insufficiently repaired car may work for some time before it breaks down. To mitigate the undertreatment problem in such a situation the liability needs to cover a longer period. But during this longer period the car may stop working for reasons unrelated to the expert's behavior. Also, an extended liability period may induce fraudulent behavior on the side of the customer as he may not put in the required maintenance effort – a problem that has previously been discussed by Taylor (1995).

a consequence, selecting the ”right” agents for jobs involving experts' services becomes particularly important. Instead of choosing doctors, mechanics or computer specialists exclusively according to their training, customers or their representatives should also take into consideration the attitudes of these experts towards their customers. Selecting the right agents may also help to solve problems created by uncertainty over input costs: With cost uncertainty standard theory would predict that verifiability cannot solve the problems on credence goods markets – a problem ignored in the formal literature on credence goods thus far. Our results suggest that verifiability can solve this problem if the ”right” agents are selected: Efficiency loving experts provide appropriate treatment in a corridor along the equal-mark-up line; that is, even if monetary incentives are not perfectly in line. Hence, the crucial task of potential employers or buyers is to identify experts with the right social preferences. Public policy might step in here, for instance, by screening applicants for particular jobs (like in the health care sector, for instance) not only after their performance in entry exams but also in accordance with their social track record. Since the 'effort cost' for performing social activities is arguably lower for more 'consumer-friendly' types, a CV featuring an impressive track record of volunteer work might well act as a screening device.

References

[1] Alger, I. and Salanié, F. (2006), A Theory of Fraud and Overtreatment in Experts Markets, *Journal of Economics and Management Strategy* **15**, 853-881.

[2] Andreoni, J. and Miller, J. (2002), Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism, *Econometrica* **70**, 737-753.

[3] Balafoutas, L., Beck, A., Kerschbamer, R. and Sutter, M. (2013), What Drives Taxi Drivers? A Field Study on Fraud in a Market for Credence Goods, *Review of Economic Studies* **80**, 876-891.

[4] Blanco, M., Engelmann, D. and Normann, H. (2011), A Within-Subject Analysis of Other-Regarding Preferences, *Games and Economic Behavior* **72**, 321-338

[5] Bolton, G. E. and Ockenfels, A. (2000), ERC – A Theory of Equity, Reciprocity and Competition, *American Economic Review* **90**: 166-193.

[6] Bolton, P. and Dewatripont, M. (2005), *Contract Theory*, MIT Press, Cambridge, MA.

[7] Brandts, J., Riedl, A. and van Winden, F. (2009), Competitive Rivalry, Social Disposition, and Subjective Well-Being: An Experiment, *Journal of Public Economics* **93**, 1158-1167.

[8] Cabrales, A., Miniaci, R., Piovesan, M. and Ponti, G. (2010), Social Preferences and Strategic Uncertainty: An Experiment on Markets and Contracts, *American Economic Review* **100**, 2261-2278.

[9] Charness, G. and Rabin, M. (2002), Understanding Social Preferences with Simple Tests, *Quarterly Journal of Economics*, **117**, 817-869.

[10] Darby, M. and Karni, E. (1973), Free Competition and the Optimal Amount of Fraud, *Journal of Law and Economics* **16**, 67-88.

[11] Dawes, Ch., Fowler, J., Johnson, T., McElreath, R. and Smirnov, O. (2007), Egalitarian Motives in Humans, *Nature* **446**, 794-796.

[12] Duesenberry, J. (1949), *Income, Saving and the Theory of Consumer Behavior*, Harvard University Press, Cambridge, MA.

[13] Dulleck, U. and Kerschbamer, R. (2006), On Doctors, Mechanics, and Computer Specialists: The Economics of Credence Goods, *Journal of Economic Literature* **44**, 5-42.

[14] Dulleck, U. and Kerschbamer, R. (2009), Experts vs. Discounters: Competition and Market Unraveling and Consumers Do Not Know What They Need, *International Journal of Industrial Organization* **27**, 15-23.

[15] Dulleck, U., Kerschbamer, R. and Sutter, M. (2011), The Economics of Credence Goods: On the Role of Liability, Verifiability, Reputation and Competition, *American Economic Review* **101**, 526–555.

[16] Dulleck, U., Johnston, D., Kerschbamer, R, and Sutter, M. (2013), The Good, The Bad, and the Naive: Do Fair Prices Signal Good Types or Do They Induce Good Behaviour?, University of Innsbruck, mimeo.

[17] Emons, W. (1997), Credence Goods and Fraudulent Experts, *Rand Journal of Economics* **28**, 107-119.

[18] Emons, W. (2001), Credence Goods Monopolists, *International Journal of Industrial Organization* **19**, 375-89.

[19] Engelmann, D. and Strobel, M. (2004), Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments, *American Economic Review* **94**, 857-869.

[20] Fehr, E., Bernhard, H., and Rockenbach, B. (2008), Egalitarism in Young Children, *Nature* **454**, 1079-1083.

[21] Fehr, E., Gächter, S. and Kirchsteiger, G. (1997), Reciprocity as a Contract Enforcement Device, *Econometrica* **65**, 833-860.

[22] Fehr, E., Kirchsteiger, G. and Riedl, A. (1993), Does Fairness Prevent Market Clearing? An Experimental Investigation, *Quarterly Journal of Economics* **108**, 437-459.

[23] Fehr, E. and Schmidt, K. (1999), A Theory of Fairness, Competition, and Cooperation, *Quarterly Journal of Economics* **114**, 817-868.

[24] Fershtman, C., Gneezy, U. and List, J. (2012), Equity Aversion: Social Norms and the Desire to be Ahead, *American Economic Journal: Microeconomics* **4**, 131-144.

[25] Fischbacher, U. (2007), Z-tree: Zürich Toolbox for Ready-Made Economic Experiments, *Experimental Economics* **10**, 171-178.

[26] Fischbacher, U. and Gächter, S. (2010), Social Preferences, Beliefs, and the Dynamics of Free Riding in Public Good Experiments, *American Economic Review* **100**, 541-556.

[27] Fisman, R., Kariv, S. and Markovits, D. (2007), Individual Preferences for Giving, *American Economic Review* **97**, 1858-1876.

[28] Fischbacher, U., Gächter, S. and Fehr, E. (2001), Are People Conditionally Cooperative? Evidence from a Public Goods Experiment, *Economic Letters* **71**, 397-404.

[29] Greiner, B. (2004), An Online Recruitment System for Economic Experiments. In: Kremer, K. and Macho, V. (eds.): Forschung und wissenschaftliches Rechnen 2003. GWDG Bericht 63. Gesellschaft für Wissenschaftliche Datenverarbeitung, Göttingen, 79-93.

[30] Gruber, J., Kim, J. and Mayzlin, D. (1999), Physician Fees and Procedure Intensity: The Case of Cesarean Delivery, *Journal of Health Economics* **18**, 473-490.

[31] Gruber, J. and Owings, M. (1996), Physician Financial Incentives and Cesarean Section Delivery, *Rand Journal of Economics* **27**, 99-123.

[32] Hubbard, T. N. (1998), An Empirical Examination of Moral Hazard in the Vehicle Inspection Market, *Rand Journal of Economics* **29**, 406-426.

