Transparency and Indirect Reciprocity in Social Responsibility: An Incentivized Experiment

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We design an incentivized human-subject experiment to study the impact of supply chain transparency on consumers’ valuations of a firm’s social responsibility practices. Lower transparency is modeled by higher uncertainty in the compensation that a worker receives for making a product. To deepen our understanding of consumers’ decision-making, we investigate how much of consumers’ valuations can be attributed to indirect reciprocity (i.e., consumers rewarding a firm for the responsible treatment of its workers). We also analyze how heterogeneity in consumers’ prosocial orientation (i.e., willingness to sacrifice one’s own benefit to improve the payoff of a person one directly interacts with) impacts the roles of transparency and indirect reciprocity in consumers’ valuations. Our results demonstrate that consumers are willing to pay a higher price under a higher level of transparency. In addition, there exists an important interplay among transparency, indirect reciprocity, and consumers’ prosocial orientation. High prosocial consumers do not exhibit indirect reciprocity. Their valuations are primarily driven by the social outcome (i.e., the worker’s pay) rather than by the knowledge about the firm’s effort. In sharp contrast, indirect reciprocity has a strong positive effect on low prosocial consumers’ valuations when transparency is high. However, as transparency decreases, we first observe a negative effect of indirect reciprocity on low prosocial consumers’ valuations, and then indirect reciprocity disappears. Our results provide insights into the benefits that a company can derive from increased transparency and how a company can better communicate its social responsibility practices to consumers.

Key words: Transparency; indirect reciprocity; prosocial orientation; social responsibility; behavioral economics; experimental economics

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1. Introduction

In 2007, Patagonia launched “The Footprint Chronicles,” a website dedicated to giving consumers visibility into Patagonia’s supply chain (Patagonia 2014). The Footprint Chronicles includes detailed information regarding the environmental and social responsibility initiatives Patagonia has undertaken with its suppliers. Similarly, in 2013 Nestlé introduced a QR code on the packaging for Kit-Kats. Consumers can scan the code to obtain detailed information about the social and environmental impacts of the product (Nestlé 2013). Websites and smart labels such as these provide
consumers with unique insight into the social and environmental impacts of a company’s supply chain. However, how much consumers value such transparency remains an open question. Providing consumers with extensive visibility into its supply chain can be a costly and time consuming investment for a company (Doorey 2011). In this paper, we employ an incentivized human-subject experiment to examine whether and when transparency impacts consumers’ valuations of a company’s social responsibility practices.\textsuperscript{1} In particular, we focus on the dimension of social responsibility regarding a company’s treatment of the workers in its supply chain. Our results provide insights into when a company can benefit from increased transparency and how a company can better communicate its social responsibility practices to consumers.

To enhance our understanding of consumers’ valuations of social responsibility, we design our experiment to investigate the behavioral motives underlying consumers’ decisions. Various social preferences can motivate a consumer to value social responsibility, such as altruism (e.g., Levine 1998, Andreoni and Miller 2002), inequality aversion (e.g., Fehr and Schmidt 1999, Bolton and Ockenfels 2000), and reciprocity (e.g., Fehr et al. 1998, Nowak and Sigmund 1998). We focus on the preference of indirect reciprocity. Following Alexander (1987, p. 5), indirect reciprocity is defined as “the return from a social investment in another...from someone other than the recipient of the beneficence.” Thus, indirect reciprocity arises when individuals help those who have helped others. We study a social context in which a worker has helped a company to make a product that the company would like to sell to a consumer. In this setting, a consumer motivated by indirect reciprocity would be willing to reward the company for its responsible treatment of the worker (e.g., ensuring reasonable compensation). Understanding how indirect reciprocity affects consumers’ valuations of social responsibility has important practical implications. If indirect reciprocity is a key driver of consumers’ valuations, then making visible the efforts (e.g., capital and time investment) that a company exerts to maintain a socially responsible supply chain can benefit the company.

