The competitive advantage of honesty

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We theoretically and experimentally study the influence of producers' honesty on consumers' purchasing decisions. In a competitive market, producers can save wage costs by lying to their workers. Our treatments vary consumers' observability of within-firm honesty. We show that when producers' honesty is fully transparent, honesty provides a competitive advantage: Despite higher production costs, honest firms make higher profits than dishonest firms. A robustness treatment demonstrates that this result is driven by honesty concerns and not by fairness towards the workers. Our findings extend the literature on consumer social responsibility by adding firms' honesty as an important decision criterion in consumer choice.

Keywords: Social responsibility, lying, consumer choice, market experiment

JEL classification: M14, C91, A13, J81,

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1 Introduction

Consumer social responsibility is "the conscious and deliberate choice to make certain consumption choices based on personal and moral beliefs," which may show up as "expressed activity in terms of purchasing or non-purchasing behavior" (Devinney, Auger, Eckhardt and Birtchnell 2006, p. 32). The impact of consumer social responsibility on total consumption decisions and its drawbacks for producers is a widely debated issue in consumer research (for an overview, see e.g., Smith, 2007). In recent years, these questions have also been addressed in controlled experimental frameworks. In the experiments by Rode, Hogarth, and Le Menestrel (2008), Etilé and Teyssier (2012), and Feicht, Grimm and Seebauer (2014), consumers are willing to pay (slightly) higher prices to buy a product that implies a donation to an NGO. Bartling and Weber (2015) find that consumers accept a price premium for goods that do not harm a third person. The effect of consumer social responsibility in different competition conditions is studied in Pigors and Rockenbach (2015). They find no indications for consumer social responsibility when the supplier is a monopolist. In competitive markets, however, when consumers can choose between different offers, consumers' purchasing behavior may make socially-responsible production profitable for suppliers. These experiments focus on payoff allocations as a proxy for social responsibility. Although distributional consequences are an important aspect, it is surely not the only influence on consumers' "moral beliefs." Companies' (lack of) compliance, for example, with human rights, animal rights, environmental protection, political rights, tax laws, and workers' rights are important factors in the recent discussions of corporate social responsibility and as triggers for boycott calls by "ethical consumers." O'Connor and Meister (2008) ask subjects to rank-order different measures commonly found in corporate social responsibility communication and identify honesty as the most important attribute of a corporation.[3] However, the extent to which a corporation's honesty actually influences consumers' purchasing behavior has not yet been studied. In this paper, we close this gap by examining the role of a corporation's honesty on consumers' purchasing behavior and disentangling the effects of honesty from distributional concerns.

In our experimental market, firms offer consumers a good with a fixed induced monetary value. Each firm determines the price of the product and the wage paid to its worker. A firm's worker either has a high or a low ability for the production process. High (low) ability workers entail low (high) production costs. The worker's ability is observed by the firm, but

[3] "I think a corporation should be honest" ranked prior to "produces quality products and services," "treat employees fairly," "give back to the community through philanthropic activities" and "conduct business in an environmentally friendly manner."

not by the worker. The firm communicates the ability to its worker, and based upon this communicated ability, a pre-specified wage is paid to the worker: a high wage for high ability and a low wage for low ability. The firm's communication does not have to be truthful. Obviously, firms can save overall production costs by being dishonest: A dishonest firm may communicate a low ability to its high ability worker and thus benefit from the low production cost of the high ability worker, but only pay the low wage. In our research, we ask whether consumers honor firms' honesty towards their workers. Specifically, we are interested in whether consumers would pay a higher price to buy from an honest firm and, if so, identifying the conditions that make honesty a competitive advantage.

We address these questions in an experimental Bertrand duopoly with two firms and two consumers. The experimental treatments vary the consumers' information on the firms' honesty towards their workers and allow testing for consumers' preferences for within-firm honesty. We find that absent any wage and honesty information passed to consumers, honesty is very low, resulting in low wages. However, when consumers see both workers' wages and firms' honesty, consumers take firms' honesty as a significant criterion for their purchasing decisions. This effect is strong enough to render honesty a competitive advantage for firms. Honest firms make higher profits by selling more units, albeit not at higher prices. In a robustness treatment that separates honesty from fairness concerns for the worker, we show that this result is driven by honesty and not by consumers' distributional fairness concerns.

We complement the experimental findings by presenting a simple model of consumers' purchasing decisions, which incorporates social preferences as well as preferences for being involved in honest transactions. Our data show that apart from allocative preferences, preferences for buying from an honest firm play a crucial role in consumers' purchasing decisions.

2 The market model

In our experiment, we study a bilateral Bertrand duopoly with two firms A and B and two consumers X and Y. Firms offer a good on the market, consumers may purchase at most one unit of the good, and each firm may potentially serve both consumers. Each consumer has a fixed valuation v for the good (in the experiment $v = 30$). Each firm consists of a manager M_z and a worker W_z, $z \in \{\mathrm{A}, \mathrm{B}\}$. The manager determines the price p_z for the units of the good her firm offers (in the experiment $p_z \in \{0,1, \dots, v\}$) and determines the wage w_z of her worker (for details see below). The worker produces the firm's units of the good.

Before the market starts, a "state of the world" $S \in \{\underline{S}, \overline{S}\}$ is randomly drawn, whereby both realizations are equally likely. You may think of the state S as a proxy for the production environment of the firm. A firm's worker does not know the exact production environment, i.e., the realization of S, but provides a guess $\hat{S}$ for S. The accuracy of the worker's guess is a proxy for the worker's ability and determines the production costs c he entails for his firm. If the worker guessed right ($\hat{S} = S$), the worker is a "high ability worker" who entails low production costs c_1 (in the experiment $c_1 = 0$) for his firm. Otherwise, if $\hat{S} \neq S$, the worker entails high production costs $c_0 > c_1$ (in the experiment $c_0 = 6$) for his firm.

The firm's manager has complete information on the production environment and the worker's guess, i.e., knows both S and $\hat{S}$. The manager informs her worker whether he guessed right or wrong, i.e., sends information $I \in \{guessed\ right, guessed\ wrong\}$. This information does not have to be true: It can be *honest*, i.e., ($\hat{S} = S$ and $I = guessed\ right$) and ($\hat{S} \neq S$ and $I = guessed\ wrong$), or *dishonest*. The information sent determines the worker's wage: If a manager informs her worker that he guessed right, she pays a high wage w_1 (in the experiment $w_1 = 7$) to the worker. If a manager informs her worker that the guess was wrong, she pays a low wage $w_0 < w_1$ (in the experiment $w_0 = 3$) to the worker. The manager has no discretion to change these exogenously fixed wages. Hence, payoffs are:

$$\Pi_{Consumer} = \begin{cases} v - p = 30 - p & \text{if consumer buys one unit of the good} \\ 0 & \text{if consumer does not buy one unit of the good} \end{cases} \quad (1)$$

$$\Pi_{Worker} = w = \begin{cases} w_0 = 3 & \text{if manager informs worker that the guess is wrong} \\ w_1 = 7 & \text{if manager informs worker that the guess is right} \end{cases} \quad (2)$$

$$\Pi_{Manager} = p \cdot \text{number of units sold} - (c + w) \quad (3)$$

$$\text{with } c + w = \begin{cases} c_1 + w_1 = 7 & \text{if worker guessed } right \text{ and manager is } honest \\ c_1 + w_0 = 3 & \text{if worker guessed } right \text{ and manager is } dishonest \\ c_0 + w_0 = 9 & \text{if worker guessed } wrong \text{ and manager is } honest \\ c_0 + w_1 = 13 & \text{if worker guessed } wrong \text{ and manager is } dishonest \end{cases}$$

Obviously, a manager profits from having a high ability worker (a worker who guessed right), as he entails low production costs. The manager has the lowest costs $c_1 + w_0 = 3$ if her worker guessed right and she is dishonest by informing her worker that he guessed wrong.