[33] Huck, S., Lünser, G. and Tyran, J.-R. (2007), Pricing and Trust, UCL Working Paper.

[34] Huck, S., Lünser, G. and Tyran, J.-R. (2010), Consumer networks and Firm Reputation: A First Experimental Investigation, *Economics Letters* **108**, 242-244.

[35] Huck, S., Lünser, G. and Tyran, J.-R. (2012), Competition Fosters Trust, *Games and Economic Behavior* **76**, 195-209.

[36] Hughes, D. and Yule, B. (1992), The Effect of Per-item Fees on the Behavior of General Practitioners, *Journal of Health Economics* **11**, 413-437.

[37] Iriberri, N. and Rey-Biel, P. (2013), Elicited Beliefs and Social Information in Modified Dictator Games: What do Dictator Believe Other Dictators Do?, *Quantitative Economics* **4**: 515-547.

[38] Iizuka, T. 2007. Experts' Agency Problems: Evidence From the Prescription Drug Market in Japan, *RAND Journal of Economics* **38**, 844-862.

[39] Kerschbamer R. (2015), The Geometry of Distributional Preferences and a Non-Parametric Identification Approach: The Equality Equivalence Test, forthcoming in *European Economic Review*.

[40] Levine, D. (1998), Modeling Altruism and Spitefulness in Experiments, *Review of Economic Dynamics* **1**, 593-622.

[41] Offerman, T., Sonnemans, J. and Schram, A. (1996), Value Orientations, Expectations and Voluntary Contributions in Public Goods, *Economic Journal* **106**, 817-845.

[42] Pesendorfer, W. and Wolinsky, A. (2003), Second Opinions and Price Competition: Inefficiency in the Market for Expert Advice, *Review of Economic Studies* **70**, 417-437.

[43] Schneider, H. (2012), Agency Problems and Reputation inExpert Services: Evidence Evidence fromn Auto Repair, *Journal of Industrial Economics* **60**, 406-433.

[44] Taylor, C. (1995), The Economics of Breakdowns, Checkups, and Cures, *Journal of Political Economy* **103**, 53-74.

[45] Wolinsky, A. (1993), Competition in a Market for Informed Experts' Services, *Rand Journal of Economics* **24**, 380-398.

[46] Wolinsky, A. (1995), Competition in Markets for Credence Goods, *Journal of Institutional and Theoretical Economics* **151**, 117-131.

7 Tables and Figures

.

Table 1: Summary Statistics for *N-Endo* and *V-Endo*

Averages per Period	*N-Endo*[a]	*V-Endo*[a]
Interaction	0.45	0.50
Undertreatment[b]	0.53	0.60
Overtreatment[c]	0.06	0.05
Overcharging[d]	0.88	-
Profit Seller	2.69	2.58
Profit Customer	1.00	1.06
Number of Subjects	96	88
(independent matching groups)	(12)	(11)

[a] none of the variables is significantly different between the two treatments (using two-sided Mann-Whitney U-tests with matching groups of eight subjects as independent observations).

[b] customer needs q^1, but seller provides q^0

[c] customer needs q^0, but seller provides q^1

[d] seller provides q^0, but charges p^1 (with $p^1 > p^0$ and customer needs q^0)

.

Table 2: Most Popular Price-Vectors in *N-Endo* and *V-Endo*

Treatment *N-Endo*			Treatment *V-Endo*		
(p^0, p^1)	absolute #	rel. frequency	(p^0, p^1)	absolute #	rel. frequency
(6,8)	176	22.92%	(6,8)	265	37.64%
(4,8)	84	10.94%	(7,8)	89	12.64%
(5,7)	50	6.51%	(5,8)	46	6.53%
(5,8)	44	5.73%	(4,8)	17	2.41%
(4,7)	39	5.08%	(8,8)	15	2.13%
	393 (of 768)	51.17%		432 (of 704)	61.36%

.

Table 3: Social Preference Types and Implied Provision Behavior

social preference type	derivative of U w.r.t. π_c		provision behavior under Ω	
	for $\pi_s \geq \pi_c$	for $\pi_s < \pi_c$	cust. needs q^0	cust. needs q^1
SE (selfish)	$= 0$	$= 0$	q^0 or q^1	q^0 or q^1
EL (efficiency loving)	> 0	> 0	q^0	q^1
SP (spiteful)	< 0	< 0	q^1	q^0
IA (inequality averse)	> 0	< 0	q^1	q^1
IL (inequality loving)	< 0	> 0	q^0	q^0

.

Table 4: Overview of Results in *V-Exo1* and *V-Exo2* (periods 7-16)

	V-Exo1	*V-Exo2*	p-value
Interaction	0.54	0.58	0.40
Undertreatment	0.53	0.46	0.71
Overtreatment	0.35	0.22	0.05#
Profit Seller	2.27	2.35	0.40
Profit Buyer	1.29	1.29	0.60
Number of Subjects	64	64	
(independent matching groups)	(8)	(8)	

#However, we do not find significant difference in overtreatment between V-Exo1 and V-Exo2 if we control for the price-vector (see Table 5): The provision behavior under the price-vector $(3, 8)$ – which is present in V-Exo1, but absent in V-Exo2 – seems to be responsible for the difference in overtreatment between V-Exo1 and V-Exo2.

Table 5: Undertreatment (UT) and Overtreatment (OT) Rates Conditional on Price-Vectors (periods 7-16)

p_I, p_{II}	UT[a] *V-Exo1*	UT[a] *V-Exo2*	p-value (UT[a])	OT[b] *V-Exo1*	OT[b] *V-Exo2*	p-value (OT[b])
(3,8)	0.048	n.a.	-	0.913	n.a.	-
(4,8)	0.100	0.243	0.07	0.333	0.529	0.17
(5,8)	0.737	0.778	1.00	0.000	0.100	0.24
(6,8)	0.882	0.765	0.23	0.077	0.000	0.28
(7,8)	0.818	0.636	0.41	0.000	0.000	n.a.

[a] undertreatment: customer needs q^1, but seller provides q^0
[b] overtreatment: customer needs q^0, but seller provides q^1

.

Table 6: Classification of Individual Behavior in *V-Exo*

social preference type	strong	weak	total
EL (efficiency loving)	13 (24.5%)	13 (24.5%)	26 (49.0%)
IA (inequality averse)	10 (18.9%)	3 (5.7%)	13 (24.5%)
SP (spiteful)	0 (0%)	3 (5.7%)	3 (5.7%)
IL (inequality loving)	0 (0%)	2 (3.8%)	2 (3.8%)
SE (selfish)	9 (17.0%)	21 (39.6%)	30 (56.6%)

Note that sellers who are classified as either weak EL, weak IA, weak SP, or weak IL are also classified as weak SE. Thus, for relative frequencies (given in parentheses) to add up to 100%, one has to add up either the strong non-SE types and the total number of SE types or the total number of non-SE types and the number of strong SE types.