1.1. Summary of Experimental Design

Our experimental design is based on a three-player game with a Firm (she), a Consumer (he), and a Worker. We call this game the Consumer Purchase Game. All three players are presented with a hypothetical scenario whereby the Worker has helped the Firm to make a product, and the Firm would like to sell the product to the Consumer. The Firm first decides how much money to use to generate a payment to the Worker. We refer to the Firm’s decision as her effort. Given the Firm’s effort, the Consumer states the highest price that he is willing to pay to the Firm to buy the product. We refer to the Consumer’s decision as his willingness-to-pay (WTP) and use

\textsuperscript{1} We follow the European Commission’s definition of social responsibility as “[companies integrating] social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis” (Dahlsrud 2008).
WTP to measure the Consumer’s valuation of social responsibility. The Worker does not make any decisions. If the product is sold, then the Worker receives a payment whose expected value is equal to the Firm’s effort.

We manipulate the Consumer Purchase Game in two dimensions. First, to study the effect of transparency on the Consumer’s WTP, we manipulate the level of uncertainty in the relationship between the Firm’s effort and the actual payment to the Worker. Lower transparency is modeled by higher uncertainty in this relationship. In our design, we define transparency as the extent to which the outcome of the Firm’s social responsibility effort is precisely known to the Firm and the Consumer. In a fully transparent supply chain, both the Firm and the Consumer know exactly the Firm’s effort and the resulting payment to the Worker (i.e., the outcome). In a non-fully transparent supply chain, however, there is uncertainty in the payment to the Worker for all players, even though the Firm’s effort is still observable to both the Firm and the Consumer.

Second, to study how indirect reciprocity affects the Consumer’s WTP, we manipulate the process by which the Firm’s effort is determined. Indirect reciprocity is elicited by comparing the Consumer’s WTP in a treatment where the Firm actively chooses her effort versus in a treatment where Nature determines the Firm’s effort. This approach is commonly used in the experimental economics literature to study reciprocity (e.g., Blount 1995, Charness 2004, Falk et al. 2008). Note that the role of indirect reciprocity may vary under different levels of transparency. Our design allows us to study the interaction between these two factors to gain insights into how a company’s communication of its social responsibility practices should vary with the level of transparency in its supply chain.

It has been shown that consumers are heterogeneous in their tendency to care about social responsibility (e.g., García-Gallego and Georgantzís 2011). Therefore, it is important to understand how individual heterogeneity may impact the effects of transparency and indirect reciprocity on consumers’ WTP. We focus on one particular aspect of heterogeneity – consumers’ prosocial orientation. In our experiment, we define prosocial orientation as the extent to which an individual is willing to sacrifice his/her own benefit to improve the payoff of a person that he/she directly interacts with. Prior studies have attributed the consumption of socially responsible products to values such as benevolence, equality, and responsibility (Vermeir and Verbeke 2006). Individuals who adhere to these values tend to have high prosocial orientation. Hence, there is a natural connection between a person’s prosocial orientation and his/her attention to social responsibility. In our experiment, we measure the Consumer’s prosocial orientation by eliciting his decision as the dictator in a variation of the dictator game (Forsythe et al. 1994).

The above experimental design allows us to study the following research questions: (i) How does transparency affect consumers’ valuations of a company’s social responsibility practices? (ii) What
role does indirect reciprocity play in driving consumers’ valuations? (iii) How do transparency and indirect reciprocity interact with each other to influence consumers’ valuations? (iv) How do the answers to the above three questions vary for consumers with different prosocial orientations?

1.2. Contributions

Our main contributions are threefold. First, to the best of our knowledge, we are the first to study the role of transparency in consumers’ valuations of social responsibility through an incentivized controlled laboratory experiment. Within the sustainable operations management (OM) literature, there is a growing interest in studying how the type and nature of the information presented to individuals affect their behavior. For example, Muthulingam et al. (2013) show that the order in which energy-saving recommendations are presented to small and medium firms significantly affects the resulting adoption rate of such recommendations. Motivated by the recent practice of showing households how their energy consumption compares to that of their neighbors, Roels and Su (2013) study how this comparison information can affect an individual’s behavior. The authors demonstrate that a social planner should select the type of comparison information communicated based on whether individuals are ahead-seeking or behind-averse. Kalkanci et al. (2013) compare mandatory versus voluntary disclosure of a company’s social and environmental impacts and show that mandatory disclosure can deter a company from learning about such impacts. Outside of the sustainable OM literature, researchers have also studied through non-incentivized tasks whether the type and uncertainty of the information provided to consumers about social responsibility has an impact on their valuations (e.g., Borin et al. 2011, Joireman et al. 2013). We differ from the above studies in our research methodology. We employ an incentivized controlled laboratory experiment to elicit consumers’ truthful valuations of social responsibility. While there exists research that uses incentivized experiments in the lab (e.g., Krishna and Rajan 2009, Munro and Valente 2009, Engelmann et al. 2011) and the field (e.g., Prasad et al. 2004, Hainmueller and Hiscox 2012, Hainmueller et al. 2014) to study consumers’ valuations of social responsibility, none of these works examine transparency. We contribute to this literature by showing that in an incentivized and controlled environment, consumers are willing to pay a higher price for socially responsible products when the level of transparency is high.