3 A model of consumer choice

Our research is motivated by the question of whether consumers' purchasing decisions in a competitive market environment are influenced by honest behavior within the firm they may buy from. To think of the question in a more structured way, we propose a simple model of consumer choice. When making her purchasing decision, a consumer in a duopoly market faces the market condition $m = (S, g_A, g_B, i_A, i_B, w_A, w_B, p_A, p_B)$ with the realization S of the state of the world, the guesses $g_A, g_B \in \{\underline{S}, \overline{S}\}$ of the workers of firms A and B, the information $i_A, i_B \in \{guessed\ right, guessed\ wrong\}$ sent by the managers of firms A and B, the wages $w_A, w_B \in \{w_0, w_1\}$ paid by firms A and B and finally the prices $p_A, p_B \in \{0,1, \dots, v\}$ asked by the firms A and B. The production costs $c_A, c_B \in \{c_0, c_1\}$ and the managers' honesty can be derived from m. Each consumer $j \in \{X, Y\}$ chooses an action $d_j \in \{0, a, b\}$, where 0 represents the decision not to buy, a represents buying at firm A, and b represents buying at firm B. We assume that consumers choose actions that maximize their utility $u_j(d_X, d_Y|m)$. With respect to our research focus, we allow the consumer's utility function u_j to depend on the monetary payoffs of the market participants as well as on the honesty within the firm the consumer is buying from. To be more specific, we model the consumer's utility function as follows:

$$u_j(d_X, d_Y|m) = P_j(d_X, d_Y|m) + L_j(d_X, d_Y|m) \quad (4)$$

The function $P_j(d_X, d_Y|m)$ captures consumer j's utility from the monetary payoffs of the players in the duopoly market. A consumer j who only cares about her own monetary payoff is characterized by $P_j(d_X, d_Y|m) = \Pi_{Consumer}$ (see equation (1)). More generally, a consumer may have *social preferences* and not only care about her own monetary profit, but also about the profits of the interaction partners. A prominent example for social preferences is inequity aversion as modelled by Fehr and Schmidt (1999), expressed in the following utility function:

$$P_j(d_X, d_Y|m) = \Pi_j - \frac{1}{5} \cdot \left[\alpha_j \sum_{k \in N \setminus \{j\}} \max(\Pi_k - \Pi_j, 0) - \beta_j \sum_{k \in N \setminus \{j\}} \max(\Pi_j - \Pi_k, 0) \right] \quad (5)$$

where $N = \{M_A, M_B, W_A, W_B, X, Y\}$ is the set of players in the duopoly market, and Π_k is the monatry payoff of player $k \in N$ as described in equations (1) – (3). The α-term captures the disutility from disadvantageous payoff comparisons, i.e., the cases where other players have a higher payoff. The β-term captures the disutility from advantageous payoff comparisons, i.e., the cases where other players have a lower payoff. The assumption $\alpha \geq \beta$ expresses the idea that disadvantageous inequity looms larger than advantageous inequity.

Importantly, the function P only incorporates the monetary payoffs, independent of how these allocations arose. In our model of consumer choice, consumers may care about the process that led to the payoff allocation and potentially experience disutility when buying from a firm in which the manager lied to the worker. This disutility is captured in the function $L_j(d_X, d_Y|m)$. In our market, managers may tell a *black lie* by lying to a worker who guessed right or an (altruistic) *white lie* by lying to a worker who guessed wrong (see Erat and Gneezy, 2012, for a categorization of lies). To acknowledge that "lying costs" have been found to be proportional to the "size of the lie" (Gneezy, 2005), we assume that the disutility of buying from a dishonest firm is proportional to the consequences of the lie, i.e., the resulting wage difference $|w_1 - w_0|$. However, we allow that black lies are weighted differently than white lies. Thus, in case of buying from a firm with a black lie, the consumer achieves a disutility of $-\lambda^b \cdot |w_1 - w_0|$, and when buying from a firm with a white lie, the consumer achieves a disutility of $-\lambda^w \cdot |w_1 - w_0|$, with $\lambda^b \geq \lambda^w \geq 0$:

$$L_j(d_X, d_Y|m) = \begin{cases} 0 & \text{if buying from an honest manager} \\ -\lambda_j^b \cdot |w_1 - w_0| & \text{if buying from a manager telling a black lie} \\ -\lambda_j^w \cdot |w_1 - w_0| & \text{if buying from a manager telling a white lie} \end{cases} \quad (6)$$

We numerically derive the subgame perfect equilibrium predictions for the duopoly market for different constellations of the Fehr-Schmidt parameters α and β and the honesty parameters λ^b and λ^w (for details, see Appendix A2). Managers' utility function is defined in analogy to the consumers' utility function (4).[4] We consider different parameter constellations composed of consumers and/or managers that are either selfish or inequity averse and either averse to dishonesty or not. The resulting equilibrium outcomes are presented in table 9 in Appendix A2. The table shows that whenever all duopolists are selfish (cases 1-3 in table 9), managers lie to workers who guessed right (and are honest to workers who guessed wrong), and consumers' market power leads to extremely low equilibrium prices of 0, 1, or 2 as in a discrete Bertrand duopoly (Pigors and Rockenbach, 2015). The same outcomes occur if players are inequity averse (cases 4-6 in table 9). The intuition is that if the prices are low, consumers achieve the highest monetary payoffs and only suffer from advantageous inequity. The consumption choice only distributes the inequity within the firm (i.e., between manager and worker) and keeps the advantageous inequity towards the firm constant. The decision to buy at the low price firm reduces the possible disadvantageous inequity towards the other consumer.

[4] Managers' inequality aversion is identical to the consumer case. Managers are assumed to experience disutility $\lambda^b|w_1 - w_0|$ ($\lambda^w|w_1 - w_0|$) from telling a black (white) lie to their worker. The disutility is assumed to be independent from the behavior of the other manager.

With lying aversion, however, results may change (cases 7-30 in table 9). When one firm's worker guessed right and the other firm's worker guessed wrong, in equilibrium the manager of the firm with the worker who guessed right still lies to her workers, but consumers "punish" the dishonest firm by not buying (cases 8, 16, 19 and 23 in table 9). In addition, there are equilibrium outcomes where managers honestly pay the high wage for the right guess. When both workers guessed right, three types of equilibrium outcomes occur. In the first type (case 14 in table 9), both managers are honest, ask for a price of 2 and share the market. In the second type (cases 12, 17, and 25 in table 9), one manager is honest, while the other is dishonest. The honest manager asks for a price of up to 3 and serves both consumers. The dishonest manager has no sales. Finally, in the third type (case 13 in table 9), the honest and the dishonest manager ask for different prices (2 and 0, respectively) and share the market.

An important prediction following from our model is that under selfish preferences, as well as under Fehr-Schmidt preferences, but absent any lying aversion, dishonest firms are not expected to sell fewer units. However, when consumers are averse to buying from dishonest firms, there are equilibria in which honest firms sell more units and even make higher profits, despite the higher costs associated with honesty (case 25 in table 9). To test these predictions, in particular consumers' aversion to buying from a dishonest firm, we conduct an experimental study with treatments allowing us to disentangle the different effects.

4 The experimental treatments, hypotheses, and implementation

4.1 Experimental treatments

In our main treatment *Full Info*, consumers perfectly observe the state S, the workers' guesses, the managers' information on the accuracy of the worker's guess and the resulting wage. Based upon this, consumers can infer managers' honesty to potentially include it in their purchasing decisions as modeled in equation (4). We compare *Full Info* to a control treatment *Wage Info* where workers' wages are known, but managers' honesty cannot be inferred. In *Wage Info*, consumers are informed about information provided by managers to their worker and the wage paid, but the workers' guesses are not revealed. Thus, consumers who only care about the final payoff to the worker, but not how it came about (i.e., $\lambda^b = \lambda^w = 0$ in equation (6)), should not act differently in the treatments. Finally, as a baseline we study treatment *No Info,* in which consumers just see the prices the two firms ask for but not the workers' guesses and the managers' information passed to the workers. Thus, consumers neither see the wages nor can they infer managers' honesty. Table 1 summarizes the conditions in the different treatments.

