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Deception and price in a market with asymmetric information

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Abstract

In markets with asymmetric information, only sellers have knowledge about the quality of goods. Sellers may of course make a declaration of the quality, but unless there are sanctions imposed on false declarations or reputations are at stake, such declarations are tantamount to cheap talk. Nonetheless, in an experimental study we find that most people make honest declarations, which is in line with recent findings that lies damaging another party are costly in terms of the liar's utility. Moreover, we find in this experimental market that deceptive sellers offer lower prices than honest sellers, which could possibly be explained by the same wish to limit the damage to the other party. However, when the recipient of the offer is a social tie we find no evidence for lower prices of deceptive offers, which seems to indicate that the rationale for the lower price in deceptive offers to strangers is in fact profit-seeking (by making the deal more attractive) rather than moral.

Keywords: honesty, deception, asymmetric information, price signaling, social ties

1 Introduction

A market is said to have asymmetric information if only the sellers know the quality of goods. George Akerlof's (1970) famous game-theoretic paper on the "market for lemons" showed that, given certain conditions, good quality would be driven out of markets with information asymmetries. Experimental studies support this basic argument (Holt, 1995). The core features of the traditional market-for-lemons model are quality and prices of goods. High quality goods are assumed to be more valuable to sellers and buyers alike, but only sellers know the quality at the time of sale. In order for any deception to take place, sellers must also be able to make a quality declaration, true or false. If no reputation-building or other sanctions are possible, such declarations are considered cheap talk and are usually discarded as irrelevant in game theory (e.g., Crawford & Sobel, 1982). In effect, in standard game theory everyone is supposed to lie if they benefit by doing so.[1]

The archetypical example of a market-for-lemons is the market for used cars. However, Uri Gneezy (2005) points out an empirical departure from the theoretical prediction:

> One of the conclusions raised by the lemons model is that only dealers who can offer a warranty will sell used cars of high quality. This conclusion is not in line with the real-world coexistence of professional car dealers and private sellers who sell cars of high quality without a warranty.

He then suggests that buyers often place sufficient trust in private sellers' honesty because many private sellers actually prefer to be honest. Indeed, many experimental studies have found that most subjects usually do not take advantage of a possibility to deceive another party (e.g., O'Connor & Carnevale, 1997; Schweitzer & Croson, 1999; Gneezy, 2005). These studies also identify several moderators of the decision whether to deceive; in particular, Gneezy (2005) found that deception is less likely to occur the more it damages the other party. We will think of this as a moral cost of deception.

Here we present a novel experimental study of deception and price in a market for lemons. As far as we know, there has been no previous study of deceptive declarations of quality in such markets. Our first aim is to establish that also in this context, most subjects will tend to be honest. Said differently, we expect most subjects who advertise a "peach" will actually sell a peach and not a lemon.

Our second and main aim is to study the relationship between deception and pricing. In a market where the sellers set the prices, no gain is made from deception unless the seller actually charges more for the good when the buyer believes it to be of high quality. This pricing

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[1]In a recent preprint, Demichelis and Weibull (2006) derive interesting game-theoretic implications of a very slight preference for honesty.

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aspect has no counterpart in Gneezy's study, where subjects only chose whether to be honest or to deceive. In our experiment, "gadget" sellers compete for buyers both with (declared) quality and price. At first glance, it may seem unreasonable for honest and deceptive sellers to deviate in the price they offer, since the gadgets are indistinguishable to the buyers at the time of purchase. However, as we will discuss immediately below, there are several reasons why deceptive sellers might charge less. In the terminology of Wolinsky (1983) higher price "signals" higher quality. Hence, our second question is whether sellers in our market employ price signaling.

Why would deceptive sellers charge less? Following Gneezy, liars that are concerned with the damage their deception causes buyers might want to compensate by offering a lower price; let us call this mechanism *moral price signaling.* An alternative mechanism is *rational price signaling*: profit-maximizing sellers who believe that most buyers prefer to buy lower-priced goods would actually charge less when deceptive than when honest. The reason is that the possibility of a higher price is relatively less attractive for a seller who does not have to bear the cost of parting with high quality.[2]

It is difficult to distinguish between these two mechanisms within the same market framework. Our approach is to let sellers make offers both to strangers and to friends. The rationale for this comes from research in sociology and social psychology showing that information asymmetries lead to strong preferences for socially embedded transactions on the part of buyers since friends are more trusted to behave honestly (e.g., Kollock, 1994; Kollock & O'Brien, 1992; DiMaggio & Louch, 1998; Yamagishi et al., 1998). Therefore, a seller who gives an offer to a friend can, regardless of price, be relatively certain that this offer will not be rejected out of distrust. Consequently, rational price signaling would not be expected between friends whereas moral price signaling would, if anything, be more accentuated between friends. Our third question is thus whether price signaling is dependent on whether offers are made to social ties or strangers.