Second, we introduce a new experimental design to study the effect of uncertainty on indirect reciprocity. How the uncertainty in the outcome of one’s actions affects social preferences remains

2 Our design is also relevant to contexts outside of social responsibility. For example, transparency has become a critical issue for charitable organizations and non-profits seeking donations from donors (Waters 2008). Our insights can help these organizations to improve their fundraising through better communication of their initiatives.

3 There is evidence that what individuals claim they would do with respect to social responsibility differs from their actual purchase behavior. For example, Devinney et al. (2010, p. 112) observe that “individuals either purposely overstate their social credentials or just want to look good in surveys, making it nearly impossible to believe what they say about their social proclivities.”
an under-studied topic with inconclusive results. In two-player settings, some show that uncertainty weakens social preferences (Brock et al. 2013), some show no significant effect (Krawczyk and Le Lec 2010), while others show that the effect depends on the elicitation method (e.g., eliciting willingness-to-pay versus willingness-to-accept; see Brennan et al. 2008). In addition, no study examines the interaction between uncertainty and indirect reciprocity. We contribute to this literature by demonstrating that the motive of indirect reciprocity can disappear if there is substantial uncertainty in the outcome of one’s action. In particular, our pooled results – without differentiating by Consumers’ prosocial orientation – show that indirect reciprocity exists and has a positive effect on Consumers’ WTP only when the level of transparency is high. However, when the level of transparency is low, indirect reciprocity disappears.

Third, we demonstrate an important interplay among transparency, indirect reciprocity, and individuals’ prosocial orientation in determining consumers’ valuations of social responsibility. Specifically, we show that how reciprocal motives interact with transparency significantly depends on consumers’ prosocial orientation. High prosocial consumers do not exhibit reciprocal motives. Instead, their valuations of social responsibility are primarily driven by the outcome of the companies’ actions (rather than the effort exerted) and the level of transparency. In contrast, reciprocal motives play an important role in driving a high WTP by low prosocial consumers when the level of transparency is high. These observations provide insights into how companies can better communicate their social responsibility practices. For example, if a company targets consumers that are driven by self-interest, then only if its supply chain is highly transparent should the company communicate information about the effort exerted towards social responsibility. Emphasizing effort when the level of transparency is low can inadvertently decrease low prosocial consumers’ willingness-to-pay, thereby hurting the company.

2. Experimental Design, Hypotheses, and Procedures

Our experiment consists of two main components: the Consumer Purchase Game and the Uncertain Dictator Game.

2.1. The Consumer Purchase Game

We design the Consumer Purchase Game as a three-player game with the following roles: a Firm (she), a Consumer (he), and a Worker. At the beginning of the game, the three players are told to consider a hypothetical scenario in which the Worker has helped the Firm to make a product, and the Firm wants to sell the product to the Consumer. The Firm, the Consumer, and the Worker are initially endowed with 160, 120, and 20 tokens, respectively. The initial endowments are explicitly designed to capture differences in the players’ wealth status, particularly the wealth differences between the Worker and the other two players. The Firm receives an additional *provisional* payment
of 120 tokens. The Firm earns this provisional payment only if she manages to sell the hypothetical product to the Consumer.