Table 1: Information conditions in the experimental treatments[5]

	Consumers receive information on …				Consumers can infer managers' honesty
	S	**workers' guesses**	**managers' information**	**workers' wages**	
Full Info	yes	yes	yes	yes	yes
Wage Info	yes	no	yes	yes	no
No Info	yes	no	no	no	no

4.2 Hypotheses

In our setup, managers have strong incentives to lie to reduce their wage costs. Yet in light of recent literature, we should not expect all managers to lie, even when consumers cannot detect it. Various studies show that subjects are lying averse (e.g., Gneezy, 2005; Lundquist, Ellingsen, Gribbe, Johannesson, 2009; Gneezy, Rockenbach and Serra-Garcia, 2013) and that the propensity to lie depends on the monetary consequences of lying and is highly heterogeneous among subjects (Gibson, Tanner and Wagner, 2013). Some subjects are even found to be "purely" lying averse, independent of the monetary benefits from lying (e.g., Erat and Gneezy, 2012; López-Pérez and Spiegelman, 2013; Abeler, Becker and Falk, 2014). This leads to:

Hypothesis 1 Independent of the treatment, not all managers lie to their worker.

The treatments may, however, influence managers' honesty. The better consumers can infer managers' honesty, the more honest managers can be assumed to be. Two effects pointing in the same direction nurture this hypothesis. First, managers who have image concerns may be more reluctant to lie the more transparent lying is (see, e.g., Andreoni and Bernheim, 2009; Ariely, Bracha and Meier, 2009; Bénabou and Tirole, 2006). Second, managers who deem it possible that consumers react to lying may increase honesty the better it can be detected. Although honesty is not observable in *Wage Info*, the higher costs associated with paying the high wage may lead consumers to interpret a high wage as a signal of manager's honesty. We may thus expect honesty in *Wage Info* to be higher than in *No Info* but less than in *Full Info*:

Hypothesis 2 Honesty increases with the information consumers receive (*Full Info* > *Wage Info* > *No Info*).

There is experimental evidence that subjects are sensitive not only to the final payoff allocation, but also to the procedure that produced the allocation (Frey, Benz and Stutzer, 2004; Frey and Stutzer, 2005; Bolton, Brandts and Ockenfels, 2005). Ohtsubo, Masuda, Watanabe

[5] Note that in our setting, a treatment where consumers are informed about honesty but not about the wages is not possible since the information necessary to detect honesty (S, guess, and information) automatically reveals the wage.

and Masuchi (2010) show that "dishonesty provokes costly third-party punishment."[6] Thus, we may expect consumers to not only take the final payoff distribution into account, but also whether or not the allocation was achieved by dishonest actions. Even if the dishonesty is vis-à-vis another participant, consumers may prefer not to buy from a dishonest manager in order to avoid participating in immoral behavior and keep a positive (self-) image while consuming (Bénabou and Tirole, 2006, 2011). These considerations are reflected in the positive λ^b and λ^w in our model of consumer choice described in section 3 and lead to the following hypothesis:

> **Hypothesis 3** Consumers with honesty concerns prefer to buy from an honest manager, as long as the price is not too high. As a result, honest managers may sell significantly more units than dishonest managers.

The effects described in hypotheses 2 and 3 impact the wages paid. Since increased honesty rates lead to increased wages, it follows that:

> **Hypothesis 4** Wages increase with the information that consumers receive (*Full Info* > *Wage Info* > *No Info*).

4.3 Experimental implementation

To account for learning effects, the stage-game market was repeated for 30 periods with fixed roles and partner matching. During the experiment, assigned letters A and B distinguished firms, and consumers were assigned the letters X and Y. We framed the market by using the words "manager," "worker," "consumer," "wage," "buying," etc. However, we refrained from using terms like "honesty" or "lying" to avoid loaded language and potential experimenter demand effects. The managers were instructed to inform the worker whether the guess was right or wrong and told that this information does not have to be correct. The state was called "state of the period" and was the same for all groups in the same session.

We conducted six sessions of the experiment in November 2014 at the Cologne Laboratory for Economic Research (CLER). We recruited subjects using ORSEE (Greiner, 2004). Thirty subjects participated in every session, leading to 180 participants overall and ten independent observations (markets of six subjects) for every treatment. At the beginning of the experiment, written instructions[7] were distributed and read aloud. The experimental interaction was computerized using the software z-Tree (Fischbacher, 2007). Sessions lasted between 95

[6] The authors study trust games with uninvolved observers, who can costly punish the trustee. For all non-maximal transfers, the punishment is higher when the trustee had signaled to send the maximal transfer than when sending no signal.
[7] English translations can be found in appendix A3.

and 120 minutes. Subjects received an initial endowment of 100 points and an additional 5 points at the beginning of every period.[8] After the experiment, all points were converted into Euro and paid in cash at an exchange rate of 1€ for 30 points, plus an additional show-up fee of 2.50€. Average total earnings were 19.86€.

5 Results

We present our experimental results in this section. First, we analyze the treatment differences regarding managers' honesty (section 5.1) before turning to consumers' decisions (section 5.2). In section 5.3, we ask whether consumers' behavior results in higher payoffs for honest managers. Finally, in a robustness check, we show that our results are driven by a preference for honesty rather than fairness concerns (section 5.4). In the following, all comparisons between treatments use the two-sided Mann-Whitney U test (MWU), and all comparisons within treatments use the two-sided Wilcoxon signed-rank test (WSR), unless stated otherwise.

5.1 Treatment effects on wages and honesty

Since guessing right is pure chance, we should expect that workers guess correctly in about 50% of the cases. As row 3 in table 2 shows, this is indeed the case.[9] Thus, under full honesty, in half of the cases workers receive a low wage of 3, while in the other half they receive a high wage of 7, resulting in an average wage of 5. As shown in the first row of table 2, wages are lower than 5 and increase with the amount of information provided in the treatment. The average wage is lowest in *No Info* (3.65), which is significantly lower than in *Wage Info* (4.40, p=0.034) and *Full Info* (4.60, p=0.007). There is no statistical difference between the wages in *Wage Info* and *Full Info* (p=0.325). Thus, we partly confirm hypothesis 4.

As shown in row 6 of table 2, the wage effects are not driven by cases in which the worker guessed wrong. In these cases, managers almost always inform honestly and pay the low wage.[10] Thus, we observe hardly any white lies. The main treatment difference is found in black lies, where honesty is "expensive" for the manager. If the worker guessed right, managers are honest in only 31% of the cases in *No Info*. This is significantly lower than in *Wage Info* (65%, p=0.049) and *Full Info* (70%, p=0.023). There is no difference between *Wage Info* and *Full Info* (p=0.734). Thus, we partly confirm hypothesis 2.

[8] The initial endowment and the roundly endowment could cover potential losses which are possible for subjects in the roles of managers (from not trading or trading at prices lower than costs). It never happened that a subject had a negative account in one point of time.
[9] Workers' guesses are statistically not different from chance, two-sided binomial probability test: *No Info* p=0.307, *Wage Info* p=0.713, *Full Info* p=0.153.
[10] Differences in honesty if worker guessed wrong: *No Info* vs. *Wage Info* p=0.478, *No Info* vs. *Full Info* p=0.075, *Wage Info* vs. *Full Info* p=0.518.

Table 2: Aggregated market outcomes

Row	Variable	*No Info*	*Wage Info*	*Full Info*
1	Wage paid	3.65 (0.19)	4.40 (0.22)	4.60 (0.18)
2	Price offered	12.22 (2.14)	10.42 (1.04)	11.46 (1.21)
3	Worker is right	0.52 (0.02)	0.51 (0.02)	0.53 (0.02)
4	Manager signals "right"	0.16 (0.05)	0.35 (0.06)	0.40 (0.06)
5	Manager's honesty (overall)	0.63 (0.06)	0.79 (0.05)	0.81 (0.05)
6	Manager's honesty (if worker is wrong)	0.99 (0.01)	0.95 (0.03)	0.93 (0.02)
7	Manager's honesty (if worker is right)	0.31 (0.10)	0.65 (0.10)	0.70 (0.09)
8	Units sold per firm	0.99 (0.01)	1.00 (0.00)	0.99 (0.00)
9	Payoff manager	4.26 (1.96)	1.63 (0.94)	2.91 (1.07)
10	Payoff consumer	18.97 (2.06)	21.02 (1.12)	19.42 (1.04)

Notes: The table reports averages and standard errors (in parentheses) based on independent observations.