The cross-national[3] experiment outlined in the section to follow was designed to answer these questions. We collected data on sellers as well as buyers. These latter data allow us to investigate buyers' preferences over prices and social embeddedness. In particular we want to ascertain that buyers tend to prefer lower priced offers unless the offer is from a friend.

2 Method

We conducted experiments concurrently in Sweden and the U.S. The labs at both locations have a number of isolated subject stations set up for interactive games over a local network.

2.1 Participants

Potential participants from pools of volunteers were contacted via telephone (for the U.S. component) or email (for the Swedish component). The scheduler told the potential participant that the study required that they bring a "friend or acquaintance" (hereafter friend) who would also be paid for his or her participation. Those who were able to bring a friend were scheduled. 104 participants in the Swedish component and 61 participants in the U.S. component gave a total of 165 participants.[4] As described below, 68 participants were assigned roles as sellers, 97 as buyers.

2.2 Procedure

Upon arrival, each participant was escorted to a private subject room equipped with a networked computer. After filling out consent and participant information forms, participants completed a computer-based questionnaire containing a number of questions about themselves and their friends. Thereafter participants read on-screen instructions for the experimental procedure. (The software for the procedure is available on request from the authors.)

Participants in our study bought and sold "gadgets" which came in different qualities; a good gadget was worth 30 Swedish kronor to a buyer and 15 Swedish kronor to a seller, whereas a bad gadget was worth 15 Swedish kronor to a buyer and nothing to a seller.[5] On-screen instructions told each participant whether he/she was assigned the role as buyer or seller. After the gadget game (described immediately below) was completed, participants answered a twenty item questionnaire. Participants were then paid, debriefed and dismissed.

[2]Formally, if $P(x)$ denotes the seller's expected probability of selling if offering at price x, then we assume that $P(x)$ is a decreasing, continuously differentiable function of x. If w denotes the value of the gadget to the seller, then the expected profit from an offer at price x is $v_w(x) = (x - w) \cdot P(x)$. The optimal offer is the price x_w for which the derivative of the profit equals zero: $(x_w - w)P'(x_w) + P(x_w) = 0$ $\Rightarrow w = x_w + P(x_w)/P'(x_w)$. The probability function $P(x)$ is always non-negative, and we have assumed its derivative to be negative, so the right-hand side is non-positive when x_w equals zero. By continuity, the right-hand expression must reach the value of a low quality gadget before it reaches the greater value of a high quality gadget, i.e., $x_{low} < x_{high}$.

[3]Data were collected in Sweden and the U.S. as part of a larger research project on trust and trustworthiness. Comparative aspects are not studied in the present paper.

[4]A computer failure resulted in the loss of one data point at the U.S. site, hence the odd number of U.S. participants.

[5]For the U.S. component, the conversion rate 10 SEK = 1 USD was used.

Table 1: Gadget quality (good vs. bad) and price (in SEK) offered to friends vs. strangers (s.d. in parentheses)

	Proportion good quality	Mean price good quality	Mean price bad quality
Offers to Friends, declared as good (*N* = 52)	0.71	22.16 (4.90)	22.33 (4.58)
Offers to Strangers, declared as good (*N* = 332)	0.64	22.89 (4.74)	19.98 (5.21)

We begin by discussing the procedures for the seller experiment, and then turn to the procedures for buyers.

2.3 Procedure for sellers

The instructions for sellers (Appendix A) explained that they could extend offers to four different buyers. An offer would consist of a price and a quality declaration ("good" or "bad"). Sellers would also decide on the actual quality of the gadget, but buyers would not know the actual quality until after the purchase and would have no opportunity for complaint.

Sellers were further informed that each buyer would receive prices simultaneously from up to four different sellers (listed along with the sellers' first names and initials and quality declarations), and could pick at most one of them. Buyers were identified by first names and last initials, so that sellers could ostensibly identify friends (and thereby take friendship into account in making decisions about offers).

Sellers participated in two rounds, with separate sets of buyer-names for each round. In the first round, one buyer was ostensibly the seller's friend. Six other ostensible buyers had typical Swedish or American names.[6] Thus, each seller gave in total six offers to strangers and one offer to a friend.

2.4 Procedure for buyers

Buyers were given a complement to sellers' procedures and instructions (Appendix B). Specifically, buyers' instructions explained that they would receive offers from four different sellers, and could pick at most one of them. Offers consisted of a price for the gadget, together with a quality declaration ("good" or "bad"). However, buyers were told that sellers could give false declarations about a gadget's quality. Buyers saw the first name and initials of sellers, along with prices and quality declarations. In reality, all offers were simulated.