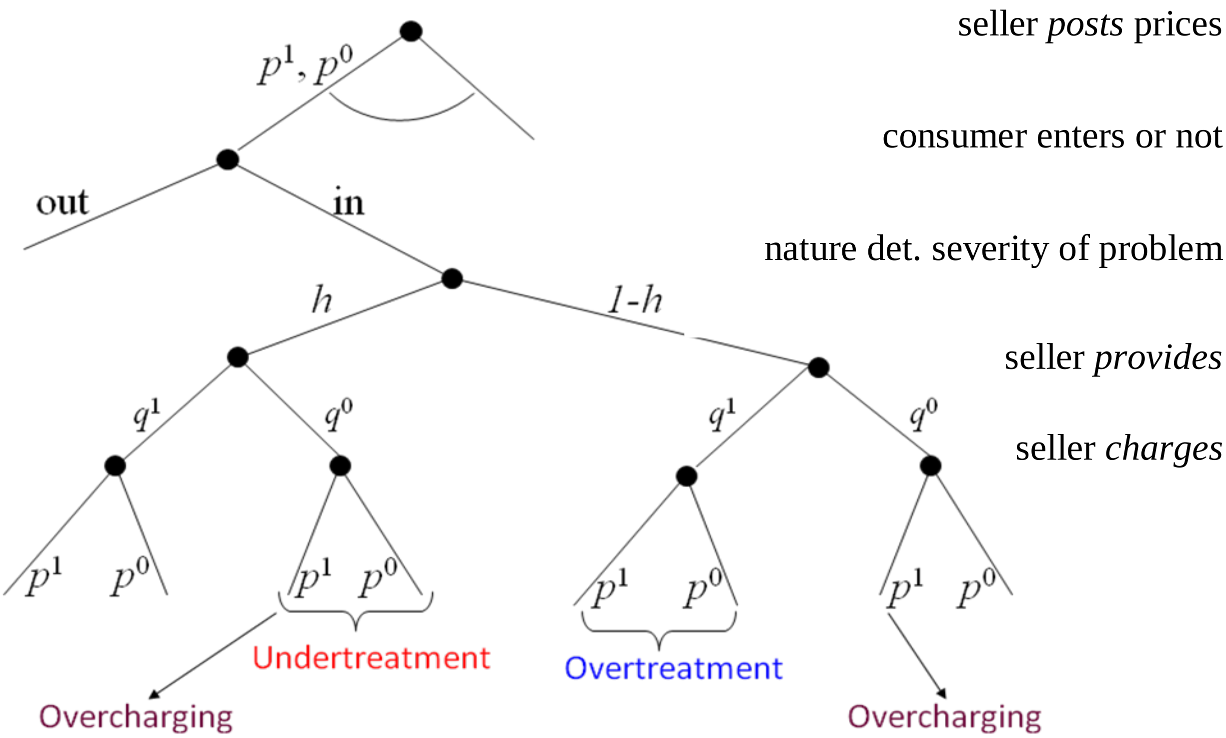

Figure 1: The Credence Goods Game

Note: The term *undertreatment* refers to providing q^0 when the consumer needs q^1; *overtreatment* refers to providing q^1 when the consumer needs q^0; and *overcharging* refers to charging p^1 when q^0 has been provided.

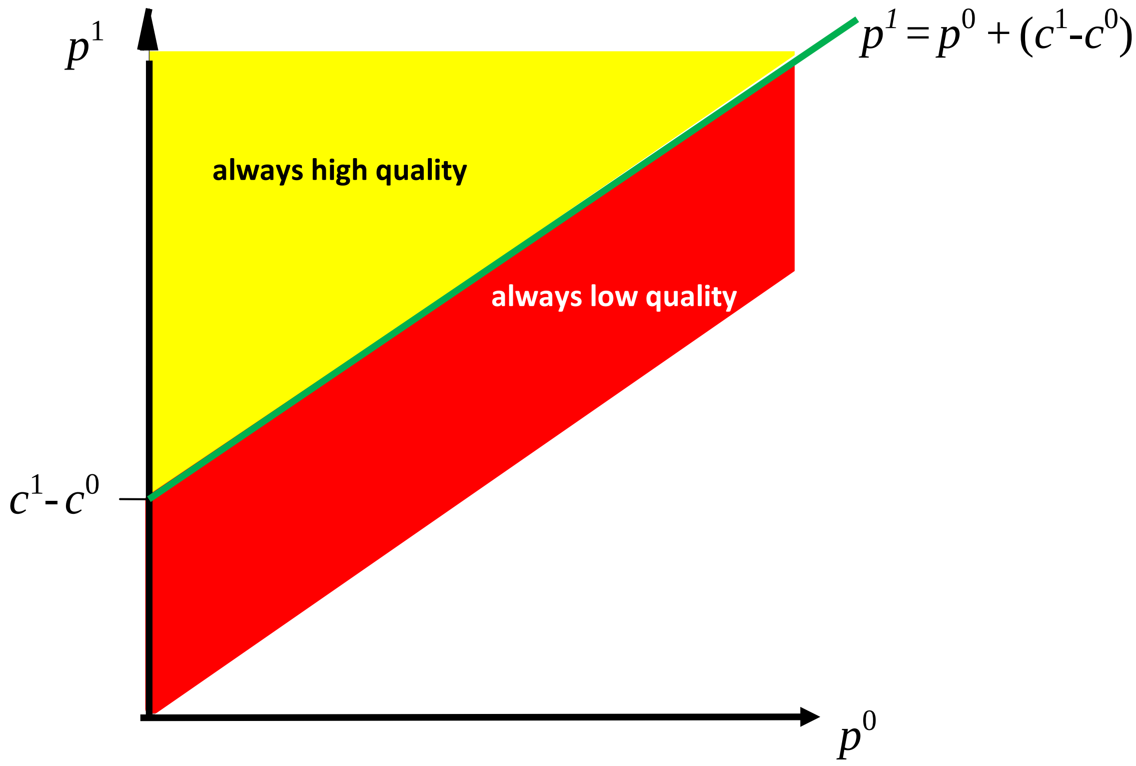

Figure 2: Standard Prediction for Provision Behavior under Verifiability

Note: Under the standard assumption on preferences an expert's provision behavior under verifiability is determined exclusively by her material incentives: if $c^1 - c^0 > p^1 - p^0$ ($c^1 - c^0 < p^1 - p^0$, respectively) the expert earns more by selling q^0 (q^1, respectively) and is therefore predicted to always provide the low quality (high quality, respectively); if $c^1 - c^0 = p^1 - p^0$ the expert is indifferent in material terms and in this case standard theory predicts that she will provide the appropriate quality.