Honesty rates differ between managers (see figure 1 in Appendix A1). In all three treatments, there are managers who are always honest and managers who are always dishonest if the worker guessed right. In *No Info*, when honesty cannot be observed by consumers, about 15% of all managers are always honest. Although it appears that increased information for consumers leads to fewer managers who always lie and more managers who are always honest, these effects are not significant.[11] Thus, we see lying aversion, as formulated in hypothesis 1.

Table 3: Managers' likelihood of being honest

Worker guesses wrong × *Wage Info*	-1.660*
	(0.892)
Worker guesses wrong × *Full Info*	-1.765**
	(0.891)
Worker guesses right × *No Info*	-6.689***
	(0.635)
Worker guesses right × *Wage Info*	-4.535***
	(0.856)
Worker guesses right × *Full Info*	-4.062***
	(0.859)
Period	-0.017*
	(0.009)
Constant	5.771***
	(0.740)
n	1800
groups	60
log l	-572.87
chi^2	250.26

Note: Random-effects logistic regression, standard errors in parentheses, clustered by manager ID: *p < 0.1, **p < 0.05, ***p < 0.01. Dependent variable: Honest.

A logistic panel regression on managers' honesty in table 3 summarizes the effects of the non-parametric analysis. Independent variables are the interaction of the treatment condition

[11] The share of managers who never tell a black lie is 15% in *No Info*, 30% in *Wage Info* and 35% in *Full Info*. There is no statistical difference between treatments (Fisher's exact test 2-sided, "always honest" vs. "not always honest" if worker guesses right): *No Info* vs. *Wage Info* p=0.451, *No Info* vs. *Full Info* p=0.273, *Wage Info* vs. *Full Info* p=1.000.

and the worker's guess. The base category is a wrong guess in *No Info*, where the manager is honest with about 99% probability (see table 2, row 6). The first two coefficients show the decrease in the likelihood of manager honesty if the worker guessed wrong in the two other treatments, here also weakly significant for *Wage Info*. Managers might assume that paying a high wage is a competitive advantage when consumers can observe it, leading managers in this case to lie and pay a high wage. However, as will be shown in table 4, a white lie does not increase consumers' likelihood to buy. The next three coefficients show a highly significant decrease in the likelihood of honesty if the worker guesses right in all three treatments. This effect is significantly stronger in *No Info*, while the coefficients between *Wage Info* and *Full Info* are not statistically different.[12]

Result 1

In all treatments, there is some degree of honesty as well as a fraction of managers that never lies (cf. hypothesis 1). Information significantly increases the overall honesty compared to *No Info* (cf. hypothesis 2). Due to the increased honesty, wages are higher in the information treatments compared to *No Info* (cf. hypothesis 4). Interestingly, there are no differences between the two information conditions regarding honesty or wages. The partial information on honesty that may be inferred in *Wage Info* seems sufficient to increase wages and honesty over *No Info.*

5.2 Consumer choices

To describe consumers' choice, we report an alternative-specific conditional logit model in table 4 (McFadden, 1974). The choice model specifies the available alternatives for the consumer for every single decision she faces in a period (called case), represented by the two potentially different offers.[13] Alternative-specific variables are the attributes of an offer, i.e., price and the information about wage and honesty. The dependent variable is *Buy*, which equals one for the accepted offer. As a case-specific variable, we include the period, which is not significant and not reported. In all treatments, the price has a highly significant negative influence. In *No Info,* when the price is the only information provided to consumers, they buy the cheaper good in 96% of the cases in which in two firms ask for different prices. In *Wage Info*, the wage has a significant positive influence on consumer choices. The high wage may be viewed as a strong signal for honesty. In *Full Info,* we compare the four different constellations

[12] Wald test: Worker guesses right × No Info=Worker guesses right × Wage Info, p=0.0015; Worker guesses right × No Info=Worker guesses right × Full Info, p=0.0001; Worker guesses right × Wage Info=Worker guesses right × Full Info, p=0.4665.

[13] We exclude the theoretical third alternative (i.e., not buy) from the analysis since it is almost never chosen.

of manager's honesty and worker's guess. The base category is a wrong guess and a manager who honestly pays the low wage. The third row of table 4 shows that consumers' propensity to buy is not increased if a manager dishonestly pays the higher wage. Hence, telling a white lie does not increase consumers' propensity to buy. Conversely, consumers strongly react to black lies. Consumers' propensity to buy is significantly reduced if managers are dishonest to pay the low wage (cf. line 4) and significantly increased if they honestly pay the high wage (cf. line 5). Notice that this strong reaction to lying is even more remarkable since we deliberately avoided using morally loaded wordings in the experiment, such as "lying" or "dishonesty." It may well be that this effect becomes even stronger when using a morally loaded wording.

Table 4: Consumers' likelihood to buy

	No Info	***Wage Info***	***Full Info***
Price	- 1.664**	- 0.964***	- 0.949***
	(0.765)	(0.260)	(0.201)
High wage		1.624***	
		(0.436)	
Wrong guess × dishonesty			-0.012
			(0.706)
Right guess × dishonesty			-2.313***
			(0.573)
Right guess × honesty			0.845***
			(0.262)
observations	1190	1200	1190
cases	595	600	595
log pseudol	-197.05	-226.86	-270.47
Wald chi2	5.35	23.34	73.33

Notes: Alternative-specific conditional logit model (McFadden's choice model) for the cases in which consumers buy. Robust standard errors in parentheses, clustered by consumer id: *p < 0.1, **p < 0.05, *** p < 0.01. Dependent variable: Buy. High wage is a binary variable that is one ($w = 7$), when the manager sends the signal that the worker guessed right and it is zero ($w = 3$), when the manager send the signal that the guess is wrong. Case-specific variables (not reported, not significant): Period.

Result 2 In *No Info* consumers almost always buy the cheaper good. In *Full Info* when managers' honesty is fully transparent, consumers reward honest and punish dishonest managers in case the worker guessed right (cf. hypothesis 3). In *Wage Info*, the high wage significantly increases the consumers' likelihood to buy.

5.3 Profitability of being honest

In this section, we analyze whether consumers' "honoring" of managers' honesty in *Full Info* is sufficient to render honesty profitable for managers. To gain a first impression, we focus on special market constellations in *Full Info*. The first constellation features the situation that both workers guessed right, yet one manager is honest while the other manager is dishonest. Table 5 shows that the honest manager, who has to bear the higher wage costs, asks for a considerably higher price (9.29) than the dishonest manager (6.71). Nonetheless, the honest

manager sells considerably more units (1.46) than the dishonest manager (0.54), which is sufficient to achieve a considerably higher profit (5.00) than the dishonest manager (1.50). This constellation corresponds to cases 17 and 25 in table 9 of our equilibrium analysis and qualitatively confirms our predictions made under the assumption of dishonesty aversion.

Table 5: Consumer choices for special market constellations in *Full Info*

Full Info	**Price**	**Sells**	**Sells in %**	**Payoff**
right guess, honesty vs.	9.29 (1.08)	1.46 (0.12)	73%	5.00 (1.60)
right guess, dishonesty	6.71 (0.84)	0.54 (0.12)	27%	1.50 (1.40)
wrong guess, honesty	11.16 (0.80)	1.42 (0.11)	74%	6.05 (1.65)
right guess, dishonesty vs.	12.21 (1.23)	0.51 (0.10)	26%	1.30 (1.07)

Notes: The table reports averages and standard errors (in parentheses) based on individual observations

The second constellation features the situation in which both managers pay the low wage. While one manager is honest to a worker who guessed wrong, the other manager is dishonest to a worker who guessed right. Both managers ask for very similar prices (11.16 and 12.21, respectively), despite their different total production costs (9 for the honest manager and 3 for the dishonest, respectively). Table 5 shows that the honest manager sells considerably more units (1.42) than the dishonest manager (0.51), which is sufficient to make a considerably higher profit (6.05) than the dishonest manager (1.30). Our equilibrium analysis shows that, absent any dishonesty aversion, honest and dishonest managers are expected to sell identical amounts of units (cases 2 and 5 in table 9). Under dishonesty aversion, however, there are equilibria exhibiting "punishment" of the dishonest manager (cases 8, 16, 19 and 23 in table 9).