There were two gadget purchase rounds, each with a separate set of seller names. In both rounds, all offers had gadgets declared as *good*, but at various prices. In each round, buyers decided which offer, if any, to accept.

In the first purchase, buyers were randomly assigned to one of two treatments: One treatment showed the friend's name at the *lowest* price, the other treatment showed the friend's name at the *third* lowest price, with other offers from strangers with names of the same sex. These two conditions allow us to address whether socially embedded exchanges are attractive regardless of competitiveness in price.

In the second purchase, all offers were from strangers to establish the baseline of buyers' price preferences.

3 Results

3.1 Sellers

We categorize offers in two recipient-categories: 68 offers to friends and $6 \times 68 = 408$ offers to strangers. A minority of these offers (19.3%) had quality declared as *bad*.[7] Henceforth, we only discuss the remaining offers in which the declared quality was *good*. For these offers, there are two outcome variables: (actual) quality and price. Table 1 shows quality and prices in offers to friends and strangers.[8]

The table clearly shows that the majority of offers were honest in their declaration of good quality. It also indicates a correlation between price and quality in offers to strangers, but not in offers to friends.

In order to test the correlation in offers to strangers, we computed each seller's average price for good gadgets and similarly for bad gadgets. Thirty-nine sellers made offers on both good and bad gadgets. A paired t-test on these data showed a significant price difference between bad and good gadgets, $t(38) = -4.66$, $p < 0.0001$.

We wanted to address more explicitly the interaction between quality and the buyer-seller relationship in their effects on price. Note, however, that each seller made only one offer to a friend. Thus, we had no within-subject

[6] As part of another study the eighth buyer had a typical Muslim name; we exclude these offers from our analyses in the present paper.

[7] As one would expect, prices of gadgets declared as bad were all in the range of up to 15 Swedish kronor, the value of a bad gadget to a buyer.

[8] Genders differed significantly in one aspect only: in offers to friends, female sellers showed a much higher degree of honesty (92%) than the male sellers (50%).

variability for quality and prices to friends. To assess the interaction, we split sellers in two groups depending on the quality of the gadget delivered to the friend. For each seller we computed the difference between the price offered to the friend and the average price delivered to strangers for a gadget *of the same quality* as the one delivered the friend. We wanted to test whether the price difference in the "bad quality" group (N = 15, mean 2.3, std 7.9) was greater than that in the "good quality" group (N = 35, mean −1.1, std 4.5). An independent samples t-test yielded a significant difference between these groups: $t(48) = 1.90$, $p = .03$ (one tailed). In sum, prices offered to friends did not depend on quality, but prices to strangers were higher when quality was good.

3.2 Buyers

Table 2 shows buyers' purchases in each of the conditions: control (i.e., all strangers), friend's name listed with the lowest price, and friend's name listed with the third lowest price.

Data from Table 2 clearly support our basic predictions regarding buyers' behavior. In the control treatment a binomial test confirms that low offers (1st and 2nd price) have significantly more takers than higher offers (3rd or 4th price), $p < .001$. Still, the very lowest offer was not especially popular, suggesting that trustworthiness was a concern.[9]

Finally, we want to show that we observe more takers at a given price if the seller is a friend. Consider, first, how likely buyers are to accept the lowest offer. When the friend's offer is the lowest, 67% of the participants accepted it. However, for the control condition where the friend does not make an offer), only 31% of participants accepted the lowest offer. We see the same preference for socially embedded purchases when the friend's price is not among the lowest. When the friend offers the third lowest price, 48% of participants accept it. However, only 21% participants accept the third lowest price when all offers are from strangers. More concretely, Fisher's exact test shows that a friend's name at the lowest price predicts more takers of this offer than in the control condition, $p < .0001$; similarly, a friend's name at the third price predicts more takers of that offer, $p < .005$. Thus, buyers tend to solve the problem of social uncertainty by relying on socially embedded transactions, even if it means paying a higher price.

[9] In interviews at the conclusion of the experiment, participants often reported that they followed a heuristic to avoid the lowest price because it was "too good to be true."

Table 2: Buyers' choices in different treatments

	Choice of offer (%):				
	Lowest	2nd	3rd	4th	No offer
Control (N=70)	31	31	21	4	11
Friend low (N=52)	67	10	13	8	2
Friend 3rd (N=44)	23	16	48	7	7

4 Discussion and conclusion

As expected, we obtained a definite positive answer to our first question about whether honesty would prevail in a market for lemons: Even among strangers, only about one third of the products sellers advertised as peaches were actually lemons.