The sequence of events is as follows. First, the Firm decides how much from the provisional 120 tokens that she is willing to use to generate a payment to the Worker. We refer to the Firm’s decision as her effort $e$. The potential values of $e$ range from 0 to 120 in increments of 20; i.e., $e \in \{0, 20, 40, 60, 80, 100, 120\}$. Second, the Consumer states the maximum price that he is willing to pay to the Firm for the product, given the Firm’s effort. We denote the Consumer’s decision as his willingness-to-pay (WTP). The Worker does not make any decisions. If the product is sold, then the Worker receives a payment $w$ that depends on $e$. After the Firm and the Consumer make their decisions, Nature chooses the product price, $p$, from a uniform distribution between 1 and 120 tokens. If $p$ is lower than or equal to the Consumer’s WTP, then the product is sold. In this case, the final payoffs to all players (including initial endowments) are as follows: (i) the Consumer pays the price of the product to the Firm and earns a payoff $\pi_C = 120 - p$; (ii) the Firm receives the provisional 120 tokens plus the price of the product minus her effort, earning a total payoff $\pi_F = 160 + 120 + p - e$; and (iii) the Worker receives the payment and earns a payoff $\pi_W = 20 + w$. Otherwise, if the price $p$ is strictly higher than the Consumer’s WTP, then the product is not sold and all players receive their initial endowments: $\pi_C = 120$, $\pi_F = 160$, and $\pi_W = 20$.\footnote{Making players’ payoffs dependent on their own decisions is a common way of incentivizing such decisions in human-subject experiments. In the sustainable OM literature, we are aware of only one behavioral study that uses an incentivized scheme (Agrawal et al. 2014).}

Using a random price to elicit a truthful WTP is known as the Becker-DeGroot-Marschak mechanism (Becker et al. 1964) and is a common technique in the experimental economics literature (e.g., Klos et al. 2005, Halevy 2007). We also apply the strategy method to obtain the Consumer’s decision: the Consumer states his WTP for each of the seven values of $e$ that the Firm may choose while the Firm is choosing $e$ (i.e., before knowing the actual value of $e$). The strategy method is commonly used in the literature (e.g., Fehr and Fischbacher 2004, Falk et al. 2008). The advantage of the strategy method is that it extracts the Consumer’s WTP for every possible value of $e$. After the Firm and the Consumer make their decisions, the Firm’s chosen effort $e$ and the Consumer’s WTP corresponding to that effort jointly determine the players’ final payoffs.

We manipulate the Consumer Purchase Game in two dimensions in our experiment. First, to study the effect of transparency on the Consumer’s WTP, we manipulate the relationship between the Firm’s effort $e$ and the payment to the Worker $w$. Specifically, we define $w$ as follows:

\begin{align*}
    w &= \begin{cases} 
    0 & \text{if } e = 0, \\
    \text{Uniformly distributed on } [e - s, e + s] & \text{if } e > 0,
    \end{cases}
\end{align*}

4 Making players’ payoffs dependent on their own decisions is a common way of incentivizing such decisions in human-subject experiments. In the sustainable OM literature, we are aware of only one behavioral study that uses an incentivized scheme (Agrawal et al. 2014).
where the parameter $s$ represents the level of transparency. We examine three different values of $s$, leading to three Transparency conditions: $s = 0$ (High Transparency), $s = 10$ (Medium Transparency), and $s = 20$ (Low Transparency). The condition of $s = 0$ represents high transparency because the payment to the Worker if the product is sold is exactly equal to the Firm’s effort $e$. Conversely, $s = 20$ represents low transparency because given $e$, there is still large uncertainty regarding the actual payment to the Worker. In our design, the Consumer always observes the Firm’s effort. Hence, we study transparency regarding the outcome of the Firm’s effort (as opposed to transparency regarding the effort itself). Note that in all three conditions, the expected payment to the Worker is equal to the Firm’s effort.

In practice, transparency may also improve the visibility of a company’s social responsibility effort and hence, consumers’ trust towards the company. We choose to focus on transparency regarding outcomes for three reasons. First, there are a number of third-party certifications (e.g., the Fair Trade Label) or information providers (e.g., the Good Guide App) that companies can rely on to establish the credibility of their practices and therefore, improve consumer trust. Second, in many practical examples where companies provide social responsibility information to consumers, the information communicated is mainly about environmental and social outcomes (e.g., Patagonia’s The Footprint Chronicles and Nestlé’s QR code). Finally, a main objective of increasing supply chain transparency is to help companies gain better visibility into their own supply chains and hence, better understand the outcomes of their social responsibility practices. In a recent survey of global senior executives, half of the executives interviewed admitted that “[their companies] know very little about partners beyond [their immediate tier 1 partners], let alone their entire network” (KPMG International 2013). Thus, there will likely be an increase in companies investing to improve the transparency of their supply chains. We are interested in studying whether there exists a financial benefit to increased transparency that could help to offset the costly investment that these companies will face.