Table 6: Average managers' profit when workers guessed right

Treatment	**Variable**	**Low wage (lying)**	**High wage (honesty)**	**Differences (WSR)**
No Info	Price offered	12.22 (2.24)	13.76 (2.10)	p=0.169 (n=10)
	Units sold	1.12 (0.06)	0.70 (0.12)	p=0.028 (n=10)
	Profit	9.81 (2.69)	1.70 (1.90)	p=0.005 (n=10)
Wage Info	Price offered	9.86 (1.44)	10.81 (1.04)	p=0.594 (n=9)
	Units sold	0.84 (0.14)	1.17 (0.08)	p=0.441 (n=9)
	Profit	3.34 (1.62)	4.15 (2.04)	p=0.767 (n=9)
Full Info	Price offered	10.27 (1.87)	11.41 (1.36)	p=0.594 (n=9)
	Units sold	0.67 (0.14)	1.14 (0.08)	p=0.021 (n=9)
	Profit	2.11 (1.10)	4.31 (0.94)	p=0.066 (n=9)

Note: The table reports averages and standard errors (in parentheses) based on independent observations when the worker guessed right. In *Wage Info* and *Full Info* there is one group each where both managers are always honest, so it follows that there are only 9 independent observations.

Both examples in table 5 show cases in which consumers' "honoring" of managers' honesty makes honesty profitable. To support these observations with statistical analyses, table 6 focuses on cases where honesty is expensive, i.e., being honest to a worker who guessed right.

An honest manager does not ask for a higher price than a dishonest manager in any of the treatments. In *No Info,* honesty significantly reduces the manager's profit. When there is only wage information (*Wage Info*), being honest neither reduces nor increases the payoff compared to a dishonest manager. Under *Full Info*, however, honest managers not only sell significantly more units, but they also make significantly higher profits.[14] The fact that under *Full Info* honest managers sell significantly more units than dishonest managers yields support for the assumption of an aversion to being involved in a dishonest trade (i.e. $\lambda^b > 0$ in equation (6)).

> **Result 3** Honesty is highly unprofitable when it is not observed by consumers (*No Info*). In *Wage Info*, the profits of honest and dishonest managers are not different. When consumers have *Full Info* on managers' honesty, however, honest firms make significantly more profit than dishonest firms.

The analyses of the previous sections showed that wages and honesty levels are not significantly different between the two information treatments, *Wage Info* and *Full Info*. We explained this by the strong honesty signal that a high wage sends in *Wage Info.* Indeed, the payoffs of honest managers in *Wage Info* and *Full Info* are not significantly different (p=0.821). The difference is in the dishonest managers: In *Full Info*, dishonest managers receive a signify-cantly lower payoff than honest ones, while this is not the case in *Wage Info.* The explanation may be as follows. In *Full Info,* a dishonest manager is unambiguously identified and "punished" by dishonesty-averse consumers. In *Wage Info*, however, a low wage is not a clear signal of dishonesty. It seems that this ambiguity is sufficient to preclude dishonest managers from being punished by dishonesty-averse consumers (*in dubio pro reo*). This observation is in line with experimental findings that punishment is reduced if norm-violators cannot be identi-fied unambiguously (Feess, Schramm, and Wohlschlegel, 2014) and that subjects with a social value orientation underestimate norm violations of others (Irlenbusch and Ter Meer, 2013).

5.4 Robustness check: Separating fairness and honesty

If paying the high (low) wage to a worker who entails low (high) production costs is considered fair, a manager sending correct information is honest and fair at the same time. The treatment *Full Info* does not provide the possibility to be fair without simultaneously being honest. We challenge the profitability of being honest, reported in result 3, by separating fairness and honesty in an additional treatment, *No Honesty Frame*. This treatment is a framing variation of

[14] In contrast to table 5, in table 6 we consider honest versus dishonest managers in all cases (independent of the competitor's choice). See table 8 in the appendix for the average sales and the resulting payoffs regarding the different competition conditions.

the *Full Info* treatment. As in *Full Info*, the worker guesses the state of the world, the worker's guess determines the firm's production costs and the manager – but not the worker – knows the accuracy of the worker's guess. However, different from *Full Info*, the manager does not inform the worker about the correctness of the guess and the resulting wage but instead *only* communicates the wage (either $w_0 = 3$ or $w_1 = 7$) to the worker. Thus, the treatment *No Honesty Frame* is identical to *Full Info* with respect to fairness considerations, but honesty is not an issue with the communication within the firm. In particular, paying the high (low) wage to a worker who entails low (high) production costs is not confounded with being honest. Hence, the treatment *No Honesty Frame* captures the mere fairness effect, and any differences to *Full Info* can be attributed to consumers' reactions to (dis)honesty.

In treatment *No Honesty Frame,* we conducted new experimental sessions with 60 new subjects, which led to 10 independent observations.[15] Strikingly, managers pay the "fair wage" (i.e., the high (low) wage to a worker who entails low (high) production costs) significantly less often than in *Full Info* (81% in *Full Info* vs. 60% in *No Honesty Frame* over all cases, p=0.005 and 70% in *Full Info* vs. 39% in *No Honesty Frame* when the worker guessed right, p=0.054). Thus, when only fairness is at stake, and not honesty, fairness is significantly reduced.

Table 7: Average managers' profit when workers guessed right

Treatment	**Variable**	**Low wage**	**High wage**	**Differences (WSR)**
No Honesty Frame	Price offered	9.15 (1.00)	13.00 (1.32)	p=0.059 (n=10)
	Units sold	1.02 (0.10)	0.86 (0.13)	p= 0.575 (n=10)
	Profit	5.56 (1.42)	3.45 (1.58)	p= 0.508 (n=10)

Note: The table reports averages and standard errors (in parentheses) based on independent observations when the worker guessed right.

Table 7, an extension of table 6 to the robustness treatment *No Honesty Frame,* provides an explanation for the reduction in fairness. It shows that managers paying a high wage to a correctly guessing worker are not "rewarded" by a higher profit; instead they earn a lower profit (however, not significantly). Thus, fairness alone does not generate higher manager profits, and the profitability of being honest in *Full Info* seems to stem from consumers' aversion to being involved in trades based upon dishonesty.

> **Result 4** Separating fairness and honesty shows that the profitability of being honest in *Full Info* stems from consumers' aversion to being involved in trades involving dishonesty.

[15] Then instructions for the treatment *No Honesty Frame* are provided in Appendix A3.

6 Conclusions

In this paper, we experimentally study the influence of producers' honesty on consumers' purchasing decisions. We find that when producers' honesty is fully transparent to consumers, being honest provides a competitive advantage. Honest firms make higher profits by selling more units, albeit not at higher prices. The synopsis of the treatments shows that this result only holds when producers' honesty is fully transparent. When the market provides strong signals for honesty but leaves consumers with some uncertainty (as in *Wage Info*), being honest is not more profitable than being dishonest, but also not less profitable. When information on honesty is completely absent, honesty is detrimental for the firm's profit (as in *No Info*). The competitive advantage of honesty in *Full Info* is consistent with the assumption of a disutility from being involved in a dishonest transaction. This disutility is independent of any social preferences concerning the final payoff allocation, as assumed in our simple model of consumer choice.

Our findings extend the literature on consumer social responsibility by showing that a firm's honesty – apart from allocative preferences – is an important decision criterion in consumer choice. Yet they show that in order to exploit the competitive advantage of honesty, the firm (or any party interested in promoting honesty) has to strive for full transparency on the honesty of the market participants.