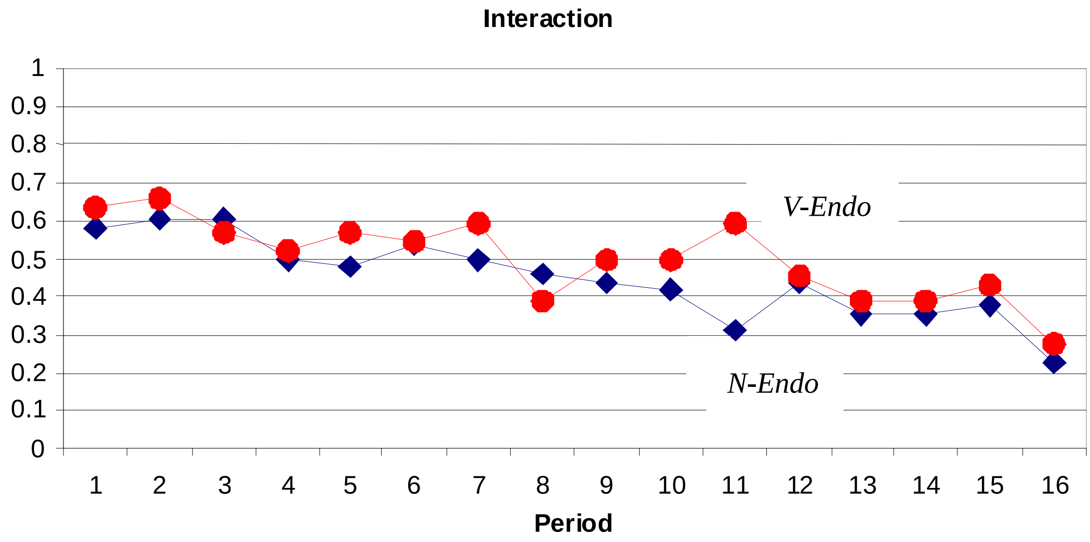

Figure 3: Relative Frequency of Interaction in *N-Endo* and *V-Endo*

Note: The *Relative Frequency of Interaction* is calculated as (# accepted transactions)/(# possible interactions) averaged over all sessions for a given treatment.

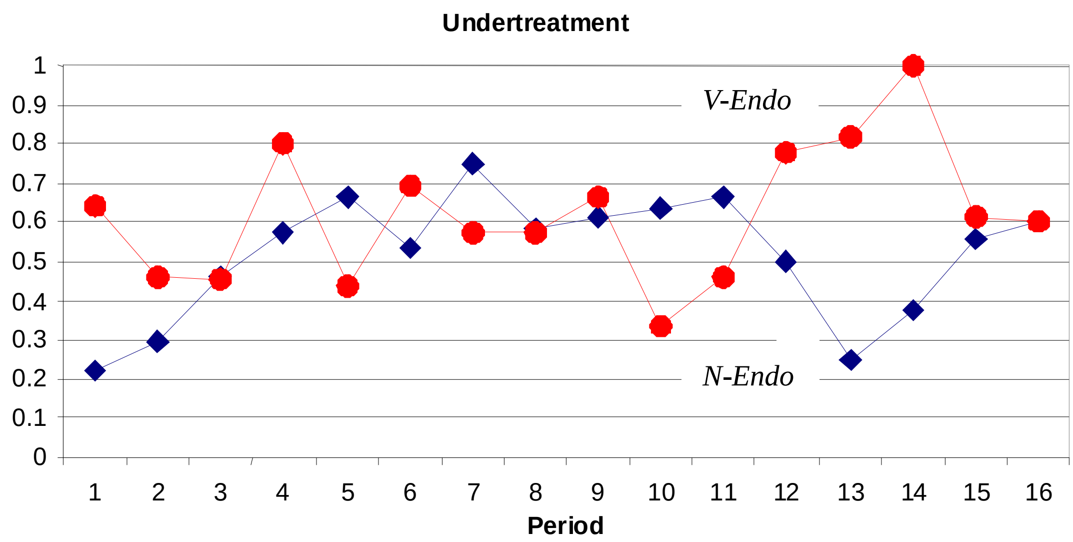

Figure 4: Relative Frequency of Undertreatment in *N-Endo* and *V-Endo*

Note: The *Relative Frequency of Undertreatment* is calculated as (# cases where the customer needs q^1 but receives q^0)/(# cases where the customer needs q^1) averaged over all sessions for a given treatment.

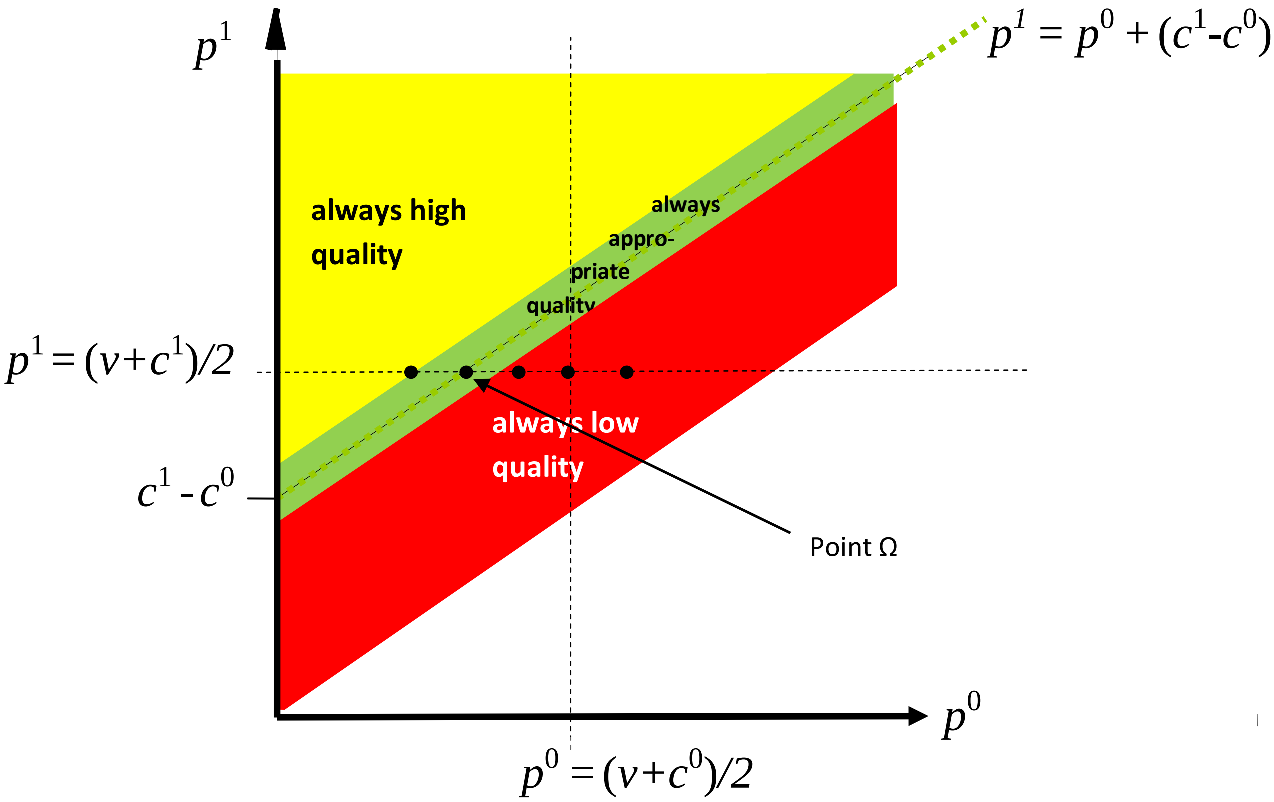

Figure 5: Provision Behavior of an EL Expert under Verifiability

Note: An EL expert is willing to give up own material payoff to increase the material payoff of the customer. Thus, she will necessarily provide the appropriate quality in a corridor along the equal-mark-up line (where helping the customer involves no cost).