To study the effect of indirect reciprocity on the Consumer’s WTP, the second dimension we manipulate in our experiment is the process by which the effort $e$ is selected. We compare two Selection conditions: the Decision condition versus the Random condition. Under the Decision condition, the Firm chooses the effort $e$ as discussed above (see Figure 1a). In contrast, under the Random condition, Nature chooses $e$ uniformly and randomly from the feasible set \{0, 20, 40, 60, 80, 100, 120\}, and the Firm automatically accepts the chosen value (see Figure 1b). For ease of exposition, we still refer to $e$ as the Firm’s effort in the Random condition, despite it not being actively chosen by the Firm. Since the Firm is not responsible for the selection of $e$ in the Random condition, high or low values of $e$ in this condition cannot be interpreted by the Consumer as a sign of kindness.
or unkindness by the Firm towards the Worker. In other words, the Consumer’s WTP in the Random condition is driven by preferences other than indirect reciprocity. Conversely, the Consumer’s WTP in the Decision condition is driven by both these preferences and indirect reciprocity. Therefore, differences observed in WTP between these two conditions measure indirect reciprocity. This approach is well established in the experimental economics literature for studying direct reciprocity (e.g., Blount 1995, Charness 2004, Falk et al. 2008). We extend it to measure indirect reciprocity. The three Transparency conditions combined with the two Selection conditions yield a $3 \times 2$ factorial design and a total of six treatments. This design allows us to study the individual effects of transparency and indirect reciprocity on willingness-to-pay, as well as their interaction effect.

### Figure 1  Summary of Experimental Design

\begin{figure}
\centering
\begin{tabular}{c c}
\textbf{1. Firm} chooses $e$ & \textbf{1. Nature} chooses $e$
\midrule
\textbf{2. Consumer decides WTP based on $e$} & \textbf{2. Consumer decides WTP based on $e$}
\midrule
\midrule
$p \leq \text{WTP}$ & $p \leq \text{WTP}$
\midrule
4. Worker’s payment $w$ is realized between $e - s$ and $e + s$ & 4. Worker’s payment $w$ is realized between $e - s$ and $e + s$
\midrule
Players’ Payoffs:  & Players’ Payoffs:  & Players’ Payoffs:  & Players’ Payoffs:
\begin{align*}
\pi_C &= 120 - p \\
\pi_F &= 160 + 120 + p - e \\
\pi_W &= 20 + w \\
\end{align*} & \begin{align*}
\pi_C &= 120 \\
\pi_F &= 160 \\
\pi_W &= 20 \\
\end{align*} & \begin{align*}
\pi_C &= 120 - p \\
\pi_F &= 160 + 120 + p - e \\
\pi_W &= 20 + w \\
\end{align*} & \begin{align*}
\pi_C &= 120 \\
\pi_F &= 160 \\
\pi_W &= 20 \\
\end{align*}
\end{tabular}
\caption{(a) Decision condition (b) Random condition}
\end{figure}

### 2.2. The Uncertain Dictator Game

One key research question that we seek to address is how individual heterogeneity in prosocial orientation may affect the roles of transparency and indirect reciprocity in determining consumers’ valuations of social responsibility. In our experiment, we define prosocial orientation as the extent to which an individual is willing to sacrifice his/her own benefit to improve the payoff of a person that he/she directly interacts with. To measure the Consumer’s prosocial orientation, we employ
the Uncertain Dictator Game with the following setup. The dictator and the recipient are initially endowed with 120 and 20 tokens, respectively. The Consumer acts as the dictator and is asked to choose the number of tokens, \( a \), from the set \{0, 20, 40, 60, 80, 100, 120\} that he is willing to use to generate a payment to the recipient. After the Consumer makes his decision, the recipient receives a random payment \( t \) that is uniformly distributed on \([a - s, a + s]\) if \( a > 0\), and exactly equal to zero otherwise. The value of \( s \) used in the Uncertain Dictator Game is set equal to the value of \( s \) the Consumer faced in the Consumer Purchase Game. Matching these two values ensures that we measure the Consumer’s prosocial orientation under the same level of uncertainty regarding outcomes. Given the above design, the Consumer’s decision \( a \) as the dictator measures his prosocial orientation. A higher value of \( a \) implies that the Consumer is more willing to improve the recipient’s payoff at his own cost. Hence, he is more prosocial. We analyze whether the two manipulation dimensions of the Consumer Purchase Game have different effects on the WTP decisions made by Consumer players with high versus low prosocial orientations.