The second question too received a clear answer: In offers to strangers, deception about quality is associated with a lower price. The prices set by deceptive sellers (those who advertised peaches and delivered lemons) were less than 90% of the prices set by honest sellers (those who advertised and delivered peaches). In the introduction we outlined two possible mechanisms that could account for such a pattern: moral price signaling where, following Gneezy, deceptive sellers try to limit the damage to buyers caused by the deception; or rational price signaling, where deceptive sellers are eager to sell their worthless goods at any price. In the latter case, the rationale to set a lower price would be to increase the probability of making a sale; as expected, our data on buyer behavior supports that lower prices are taken more often than higher prices.

In order to distinguish between these conjectural explanations, we also studied offers to friends. If people wanted to combine deception with a low price in order to limit the damage to the other party, then we would expect the same pattern in offers to friends. We found absolutely no evidence for price signaling in offers to friends; however, the limited statistical power on friends in our experimental design was not sufficient to give a clear answer to whether seller behavior toward friends was different from their behavior toward strangers. Still, the observed tendency is in line with what we would expect from rational price signaling. Our argument in the introduction was based on the assumption that sellers would expect buyers to buy from friends when possible (i.e. to prefer socially embedded transactions, in line with established theory on information asymmetry). Our data on buyers confirm that they indeed tend to prefer to buy from friends, even when the price is high.

We would like to remark on the unanticipated result that the majority of buyers did not choose the lowest-

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priced offer. Our interpretation is that most buyers sense the price-signaling that is going on, i.e. they expect deceptive sellers to try to use low prices to attract suckers. Marketing research has showed that consumers often infer quality from price (Zeithamel, 1988), but it is still somewhat surprising that they do in this type of experimental game.

Summing up, this paper contributes to the literature on uncertainty by showing how signaling depends critically on important social factors. In order for price signaling to work, some sellers must be honest. Otherwise, signals would either never emerge or quickly break down. However, we have suggested that we need not assume that dishonest sellers price their lemons lower due to a motivation to limit the damage caused to the buyer. Rather dishonest sellers capitalize on a price-signaling system in order to maximize profit by increasing the likelihood of making a sale. Results from our experimental market are consistent with these arguments.

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Appendix A. Instructions and decision form for sellers.

Instructions

In this scenario you own a supply of gadgets, some of which are of bad quality, i.e. in need of repair, though it doesn't show on the outside. A *good* gadget is worth \$1.50 to you and \$3 to a potential buyer. Because repair costs \$1.50, a *bad* gadget is worth nothing to you, and \$1.50 to a potential buyer. You can earn money in this game by selling gadgets at a higher price than their worth to you.

For instance, suppose you make an offer at, say, \$2.25 for a good gadget. If the buyer accepts this offer, your gain will be \$2.25-\$1.50 = \$0.75 (whereas the buyer will gain \$3.00-\$2.25=\$0.75). If you make the same offer for a bad gadget, and it is accepted, your gain will be \$2.25, whereas the buyer will gain \$1.50-\$2.25=-\$0.75 (i.e. the buyer makes a loss).

Buyers will not know if a gadget is good until after they have bought it, and they will have no opportunity for complaint. You can, if you wish, lie about the quality by offering a bad gadget and declaring it to be good.

Every buyer will receive four offers from sellers like you, and will choose one of them.

First round

In this round you make offers to the below four buyers.

To buyer **Mike A.** I offer a gadget at price \$______, and I declare it to be ______.

To buyer **John W.** I offer a gadget at price \$______, and I declare it to be ______.

To buyer **Shane S.** I offer a gadget at price \$______, and I declare it to be ______.

To buyer **David F.** I offer a gadget at price \$______, and I declare it to be ______.

Appendix B. Instructions and decision form for buyers.

Instructions

Gadgets come in two qualities: a *good* gadget is worth $3 to you (and $1.50 to the seller) whereas a *bad* gadget is worth $1.50 to you (and nothing to the seller).

You will receive offers from four different sellers. An offer consists of a price for the gadget and a quality declaration of whether the gadget on sale is good or bad. However, a seller may give a false declaration, misrepresenting a bad gadget as good.

You may assume that you have an account with money to use for purchase of gadgets; what you earn in this scenario is the difference between the price worth of the gadget you buy and the price you pay for it. For instance, if you accept an offer at, say, $2.25, and it turns out to be a good gadget, your gain will be $(3.00-2.25)=$.75. On the other hand, if it turns out to be a bad gadget, you will gain $(1.50-2.25)=-$0.75, i.e. a loss, which will be subtracted from your total gains of this experiment.

First round

Four sellers have given you the following offers. Accept one or none of them.

Kelly R. offers you a gadget for **$2.10**, declaring it as **good**. Accept this offer:

Anna A. offers you a gadget for **$1.80** , declaring it as **good**. Accept this offer:

Darla H. offers you a gadget for **$2.50**, declaring it as **good**. Accept this offer:

Lisa R. offers you a gadget for **$2.30** , declaring it as **good**. Accept this offer:

Accept none of these offers:

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