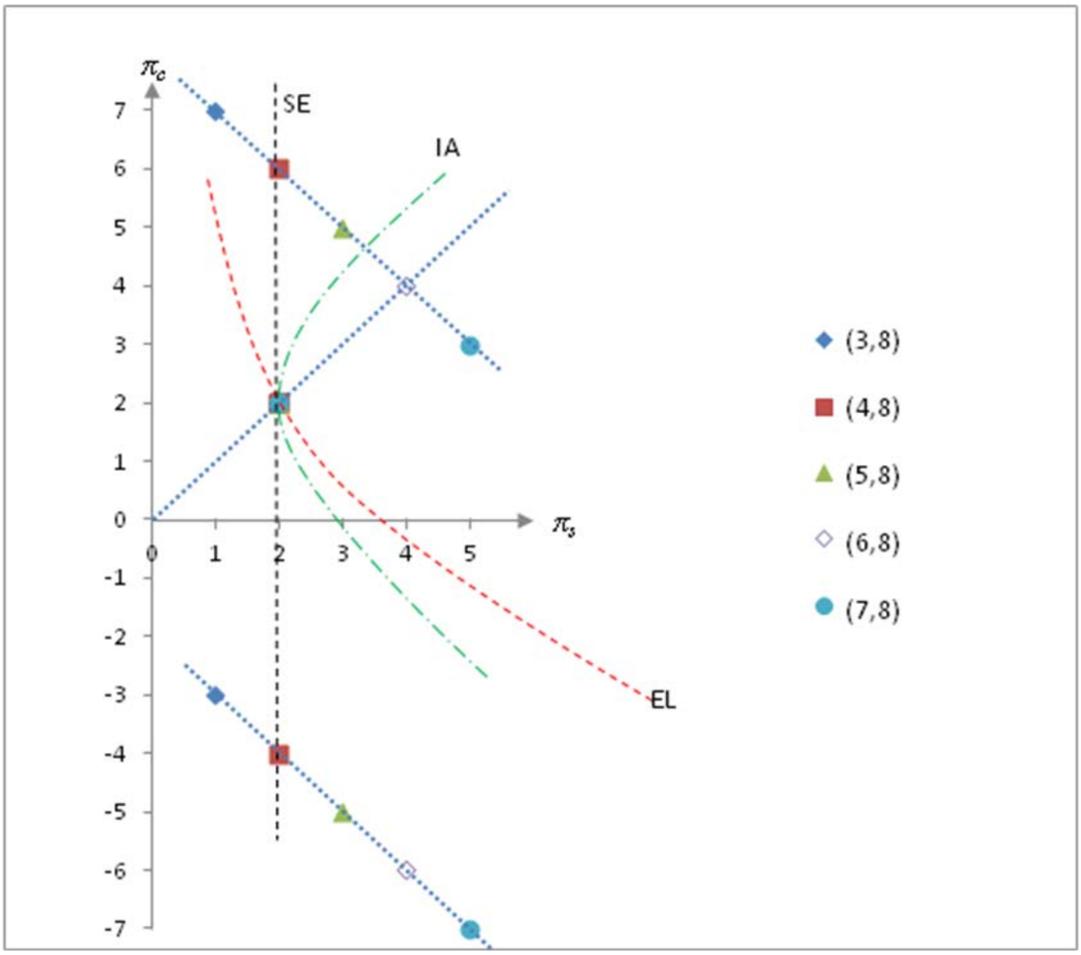

Figure 6: Possible Combinations of Buyer's and Seller's Material Payoffs

(for different price-vectors and depending on whether the buyer needs q^0 or q^1)

Note: Providing q^1 induces the equal-material-payoffs outcome (π_s, π_c) = (2, 2) independently of the needed quality under each of the considered price-vectors. If the *customer needs* q^0, the seller implicitly chooses between this allocation (by inefficiently providing q^1) and the allocation corresponding to the respective price-vector on the line [with slope -1] *above* the equal-material-payoffs allocation (by efficiently providing q^0). If the *customer needs* q^1 the choice is between the equal-material-payoffs point (by efficiently providing q^1) and the respective point on the line [with slope -1] *below* the equal-material-payoffs allocation (by inefficiently providing q^0).

Online APPENDIX Part A:

Social Preference Types

To keep the discussion in sections 3 and 4 succinct we focus in those sections on the five ‘pure’ types of social preferences defined in Table 3. Figure A1 on the next page displays typical indifference curves for those types in the space of own payoff (horizontal axis) and other's payoff (vertical axis).

- A selfish (**SE**) seller is a homo oeconomicus according to standard theory – she simply maximizes her own material payoff. Thus, since the payoff of the customer does not affect the seller’s utility, the indifference curves of a **SE** seller in (π_s, π_c) space are vertical.
- An efficiency loving (**EL**) expert is willing to give up own monetary payoff to increase the material payoff of her trading partner if the 'price of giving' is not too high. Thus, the indifference curves of an **EL** expert in (π_s, π_c) space are negatively sloped everywhere (if π_c increases π_s has to decrease to hold the expert indifferent). Note that this class subsumes altruists, as modelled by Andreoni and Miller (2002), for instance; as well as surplus maximizers, as discussed by Engelmann and Strobel (2004), among others.
- A spiteful (**SP**) expert is willing to give up own material payoff to decrease the payoff of her trading partner if the 'price of taking' is not too high. Thus, the indifference curves of a **SP** seller in (π_s, π_c) space are positively sloped. Note that this class includes spiteful agents, as modelled by Levine (1998), for instance; competitive agents à la Charness and Rabin (2002); and agents with concerns for relative income à la Duesenberry (1949).
- An inequality averse (**IA**) expert wants to see the payoff of her customer increased if she is better off than the customer, but she wants to see the customer's payoff decreased if the opposite is the case. Thus, the defining feature of inequality averse preferences in (π_s, π_c) space is negatively sloped indifference curves in the domain of advantageous and positively sloped indifference curves in the domain of disadvantageous inequality. Note that this class includes inequity or inequality averse agents, as modelled by Fehr and Schmidt (1999), or Bolton and Ockenfels (2000), for instance; agents with egalitarian motives, as discussed by Dawes et al. (2007) and by Fehr et al. (2008), among others; as well as difference averse agents à la Charness and Rabin (2002) and Fisman et al. (2007).
- An inequality loving (**IL**) expert is willing to sacrifice own material payoff to increase the difference between the payoffs of the two trading partners. Thus, the indifference curves of an **IL** seller in (π_s, π_c) space are positively sloped in the domain of advantageous inequality and negatively sloped in the domain of disadvantageous inequality. Note that this class includes equity averse agents as discussed, e.g., by Charness and Rabin (2002) and by Fershtman et al. (2012).

The above distinction between five classes of social preferences omits types that are selfish in one of the two domains and pro- or anti-social in the other (see Kerschbamer 2015 for a distinction between 9 archetypes of social preferences). In the experimental section (Section 5) we allow for such hybrid types. We do so by extending the definitions of **IA** and **IL** as follows:

- We assign a subject to **IA** if her behavior is consistent with the combination a) $\partial U/\partial \pi_c \geq 0$ for $\pi_s \geq \pi_c$; b) $\partial U/\partial \pi_c \leq 0$ for $\pi_s < \pi_c$; and c) at least one of the two derivatives is different from 0.
- And we assign a subject to **IL** if her behavior is consistent with the combination a) $\partial U/\partial \pi_c \leq 0$ for $\pi_s \geq \pi_c$; b) $\partial U/\partial \pi_c \geq 0$ for $\pi_s < \pi_c$; and c) at least one of the two derivatives is different from 0.