2.3. Hypotheses

Our experimental design allows us to measure the Consumer’s willingness-to-pay for a socially responsible product and how it is affected by three key factors: (i) the level of transparency about the payment to the Worker; (ii) the Consumer’s indirect reciprocity towards the Firm; and (iii) the Consumer’s prosocial orientation. Note that if the Consumer only cares about his own payoff, then he will always state \( \text{WTP} = 0 \) regardless of the value of \( e \). However, a number of empirical studies have shown that individuals often care about others’ well-being in addition to their own payoffs (for a review, see Fehr and Schmidt 2006). For example, inequality aversion (Fehr and Schmidt 1999, Bolton and Ockenfels 2000) posits that individuals are motivated to reduce the payoff differences between themselves and others. Therefore, we expect the Consumer’s WTP to be increasing in the value of \( e \). Building on this expected behavior, we next discuss our main hypotheses regarding the effects of transparency and indirect reciprocity. Recall from §2.1 that the Random condition is designed solely to isolate the effect of indirect reciprocity on the Consumer’s WTP. Therefore, our hypothesis regarding transparency only examines the Consumer’s WTP in the Decision condition; our hypothesis regarding indirect reciprocity examines the Consumer’s WTP in both the Decision and Random conditions.

We first focus on how transparency regarding the actual payment to the Worker impacts the Consumer’s WTP. In the Low and Medium Transparency conditions, the exact payment that the Worker receives if the product is sold is unknown. The current literature on how uncertainty about the outcome of one’s actions affects social preferences is scarce and yields mixed results. For example, Krawczyk and Le Lee (2010) and Brock et al. (2013) both compare the standard dictator
game with one where the payoffs to the dictator and/or the recipient are uncertain. When there is uncertainty in the payoff(s), the dictator’s decision determines the expected payoff(s). Krawczyk and Le Lec (2010) show that if uncertainty exists for both parties’ payoffs and these payoffs are independent from each other, then the dictators’ decisions are not significantly different from those in the standard dictator game. Conversely, Brock et al. (2013) observe that if uncertainty exists only for the recipient’s payoff, then the dictators transfer significantly lower amounts to the recipients. A study by Brennan et al. (2008) suggests that the effect of uncertainty on people’s reservation prices depends on the elicitation method. In their setting, participants are asked to state their WTP or willingness-to-accept (WTA)\(^5\) for a sure payoff to themselves, and either a sure payoff or a lottery to a recipient. The expected value of the lottery is equal to the sure payoff to the recipient. The authors observe that the WTP for the sure payoff to the recipient is similar to that for the lottery, whereas the WTA for the sure payoff is significantly higher than that for the lottery.\(^6\) Given these mixed results, we develop the following competing hypotheses to be tested in our experiment.

**Hypothesis 1A.** Given effort \(e\), the Consumer’s WTP does not differ across different levels of transparency.

**Hypothesis 1B.** Given effort \(e\), the Consumer’s WTP increases as the level of transparency increases.\(^7\)

Our second hypothesis examines how indirect reciprocity affects the Consumer’s WTP. We distinguish indirect reciprocity from direct reciprocity. Direct reciprocity occurs when an individual treats someone else in the same manner as that person has treated him/her. Conversely, indirect reciprocity occurs when an individual treats someone else in the same manner as that person has treated a third party. Direct reciprocity has been studied extensively in the literature (e.g., Fehr et al. 1998, Charness and Rabin 2002, Cox 2004, Falk et al. 2008). The most common setting used to study direct reciprocity is the gift exchange game (Akerlof 1982). For example, Charness (2004) show that the marginal increase in an employee’s effort given a unit increase in his wage, is larger when the wage increase is actively chosen by the firm than when it is randomly determined. This phenomenon is attributed to direct reciprocity. Although less studied than direct reciprocity, the existence of indirect reciprocity has also been documented in the literature (e.g., Buchan et al. 2002, \(^5\)Willingness-to-accept (WTA) is defined as the minimum price at which a person would be willing to sell something that he/she already owns.  
\(^6\)Brennan et al. (2008) focus on the effect of participants’ risk attitudes on social preferences. We also design our study to measure individuals’ risk attitudes. However, as will be discussed in §4 and Appendix C, risk attitudes do not explain our results.  
\(^7\)Hypothesis 1B does not consider the case \(e = 0\), because in that case the payment to the Worker is exactly equal to 0, regardless of the Transparency condition.
Seinen and Schram 2006, Engelmann and Fischbacher 2009). One paper that is related to ours is by Stanca (2009). In their indirect social reciprocity treatment, they study the following two-stage game. In the first stage, a participant (the sender) chooses the amount $x$ that he/she wants to send to another participant (the recipient). In the second stage, a third participant (i.e., different from the sender and the recipient) observes the amount $x$ chosen by the sender and chooses an amount $y$ that he/she wants to transfer to the sender. All participants receive the same initial endowments. The authors find that the amounts chosen in the second stage positively correlate with those sent in the first stage. They attribute this result to indirect reciprocity.