References

Abeler, J., Becker, A., and Falk, A. (2014). Representative evidence on lying costs. *Journal of Public Economics, 113*, 96-104.

Andreoni, J., and Bernheim, B. D. (2009). Social image and the 50–50 norm: A theoretical and experimental analysis of audience effects. *Econometrica*, *77* (5), 1607-1636.

Ariely, D., Bracha, A., and Meier, S. (2009). Doing good or doing well? Image motivation and monetary incentives in behaving prosocially. *American Economic Review, 99* (1), 544-555.

Bartling, B., Weber, R. A. and Yao, L. (2015). Do Markets Erode Social Responsibility? *The Quarterly Journal of Economics, 130* (1), 219-266.

Bénabou, R., and Tirole, J. (2006). Incentives and Prosocial Behavior. *American Economic Review*, *96* (5), 1652-1678.

Bénabou, R., and Tirole, J. (2011). Identity, morals, and taboos: Beliefs as assets. *Quarterly Journal of Economics*, *126* (2), 805-855.

Blanco, M., Engelmann, D., & Normann, H. T. (2011). A within-subject analysis of other-regarding preferences. *Games and Economic Behavior*, *72* (2), 321-338.

Bolton, G. E., Brandts, J., and Ockenfels, A. (2005). Fair procedures: Evidence from games involving lotteries. *Economic Journal*, *115* (506), 1054-1076.

Devinney, T. M., Auger, P., Eckhardt, G. and Birtchnell, T. (2006). The other CSR: Consumer social responsibility. *Stanford Social Innovation Review, 4* (3), 30-37.

Erat, S., and Gneezy, U. (2012). White lies. *Management Science, 58* (4), 723-733.

Etilé, F. and Teyssier, S. (2012, January). *Signaling corporate social responsibility: Testing third-party certification vs. self-regulation in the lab.* Working paper. Available at https://www.gate.cnrs.fr/IMG/pdf/Teyssier_2012.pdf.

Feess, E., Schramm, M. and Wohlschlegel, A. (2014). *The Impact of Fine Size and Uncertainty on Punishment and Deterrence: Evidence from the Laboratory*. Working Paper.

Fehr, E. and Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics, 114* (3), 817-868.

Feicht, R., Grimm, V. and Seebauer, M. (2014). *An experimental study of corporate social responsibility through charitable giving in Bertrand markets*. IWQW Discussion Paper Series, FAU Erlangen-Nürnberg. Available at http://hdl.handle.net/10419/ 95861.

Fischbacher, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental economics*, *10* (2), 171-178.

Frey, B. S., Benz, M., and Stutzer, A. (2004). Introducing procedural utility: Not only what, but also how matters. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft, 160* (3), 377-401.

Frey, B. S., and Stutzer, A. (2005). Beyond outcomes: measuring procedural utility. *Oxford Economic Papers*, *57* (1), 90-111.

Gibson, R., Tanner, C., and Wagner, A. F. (2013). Preferences for truthfulness: Heterogeneity among and within individuals. *American Economic Review, 103*, 532-548.

Gneezy, U. (2005). Deception: The role of consequences. *American Economic Review*, 384-394.

Gneezy, U., Rockenbach, B., and Serra-Garcia, M. (2013). Measuring lying aversion. *Journal of Economic Behavior & Organization, 93* (0), 293–300.

Greiner, B. (2004). An Online Recruitment System for Economic Experiments. In K. Kremer and V. Macho (Eds.), *Forschung und wissenschaftliches Rechnen 2003. GWDG Bericht 63* (p. 79-93). Göttingen: Ges. für Wiss. Datenverarbeitung.

Irlenbusch, B., and Ter Meer, J. (2013). Fooling the Nice Guys: Explaining receiver credulity in a public good game with lying and punishment. *Journal of Economic Behavior & Organization*, *93*, 321-327.

López-Pérez, R., and Spiegelman, E. (2013). Why do people tell the truth? Experimental evidence for pure lie aversion. *Experimental Economics, 16* (3), 233-247.

Lundquist, T., Ellingsen, T., Gribbe, E., and Johannesson, M. (2009). The aversion to lying. *Journal of Economic Behavior & Organization, 70* (1), 81-92.

McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. *Frontiers in Econometrics*, 105-142.

O'Connor, A. and Meister, M. (2008). Corporate social responsibility attribute rankings. *Public Relations Review, 34* (1), 49-50.

Ohtsubo, Y., Masuda, F., Watanabe, E., and Masuchi, A. (2010). Dishonesty invites costly third-party punishment. *Evolution and Human Behavior*, 31(4), 259-264.

Pigors, M. and Rockenbach, B. (2015). *Consumer Social Responsibility*. *Management Science*, forthcoming.

Rode, J., Hogarth, R. M. and Le Menestrel, M. (2008). Ethical differentiation and market behavior: An experimental approach. *Journal of Economic Behavior & Organization*, 66, 265-280.

Smith, N. C. (2007). Consumers as Drivers of Corporate Responsibility, In: Crane, A., McWilliams, A., Matten, D., Moon, J., and Siegel, D.S. (Eds.). *Oxford Handbook of Corporate Social Responsibility*, Oxford: Oxford University Press.