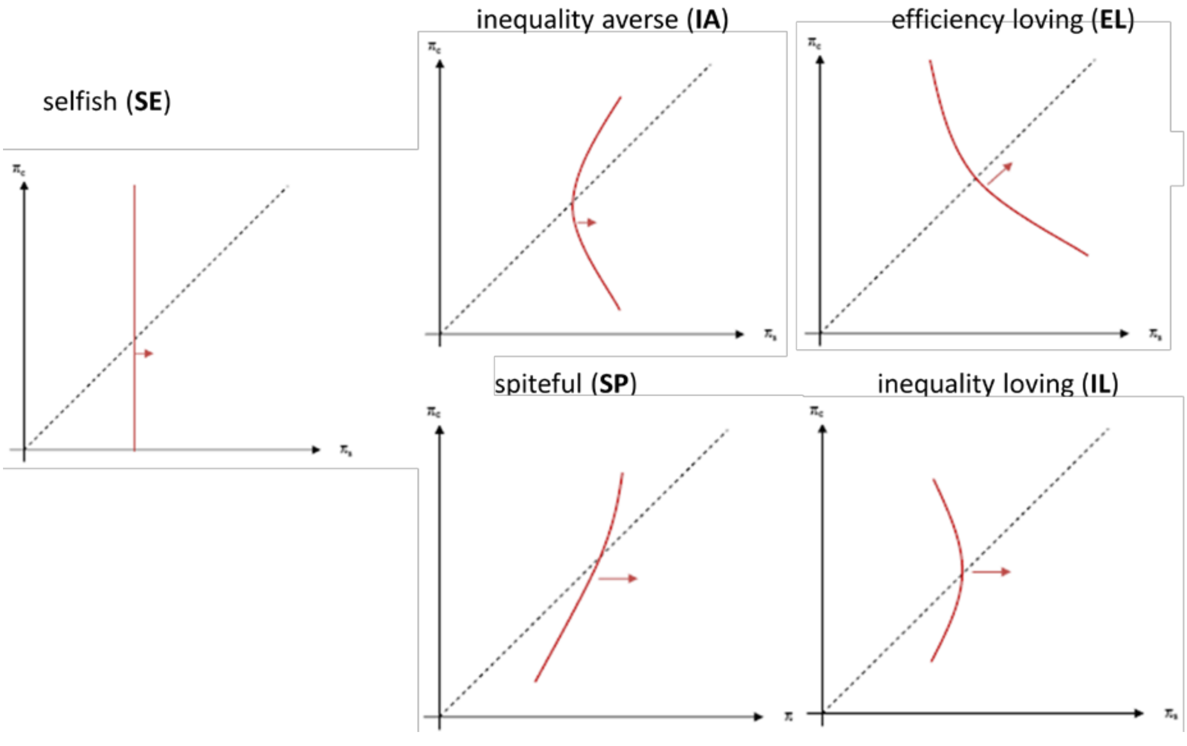

Figure A1: Indifference Curves of SE, IA, EL, SP and IL Experts in (π_s, π_c) Space

Note: A downward sloping segment of an indifference curve implies benevolent (or pro-social) preferences in the respective domain while an upward sloping segment of an indifference curve implies malevolent (or anti-social) preferences in the respective domain.

References

Andreoni, J. and Miller, J. (2002). Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism. *Econometrica* 70, 737-753.

Bolton, G. and Ockenfels, A. (2000). ERC: A Theory of Equity, Reciprocity, and Competition. *American Economic Review* 90, 166-193.

Charness, G. and Rabin, M. (2002). Understanding Social Preferences with Simple Tests. *Quarterly Journal of Economics* 117, 817-869.

Dawes, Ch., Fowler, J., Johnson, T., McElreath, R. and Smirnov, O. (2007). Egalitarian Motives in Humans, *Nature* 446, 794-796.

Duesenberry, J. (1949). *Income, Saving and the Theory of Consumer Behavior*. Harvard University Press, Cambridge, MA.

Engelmann, D. and Strobel, M. (2004). Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments. *American Economic Review* 94, 857-869.

Fehr, E., Bernhard, H., and Rockenbach, B. (2008). Egalitarism in Young Children. *Nature* 454, 1079-1083.

Fehr, E. and Schmidt, K. (1999). A Theory of Fairness, Competition, and Cooperation. *Quarterly Journal of Economics* 114, 817-868.

Fershtman, Ch., Gneezy, U. and List, J. (2012). Equity Aversion: Social Norms and the Desire to be Ahead. *American Economic Journal: Microeconomics* 4, 131-144.

Fisman, R., Kariv, S. and Markovits, D. (2007). Individual Preferences for Giving. *American Economic Review* 97, 1858-1876.

Kerschbamer R. (2015). The Geometry of Distributional Preferences and a Non-Parametric Identification Approach: The Equality Equivalence Test. Forthcoming in *European Economic Review.*

Levine, D. (1998). Modeling Altruism and Spitefulness in Experiments. *Review of Economic Dynamics* 1, 593-622.

Online APPENDIX Part B:
Proof of Lemma 1

Lemma 1 (Monotonicity) *Consider two price-vectors, the price-vector Ω from Definition 1 and a second vector, Ψ, which has the same* p^1 *as Ω (i.e.,* $p^1_{\Psi} = p^1_{\Omega}$*) but a different* p^0 *(i.e.,* $p^0_{\Psi} \neq p^0_{\Omega}$*). If* $p^0_{\Omega} < p^0_{\Psi}$ *(*$p^0_{\Omega} > p^0_{\Psi}$*, respectively) then – keeping the consumer's need with respect to quality constant – an expert who provides* q^0 *(*q^1*, respectively) under Ω must provide* q^0 *(*q^1*, respectively) under Ψ.*

Proof First note that providing q^1 yields the equal-material-payoffs allocation $\pi_s = \pi_c = (v - c^1)/2$, independently of the consumer's need and independently of whether Ω or Ψ is the relevant price-vector. By contrast, the payoff allocation from providing q^0 depends on both, the consumer's need and the type of contract. Suppose first the consumer needs q^0. Then providing q^0 under Ω yields $\pi_s = (v - c^1)/2$ and $\pi_c = (v - c^1)/2 + (c^1 - c^0)$, while providing q^0 under Ψ yields $\pi_s = (v - c^1)/2 + \varepsilon$ and $\pi_c = (v - c^1)/2 + (c^1 - c^0) - \varepsilon$, where $\varepsilon > 0$ for $p^0_{\Omega} < p^0_{\Psi}$ and $\varepsilon < 0$ for $p^0_{\Omega} > p^0_{\Psi}$. Now suppose the consumer needs q^0. Then providing q^0 under Ω yields $\pi_s = (v - c^1)/2$ and $\pi_c = (v - c^1)/2 + (c^1 - c^0) - v$, while providing q^0 under Ψ yields $\pi_s = (v - c^1)/2 + \varepsilon$ and $\pi_c = (v - c^1)/2 + (c^1 - c^0) - v - \varepsilon$, where $\varepsilon > 0$ for $p^0_{\Omega} < p^0_{\Psi}$ and $\varepsilon < 0$ for $p^0_{\Omega} > p^0_{\Psi}$. It remains to be shown that $U(\phi + \varepsilon, \chi - \varepsilon)$ is increasing in ε. This follows from $\partial U/\partial \pi_s > \partial U/\partial \pi_c$ for all (ϕ, χ). ■