In our Consumer Purchase Game, indirect reciprocity occurs if the Consumer rewards or punishes the Firm when he perceives the Firm acting kindly or unkindly towards the Worker. We extend Charness’s (2004) approach to measure indirect reciprocity. That is, given a unit increase in the Firm’s effort, we consider indirect reciprocity to exist if the marginal increase in the Consumer’s WTP is larger in the Decision condition than in the Random condition (see Figure 1 for the design of these two conditions). To the best of our knowledge, the current literature has not studied the impact of transparency (or uncertainty about how one’s action affects another’s payoff) on either direct or indirect reciprocity. Therefore, we make the following null hypothesis that indirect reciprocity universally exists regardless of the level of transparency.

**Hypothesis 2.** At each level of transparency, the same increase in $e$ yields a larger increase in the Consumer’s WTP in the Decision condition than in the Random condition.

Hereafter, to simplify our discussion, we refer to indirect reciprocity simply as reciprocity. In addition to the above two hypotheses, our experimental design allows us to address some of our main research questions via the following interaction effects: (i) the interaction between transparency and reciprocity, and (ii) the interaction among transparency, reciprocity, and the Consumer’s prosocial orientation. Examining the above hypotheses and these interaction effects enables us to determine when consumers value transparency and to provide companies with practical guidance on how they should better communicate their social responsibility practices to consumers.

### 2.4. Experimental Procedures

We conducted all experimental sessions in the computer laboratories of two large universities. The sessions were comprised of experimental treatments based on our 3 (Transparency: High vs. Medium vs. Low) × 2 (Selection: Decision vs. Random) factorial design. Table 1 summarizes the number of Consumer participants in each treatment and the corresponding treatment conditions.

All sessions followed the same procedure. In particular, participants completed the following tasks in the same order in each session: (i) two rounds of the Consumer Purchase Game, (ii) one round of the Uncertain Dictator Game, and (iii) a post-experiment survey. Participants were
Table 1  Summary of Experimental Treatments

<table>
<thead>
<tr>
<th>Selection condition</th>
<th>Transparency condition</th>
<th>Number of Consumer participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision</td>
<td>High</td>
<td>26</td>
</tr>
<tr>
<td>Decision</td>
<td>Medium</td>
<td>29</td>
</tr>
<tr>
<td>Decision</td>
<td>Low</td>
<td>31</td>
</tr>
<tr>
<td>Random</td>
<td>High</td>
<td>38</td>
</tr>
<tr>
<td>Random</td>
<td>Medium</td>
<td>34</td>
</tr>
<tr>
<td>Random</td>
<td>Low</td>
<td>40</td>
</tr>
</tbody>
</table>

Note. Consumer participants include those who played the role of the Consumer in any round of an experimental session.

informed of the next task only after they completed the previous one. This procedure prevented participants from altering their current decisions in anticipation of future decisions. In addition, the outcomes of the tasks were not presented to the participants until they had completed all tasks. This procedure eliminated the possibility that outcomes from previous tasks affected current and future decisions, including income effects and an increase (decrease) in generosity due to positive (negative) past outcomes.