Appendix

A1 Figures and tables

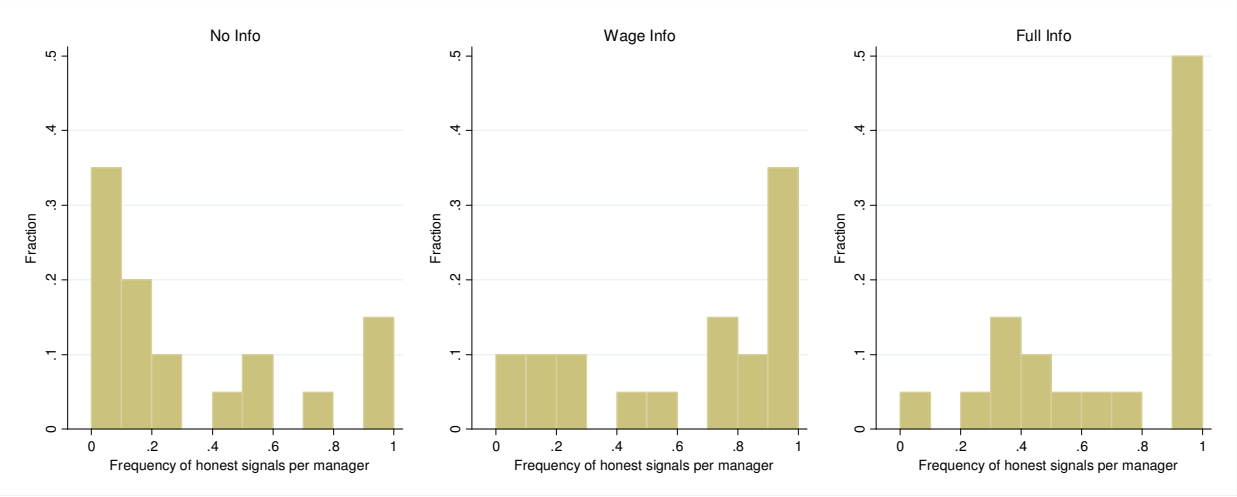

Figure 1: Distribution of managers' honesty if worker guesses right

Table 8: Manager's sales and payoff

			Wage Info	
		Lower Price	**Equal Price**	**Higher Price**
Lower Wage	**Sales**	1.45 (0.20)	0.40 (0.19)	0.05 (0.05)
	Payoff	3.77 (2.56)	-4.50 (1.37)	-7.87 (0.54)
Equal Wage	**Sales**	1.90 (0.05)	1.00 (0.00)	0.11 (0.05)
	Payoff	10.16 (2.14)	1.72 (0.97)	-6.65 (0.51)
Higher Wage	**Sales**	1.95 (0.05)	1.60 (0.19)	0.55 (0.20)
	Payoff	10.07 (3.02)	8.94 (3.34)	-1.65 (2.52)
			Full Info	
		Lower Price	**Equal Price**	**Higher Price**
Lower Wage	**Sales**	1.27 (0.21)	0.61 (0.15)	0.00 (0.00)
	Payoff	6.41 (2.96)	-1.88 (1.90)	-9.00 (0.00)
Equal Wage	**Sales**	1.70 (0.06)	1.00 (0.00)	0.26 (0.07)
	Payoff	10.13 (2.26)	2.88 (1.24)	-4.83 (0.85)
Higher Wage	**Sales**	2.00 (0.00)	1.39 (0.15)	0.73 (0.21)
	Payoff	12.55 (2.94)	6.32 (2.32)	-0.80 (1.75)
			Full Info	
		Lower Price	**Equal Price**	**Higher Price**
Lower Honesty	**Sales**	1.09 (0.16)	0.33 (0.21)	0.02 (0.02)
	Payoff	4.32 (1.91)	-1.33 (1.05)	-7.84 (2.37)
Equal Honesty	**Sales**	1.72 (0.08)	1.00 (0.00)	0.27 (0.09)
	Payoff	10.25 (2.43)	2.92 (1.57)	-4.88 (0.92)
Higher Honesty	**Sales**	1.94 (0.04)	1.67 (0.21)	0.89 (0.16)
	Payoff	9.44 (2.70)	6.06 (3.70)	1.09 (2.13)
	Payoff	15.47 (1.79)	12.75 (4.31)	-1.22 (2.07)

Notes: The table reports averages and standard errors (in parentheses) based on independent observations. Managers' sales and payoff depend on offering a lower, equal or higher price and on the differences in wage and honesty.

A2 Subgame perfect equilibrium outcomes

We derive the subgame perfect equilibrium predictions of the duopoly market numerically. To do so, we have to specify the model parameters α, β, λ^b and λ^w. Since there are no obvious parameter choices for λ^b and λ^w, we exemplarily present a dishonesty aversion with $\lambda^b = 0.5$ and $\lambda^w = 0.1$ in the following considerations. In our numerical calculations, we considered a wide range of parameter choices, however, the results do not change qualitatively. As inequity aversion parameters, we chose $\alpha = 1.5$ and $\beta = 0.5$ as it is well in the range of experimentally observed values (e.g., Blanco, Engelmann and Norman, 2011). To present a detailed picture, we consider seven different parameter constellations, which are composed of consumers and/or managers who are either selfish ($\alpha = \beta = 0$) or inequity averse ($\alpha = 1, \beta = 0.25$) and either lying averse ($\lambda^b = 0.5,\ \lambda^w = 0.1$) or not ($\lambda^b = \lambda^w = 0$).

Parameter constellation 1: all selfish

Parameter	Consumer X	Consumer Y	Manager A	Manager B
α	0	0	0	0
β	0	0	0	0
λ^b	0	0	0	0
λ^w	0	0	0	0

Parameter constellation 2: all inequity averse

Parameter	Consumer X	Consumer Y	Manager A	Manager B
α	1	1	1	1
β	0.25	0.25	0.25	0.25
λ^b	0	0	0	0
λ^w	0	0	0	0

Parameter constellation 3: all dishonesty averse

Parameter	Consumer X	Consumer Y	Manager A	Manager B
α	0	0	0	0
β	0	0	0	0
λ^b	0.5	0.5	0.5	0.5
λ^w	0.1	0.1	0.1	0.1

Parameter constellation 4: all inequity and dishonesty averse

Parameter	Consumer X	Consumer Y	Manager A	Manager B
α	1	1	1	1
β	0.25	0.25	0.25	0.25
λ^b	0.5	0.5	0.5	0.5
λ^w	0.1	0.1	0.1	0.1

Parameter constellation 5: only consumers dishonesty averse

Parameter	Consumer X	Consumer Y	Manager A	Manager B
α	0	0	0	0
β	0	0	0	0
λ^b	0.5	0.5	0	0
λ^w	0.1	0.1	0	0

Parameter constellation 6: only consumers inequity and dishonesty averse

Parameter	Consumer X	Consumer Y	Manager A	Manager B
α	1	1	0	0
β	0.25	0.25	0	0
λ^b	0.5	0.5	0	0
λ^w	0.1	0.1	0	0

Parameter constellation 7: only managers inequity and dishonesty averse

Parameter	Consumer X	Consumer Y	Manager A	Manager B
α	0	0	1	1
β	0	0	0.25	0.25
λ^b	0	0	0.5	0.5
λ^w	0	0	0.1	0.1

Parameter constellation 8: one consumer and one manager inequity and dishonesty averse; the others selfish

Parameter	Consumer X	Consumer Y	Manager A	Manager B
α	1	0	1	0
β	0.25	0	0.25	0
λ^b	0.5	0	0.5	0
λ^w	0.1	0	0.1	0

The numeric calculations follow backwards induction. For a given market situation m, consumers' consumption decisions are calculated as best replies to each other. The possible multiple Nash equilibria in pure consumption choices lead to expected sales for both managers. They then choose prices and information (i_A, p_A, i_B, p_B) as best responses to the other manager's choice given the state of the world and random guesses (S, g_A, g_B). The resulting equilibrium outcomes are presented in table 9.

Table 9: Subgame equilibrium outcomes for different parameter constellations

Assumptions			Subgame perfect equilibrium predictions					
Case	Parameter constellation		Managers' decisions		Consumers' expected purchases			
		(Guess worker A, Guess worker B)	(Honesty manager A, Honesty manager B)	(Price A, Price B)	X buys at A	X buys at B	Y buys at A	Y buys at B
1	1 (all selfish)	(wrong,wrong)	(honest, honest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
2*		(wrong,right)	(honest, dishonest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
3		(right,right)	(dishonest, dishonest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
4	2 (all inequity averse)	(wrong,wrong)	(honest, honest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
5*		(wrong,right)	(honest, dishonest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
6		(right,right)	(dishonest, dishonest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
7	3 (all dishonesty averse)	(wrong,wrong)	(honest, honest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
8*		(wrong,right)	(honest, dishonest)	(1,0),(2,1)	1	0	1	0
9*		(wrong,right)	(honest, dishonest)	(2,0)	0.5	0.5	0.5	0.5
10*		(wrong,right)	(honest, honest)	(2,2)	0.5	0.5	0.5	0.5
11		(right,right)	(dishonest, dishonest)	(0,0)	0.5	0.5	0.5	0.5
12*		(right,right)	(dishonest, honest)	(0,1)	0	1	0	1
13*		(right,right)	(dishonest, honest)	(0,2)	0.5	0.5	0.5	0.5
14		(right,right)	(honest, honest)	(2,2)	0.5	0.5	0.5	0.5
15	4 (all inequity and dishonesty averse)	(wrong,wrong)	(honest, honest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
16*		(wrong,right)	(honest, dishonest)	(2,0)	1	0	1	0
17*		(right,right)	(dishonest, honest)	(0,2)	0	1	0	1
18	5 (only consumers dishonesty averse)	(wrong,wrong)	(honest, honest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
19*		(wrong,right)	(honest, dishonest)	(1,0),(2,1)	1	0	1	0
20*		(wrong,right)	(honest, dishonest)	(2,0)	0.5	0.5	0.5	0.5
21		(right,right)	(dishonest, dishonest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
22	6 (only consumers inequity and dishonesty averse)	(wrong,wrong)	(honest, honest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
23*		(wrong,right)	(honest, dishonest)	(2,0),(3,1)	1	0	1	0
24		(right,right)	(dishonest, dishonest)	(0,0)	0.5	0.5	0.5	0.5
25*		(right,right)	(honest, dishonest)	(2,0),(3,1)	1	0	1	0
26	7 (only managers inequity and dishonesty averse)	(wrong,wrong)	(honest, honest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
27*		(wrong,right)	(honest, dishonest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
28		(right,right)	(dishonest, dishonest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
29	8 (A and X inequity and dishonesty averse; B and Y selfish)	(wrong,wrong)	(honest, honest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5
30		(right,right)	(dishonest, dishonest)	(0,0),(1,1),(2,2)	0.5	0.5	0.5	0.5

* indicates that there is also the corresponding symmetric case where A and B is reversed

A3 Instructions

A3.1 Experimental instructions for treatment *Full Info*

Instructions for the experiment

General information

We welcome you to this economic experiment. It is very important that you read the following explanations carefully. If you have any questions, please direct them to us.