Online APPENDIX Part C:

Additional Experimental Results

Table A1: Overview of Results in *V-Exo1* and *V-Exo 2* (all periods)

	V-Exo1	V-Exo2	p-value
Interaction	0.62	0.64	0.29
Undertreatment	0.57	0.49	0.75
Overtreatment	0.44	0.17	0.00
Profit Seller	2.28	2.48	0.25
Profit Buyer	1.20	1.44	1.00
Number of Subjects	64	64	
Matching Groups	8	8	

Table A2: Undertreatment (UT) and Overtreatment (OT) Rates Conditional on Price-Vectors (all periods)

	UT[a]	UT[a]	p-value	OT[b]	OT[b]	p-value
p_I, p_{II}	V-Exo1	V-Exo2	(UT)	V-Exo1	V-Exo2	(OT)
(3,8)	0.036	n.a.	-	0.935	n.a.	-
(4,8)	0.237	0.211	0.60	0.409	0.414	0.96
(5,8)	0.588	0.681	0.6	0.040	0.059	0.62
(6,8)	0.657	0.606	0.87	0.077	0.026	0.84
(7,8)	0.588	0.772	0.07	0.056	0.038	0.93

[a] undertreatment: customer needs q^1, but seller provides q^0

[b] overtreatment: customer needs q^0, but seller provides q^1

Table A3: Classification of Individual Behavior in V-Exo (all periods)

social preference type	strong	weak	total
EL (efficiency loving)	13 (28.9%)	8 (17.8%)	21 (46.7%)
IA (inequality averse)	10 (22.2%)	3 (6.7%)	13 (28.9%)
SP (spiteful)	0 (0%)	2 (4.4%)	2 (4.4%)
IL (inequality loving)	0 (0%)	2 (4.4%)	2 (4.4%)
SE (selfish)	7 (15.6%)	15 (33.3%)	22 (48.9%)

Table A4: Average Profits of Sellers per Period, Conditional on Preference Type and Conditional on Interaction (based on the classification in Table 6 – see number of observations there)

social preference type	strong	weak	total
EL (efficiency loving)	2.37	2.45	2.41
IA (inequality averse)	2.22	2.69	2.33
SP (spiteful)	-	2.25	2.25
IL (inequality loving)	-	2.37	2.37
SE (selfish)	2.55	2.45	2.48

Table A5: Average Profits of Sellers per Period, Conditional on Preference Type and Conditional on Interaction (based on the classification in Table A3 – see number of observations there)

social preference type	strong	weak	total
EL (efficiency loving)	2.37	2.49	2.42
IA (inequality averse)	2.22	2.69	2.33
SP (spiteful)	-	2.21	2.21
IL (inequality loving)	-	2.37	2.37
SE (selfish)	2.64	2.48	2.53

Online APPENDIX Part D:
Experimental Instructions for the *-Exo* Treatments

INSTRUCTIONS FOR THE EXPERIMENT

Thank you for participating in this experiment. Please do not to talk to any other participant until the experiment is over.

2 Roles and 16 Rounds

This experiment consists of **16 rounds,** each of which consists of the same sequence of decisions. This sequence of decisions is explained in detail below.

There are 2 kinds of roles in this experiment: **player A** and **player B**. At the beginning of the experiment you will be randomly assigned to one of these two roles. On the first screen of the experiment you will see which role you are assigned to. Your role remains the same throughout the experiment.

A player A interacts with a player B. This pair of players **changes** for each round. Therefore you are interacting in every round with a **new** player (of the other role).

All participants get the same information on the rules of the game, including the costs and payoffs for both players.

Overview of the Sequence of Decisions in a Round

Each round consists of a maximum of 2 decisions which are made consecutively. Decision 1 is made by player B and decision 2 is made by player A. In each round 2 prices will be announced before players make their decisions. These prices are set for a given round. This price setting is referred to in the following as "Decision 0".

Short Overview of the Sequence of Decisions in a Round

0. The prices for action I and action II are announced to both players.
1. Player B decides whether he/she wants to interact with player A. If he/she chooses No, the round ends.

If player B chooses to interact then

2. Player A (but **not** player B) is informed about the type of player B. There are two possible types of player B: he/she is of either type I or type II. Player A has to choose an action: either action I or action II. He/she then receives the price for the chosen action valid for this round. This price has to be paid by player B.

Detailed Illustration of the Decisions and Their Consequences Regarding Payoffs

Decision 0

In case of an interaction **player A** has to choose between two actions, action I and action II, in Decision 2. Each chosen action causes costs which are as follows:

Action I results in a **cost of 2 points** (=currency of the experiment) for player A.

Action II results in a **cost of 6 points** for player A.

Player A receives from player B the valid price for the action he/she chooses in Decision 2 if player B decides to interact with him/her. **At Decision 0 the valid prices for action I and action II for this round are announced to both players**.

Decision 1

Player B decides whether he/she wants to interact with player A.

If he/she wants to do so, then player A chooses an action in Decision 2 and he/she receives the valid price for this action from player B.

If he/she doesn't want to interact, then this round **ends** and both players get a **payoff of 1.6 points for this round**.

Decision 2

Before Decision 2 is made (in case player B chose "Yes" at Decision 1) a type is randomly assigned to player B. **Player B** can be of one of two types: **type I** or **type II**. This type is determined **new** in **each round**. With **a probability of 50%** player B is of **type I**, and with a **probability of 50%** he/she is of **type II**. Imagine that a coin is tossed in each round. If, for example, the result is "heads", player A is of type I, if it is "tails" he/she is of type II.

Player A gets to know the **type of player B** *before* he/she makes Decision 2. Then player A chooses an action, either action I or action II, and receives the corresponding price (valid for the respective round).

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

a) In case player B is a type I player and player A chooses either action I or action II.
b) In case player B is a type II player and player A chooses action II.

An action is **not sufficient** if player B is of type II and player A chooses action I.

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 **not sufficient**. In both cases player B has to pay the valid price for the chosen action.

At no time player B will be informed about whether he/she is of type I or a type II in any given round.

Payoffs

If player B chooses not to interact in Decision 1 (*decision "No" of player B*) then both players receive **1.6 points** for this round.
Otherwise (*decision "Yes" by player B*) the payoffs are as follows:

Player A receives the **price** (denoted in points, as announced in Decision 0) for the action chosen in Decision 2, **less the cost** of this action.

Player B's payoff depends on whether the Decision 2 of player A was sufficient or not.

a) If the action was sufficient, **player B** gets **10 points less** the price for the action chosen by player A in Decision 2.
b) If the action was not sufficient, **player B** has to pay the price for the action chosen by player A in Decision 2.

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 sums up to a loss at the end of the experiment you will have to pay this amount to the supervisor of the experiment. By participating in this experiment you agree to this term. Please note 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 = 25 Euro-cents
(i.e. 4 points = 1 Euro)

University of Innsbruck - Working Papers in Economics and Statistics
Recent Papers can be accessed on the following webpage:

http://eeecon.uibk.ac.at/wopec/

2015-04 **Rudolf Kerschbamer, Matthias Sutter, Uwe Dulleck:** How social preferences shape incentives in (experimental) markets for credence goods

2015-03 **Kenneth Harttgen, Stefan Lang, Judith Santer:** Multilevel modelling of child mortality in Africa

2015-02 **Helene Roth, Stefan Lang, Helga Wagner:** Random intercept selection in structured additive regression models

2015-01 **Alice Sanwald, Engelbert Theurl:** Out-of-pocket expenditures for pharmaceuticals: Lessons from the Austrian household budget survey

2014-32 **Esther Blanco, Tobias Haller, James M. Walker:** Externalities in appropriation: Responses to probabilistic losses

2014-31 **Michael Kirchler, Stefan Palan:** Friendliness pays off! Monetary and immaterial gifts in consumer-salesperson interactions

2014-30 **Alice Sanwald, Engelbert Theurl:** Out-of-pocket expenditures of private households for dental services - Empirical evidence from Austria

2014-29 **Stefan Borsky, Esther Blanco:** Setting one voluntary standard in a heterogeneous Europe - EMAS, corruption and stringency of environmental regulations

2014-28 **Eberhard Feess, Christian Grund, Markus Walzl, Ansgar Wohlschlegel:** Competing trade mechanisms and monotone mechanism choice

2014-27 **Esther Blanco, E. Glenn Dutcher, Tobias Haller:** To mitigate or to adapt? Collective action under asymmetries in vulnerability to losses

2014-26 **Alice Sanwald, Thomas Schober:** Follow your heart: Survival chances and costs after heart attacks - An instrumental variable approach

2014-25 **Eric Mayer, Sebastian Rüth, Johann Scharler:** Total factor productivity and the propagation of shocks; Empirical evidence and implications for the business cycle

2014-24 **Susanne Berger, Herbert Stocker, Achim Zeileis:** Innovation and institutional ownership revisited: An empirical investigation with count data models

2014-23 **James C. Cox, Rudolf Kerschbamer, Daniel Neururer:** What is trustworthiness and what drives it?

2014-22 **Michael Kirchler, Caroline Bonn, Jürgen Huber, Michael Razen:** The "Inflow-Effect" - Trader inflow and bubble formation in asset markets

2014-21 **Silvia Angerer, Daniela Glätzle-Rützler, Philipp Lergetporer, Matthias Sutter:** Donations, risk attitudes and time preferences: A study on altruism in primary school children *forthcoming in Journal of Economic Behavior and Organization*

2014-20 **Christian Kleiber, Achim Zeileis:** Visualizing count data regressions using rootograms

2014-19 **Matthias Siller, Christoph Hauser, Janette Walde, Gottfried Tappeiner:** The multiple facets of regional innovation

2014-18 **Carmen Arguedas, Esther Blanco:** On fraud and certification of corporate social responsibility

2014-17 **Achim Zeileis, Christoph Leitner, Kurt Hornik:** Home victory for Brazil in the 2014 FIFA World Cup

2014-16 **Andreas Exenberger, Andreas Pondorfer, Maik H. Wolters:** Estimating the impact of climate change on agricultural production: accounting for technology heterogeneity across countries

2014-15 **Alice Sanwald, Engelbert Theurl:** Atypical employment and health: A meta-analysis

2014-14 **Gary Charness, Francesco Feri, Miguel A. Meléndez-Jiménez, Matthias Sutter:** Experimental games on networks: Underpinnings of behavior and equilibrium selection *slightly revised version forthcoming in Econometrica*

2014-13 **Uwe Dulleck, Rudolf Kerschbamer, Alexander Konovalov:** Too much or too little? Price-discrimination in a market for credence goods

2014-12 **Alexander Razen, Wolgang Brunauer, Nadja Klein, Thomas Kneib, Stefan Lang, Nikolaus Umlauf:** Statistical risk analysis for real estate collateral valuation using Bayesian distributional and quantile regression

2014-11 **Dennis Dlugosch, Kristian Horn, Mei Wang:** Behavioral determinants of home bias - theory and experiment

2014-10 **Torsten Hothorn, Achim Zeileis:** partykit: A modular toolkit for recursive partytioning in R

2014-09 **Rudi Stracke, Wolfgang Höchtl, Rudolf Kerschbamer, Uwe Sunde:** Incentives and selection in promotion contests: Is it possible to kill two birds with one stone? *forthcoming in Managerial and Decision Economics*

2014-08 **Rudi Stracke, Wolfgang Höchtl, Rudolf Kerschbamer, Uwe Sunde:** Optimal prizes in dynamic elimination contests: Theory and experimental evidence *forthcoming in Journal of Economic Behavior and Organization*

2014-07 **Nikolaos Antonakakis, Max Breitenlechner, Johann Scharler:** How strongly are business cycles and financial cycles linked in the G7 countries?

2014-06 **Burkhard Raunig, Johann Scharler, Friedrich Sindermann:** Do banks lend less in uncertain times?

2014-05 **Julia Auckenthaler, Alexander Kupfer, Rupert Sendlhofer:** The impact of liquidity on inflation-linked bonds: A hypothetical indexed bonds approach

2014-04 **Alice Sanwald, Engelbert Theurl:** What drives out-of pocket health expenditures of private households? - Empirical evidence from the Austrian household budget survey

2014-03 **Tanja Hörtnagl, Rudolf Kerschbamer:** How the value of information shapes the value of commitment or: Why the value of commitment does not vanish

2014-02 **Adrian Beck, Rudolf Kerschbamer, Jianying Qiu, Matthias Sutter:** Car mechanics in the lab - Investigating the behavior of real experts on experimental markets for credence goods *forthcoming in Journal of Economic Behavior and Organization*

2014-01 **Loukas Balafoutas, Adrian Beck, Rudolf Kerschbamer, Matthias Sutter:** The hidden costs of tax evasion - Collaborative tax evasion in markets for expert services

University of Innsbruck

Working Papers in Economics and Statistics

2015-04

Rudolf Kerschbamer, Matthias Sutter, Uwe Dulleck

How social preferences shape incentives in (experimental) markets for credence goods

Abstract
Credence goods markets suffer from inefficiencies caused by superior information of sellers about the surplus-maximizing quality. While standard theory predicts that equal mark-up prices solve the credence goods problem if customers can verify the quality received, experimental evidence indicates the opposite. We identify a lack of robustness with respect to heterogeneity in social preferences as a possible cause of this and conduct new experiments that allow for parsimonious identification of sellers' social preference types. Our results indicate that less than a fourth of the subjects behave in accordance with the standard assumption on preferences, the rest behaving either in line with other forms of selfish or in accordance with different variants of non- selfish social preferences. We discuss consequences of our findings for institutional design and agent selection.

ISSN 1993-4378 (Print)
ISSN 1993-6885 (Online)