In this experiment, you can earn money according to your decisions and the decisions of the other participants. During the experiment, it is not allowed to talk to other participants of the experiment. Non-compliance with this rule will result in exclusion from the experiment and from all payments. All decisions are made anonymously, i.e., none of the other participants learn the identity of the person who has made a specific decision. The payment is also anonymous, i.e., no participant learns the payments of other participants.

During the experiment, your entire income is calculated in points. The total number of points achieved during the experiment will be converted into Euro at the end, with

30 points = 1 Euro.

At the end of today's experiment, you will receive the number of points earned during the experiment plus a 2.50 € show-up fee from us in cash. In addition, at the beginning of the experiment, you receive an initial endowment of 100 points. In the following pages, we will explain to you the detailed procedure of the experiment.

Information on the experiment

Course of the experiment

- The experiment consists of **30 rounds**; each round has the same structure.
- You are part of a group of **6 members**. During the entire experiment, you will interact exclusively with the members of your group. The composition of the group remains the same across all rounds.

Firms, managers, workers, and consumers

- There are two **firms** (**A** and **B**) and two **consumers** (**X** and **Y**).
- Each of the two firms consists of a **manager** and a **worker**. At the beginning of the experiment it will be randomly determined which manager and which worker form firm A and which manager and which worker form firm B. This assignment remains unchanged over the entire experiment.
- Which role you take is randomly determined at the beginning of the experiment and remains unchanged during the entire experiment. Please note that your role does not permit any conclusions about your identity.

Production

- In both firms, the worker produces several units of an identical **good**.
- A **state** is randomly assigned to each round: "Red" and "Blue," with a probability of 50% each. At the beginning of each round, the firm's worker guesses the current state. If the worker's guess is right, the firm has **production costs of 0 points**. If the worker's guess is wrong, the firm has **production costs of 6 points**. The workers do not learn the true state of the round.

	Production Costs	
	State "Red"	State "Blue"
Worker guesses "Red"	0	6
Worker guesses "Blue"	6	0

- A firm's manager learns the true state of the round and the guess made by her/his worker. The manager informs her/his worker whether her/his guess was right or wrong. This information may be but does not have to be true. If the manager informs the worker that her/his **guess was right**, she/he will pay a **wage of 7 points** to her/his worker. If the manager informs the worker that her/his **guess was wrong**, she/he will pay a **wage of 3 points** to her/his worker.

	Wage
Manager informs the worker that her/his guess was right.	7
Manager informs the worker that her/his guess was wrong.	3

- A firm's manager determines the **price** at which the firm offers the good (integer numbers **between 0 and 30 points**).

Purchase

- Each consumer can buy **up to one unit** of the good and decides whether she/he buys the goods from firm A, from firm B or whether she/he does not buy the good. The good has a **value of 30 points** to each of both consumers.
- If a consumer buys the good from firm A, she/he will pay the price set by the manager of firm A. If a consumer buys at firm B, she/he will pay the price set by the manager of firm B. By purchasing, a consumer receives 30 points minus the price paid. A consumer who does not buy a good receives 0 points.

	Consumer Profit
Consumer buys one unit of the good	30 - price
Consumer does not buy a unit	0

- The number of goods a firm sells depends on the purchasing decisions of the two consumers. Therefore, a firm can sell none, one or two units.

Income in each round

Each participant receives a **round endowment** of **5 points** in each round. The rest of the income depends on the decisions as follows:

Income of the participants in a round

Manager:
$$\begin{aligned}\text{Income} &= \text{Round endowment} \\ &+ \text{Price of the good} \times \text{Number of units sold} \\ &- \text{Production costs} \begin{cases} 0, \text{if the worker guessed right} \\ 6, \text{if the worker guessed wrong} \end{cases} \\ &- \text{Wage} \begin{cases} 7, \text{if the manager informs the worker that she/he guessed right} \\ 3, \text{if the manager informs the worker that she/he guessed wrong} \end{cases}\end{aligned}$$

Worker:
$$\begin{aligned}\text{Income} &= \text{Round endowment} \\ &+ \text{Wage} \begin{cases} 7, \text{if the manager informs the worker that she/he guessed right} \\ 3, \text{if the manager informs the worker that she/he guessed wrong} \end{cases}\end{aligned}$$

Consumer:
$$\begin{aligned}\text{Income} &= \text{Round endowment} \\ &+ \text{Consumer Profit} \begin{cases} 30 - \text{price}, \text{if the consumer buys} \\ 0, \text{if the consumer does not buy} \end{cases}\end{aligned}$$

Course of the experiment

Before the start of the first round, you are informed about your role (manager A, worker A, manager B, worker B, consumer X or consumer Y). All rounds take place according to the following scheme:

Step 0: State of the round

- The state of the round is randomly drawn, with a probability of 50% it is "Red" and with a probability of 50% it is "Blue".

Step 1: Actions of the workers

- The workers guess the state of the round.
- The workers produce the units of the good.

Step 2: Actions of the workers and the managers

- The managers learn the state of the round and the guess of their worker.
- The managers inform their worker whether their guess was right or not (this information may be but does not have to be true) and about the resulting wage.
- The managers determine the price of the good.

Step 3: Actions of the consumers

- The consumers learn the state of the round, the workers' guesses, as well as the information sent by the managers to the workers about whether their guesses were right or not and the resulting wages.
- The consumers learn the price of the good of firm A and the price of the good of firm B.
- The consumers decide whether and from which firm they buy one unit of the good.

Step 4: Information

- The workers receive the information from their managers about whether their guess was right or not as well as the resulting wage.
- Both managers learn the guess of the respective other worker and receive the information sent by the other manager to the worker whether the guess was right or not.
- Both managers, both workers, and both consumers are informed about the prices of both firms and the purchase decisions of both consumers.
- Each participant learns her/his round income.

Total income

Your total income is the sum of the incomes of all rounds plus the start income of 100 points.

Good luck!

A3.2 Experimental instructions for treatment *No Honesty Frame*

To avoid repetition and highlight the differences, we describe the parts in the instructions of treatment *No Honesty Frame* that differ from *Full Info*.

Third bullet point in **Production**:

- A firm's manager learns the true state of the round and the guess for her/his worker. The manager determines her/his worker's wage. The manager may pay a **wage of 7 points or** a **wage of 3 points** to her/his worker.

Income table in **Income in each round**:

Income of the participants in a round

Manager:

$$\begin{aligned}\text{Income} &= \text{Round endowment} \\ &+ \text{Price of the good} \times \text{Number of units sold} \\ &- \text{Production costs} \begin{cases} 0, \text{if the worker guessed right} \\ 6, \text{if the worker guessed wrong} \end{cases} \\ &- \text{Wage determined by the manager (either 3 or 7)}\end{aligned}$$

Worker:

$$\begin{aligned}\text{Income} &= \text{Round endowment} \\ &+ \text{Wage determined by the manager (either 3 or 7)}\end{aligned}$$

Consumer: $\text{Income} = \text{Round endowment} + \text{Consumer Profit} \begin{cases} 30 - \text{price, if the consumer buys} \\ 0, \text{if the consumer does not buy} \end{cases}$

Second bullet point in **Step 2**:

Step 2: Actions of the workers and the managers

- The managers determine the wage of their worker.

First bullet point in **Step 3**:

Step 3: Actions of the consumers

- The consumers learn the state of the round, the workers' guesses as well as wages of the workers.

First and second bullet point in **Step 4**:

Step 4: Information

- The workers receive the information on their wage.
- Both managers learn the guess and the wage of the respective other worker.