At the beginning of round 1 of the Consumer Purchase Game, participants were randomly and anonymously matched into groups of three. Within each group, participants were randomly assigned to one of three roles: Firm, Consumer, or Worker. These roles were referred to as Player A, Player B, and Player C in the experiment. Participants were informed of the treatment conditions they were in and played the Consumer Purchase Game as described in §2.1. After participants completed round 1 of the game, the following role reassignments occurred for round 2. The Consumer participants in round 1 were assigned the role of the Firm in round 2. The Firm participants in round 1 were assigned the role of the Consumer in round 2. The Worker participants in round 1 remained in that role in round 2. Therefore, all participants played the role of the Consumer at most once. All participants were then randomly and anonymously rematched into groups of three. They were informed that they were randomly and anonymously assigned to a new group, but they were not informed of how the roles were reassigned. The Transparency condition in round 2 was different than the one used in round 1, whereas the Selection condition was the same in both rounds. The order of Transparency conditions used in the two rounds was randomized across sessions.8

After two rounds of the Consumer Purchase Game, participants who had played the Consumer role participated in the Uncertain Dictator Game described in §2.2. These players were informed that they had been randomly and anonymously paired with another participant and they were asked to make decisions as the dictator (referred to as Player 1 in the experiment). In each pair, the

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8To investigate the impact of potential order effects on our results, we also examine our research questions by only using the data from round 1. Our analysis confirms that all of our conclusions with the pooled data continue to hold.
level of uncertainty about the recipient’s actual payment was designed to match the Transparency condition that the dictator faced when he/she was the Consumer in the Consumer Purchase Game. After completing the Uncertain Dictator Game, participants were shown the outcomes of all tasks, including their decisions, the decisions of the participants whom they were matched with, the realized price of the product and the realized payment to the Worker in each round of the Consumer Purchase Game, and the resulting payoffs. Finally, participants were asked to answer short questions about their decisions in the experimental session and to complete a demographic survey. The instructions, sample screenshots, and the survey are available from the authors upon request.

The experimental tasks were implemented using the z-Tree software (Fischbacher 2007). During a session, participants were not allowed to talk to each other. They made decisions and interacted with each other only through computer terminals. Before each task, participants read the instructions on the screen and answered a set of practice questions. They were also provided with a reference sheet for the instructions. A total of 198 participants played the role of the Consumer. All of the participants in the study were students; 82.4% of them were undergraduates and the remaining 17.6% were graduate students. In addition, 61.2% of them were female, and the average age was 21.6 years old (with a standard deviation of 4.6 years). Participants were provided with monetary compensation based on their total payoffs in all tasks. Every 16 tokens were worth 1 U.S. dollar. Participants earned an average of $29.56, with a minimum of $20 and a maximum of $40. Each session lasted on average 90 minutes.

3. Experimental Results

Table 2 presents the summary statistics of the Consumers’ WTP for all combinations of Transparency and Selection conditions. We highlight three preliminary observations. First, the average WTP is significantly higher than zero in all treatments and for all effort levels (one-sided Wilcoxon signed-rank test, $p < 0.001$). As expected, we also observe that the average WTP is increasing in the Firm’s effort $\epsilon$. This result is confirmed by the Pearson’s correlation between the Firms’ effort and the Consumers’ WTP. This correlation ranges between 0.25 and 0.35 (one-sided $t$ test, $p < 0.001$) depending on the Transparency and Selection conditions.

To ensure that participants correctly understood the Consumer Purchase Game, they were provided with detailed instructions and examples, and they had to answer all practice questions correctly before proceeding to making decisions. In addition, participants’ responses in the post-experiment survey also confirm that they clearly understood the main aspects of the game. For example, they understood that choosing $WTP = 0$ was the profit-maximizing decision for the Consumer, that the Worker was more likely to receive the payment $w$ if the $WTP$ was higher, and that a higher effort by the Firm would give the Worker a larger share of the gain from selling the product. When asked whether they would change their decisions if they were to play the game again, a vast majority of the participants stated that they would not.

The average WTP being significantly higher than zero even when $\epsilon = 0$ may be due to the Consumers’ efficiency consideration; i.e., the Consumers prefer the product being sold to increase the total payoff for the group. The notion of an efficiency consideration is well documented in the social preferences literature (e.g., Charness and Rabin 2002, Engelmann and Strobel 2004).
Table 2 Summary Statistics for Consumers’ Willingness-to-Pay

<table>
<thead>
<tr>
<th>Effort</th>
<th>Transparency condition</th>
<th>Random condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>100</td>
<td>52   [55] (41)</td>
<td>47   [45] (43)</td>
</tr>
</tbody>
</table>

Note. Values shown are the mean, [median], and (standard deviation) of Consumers’ WTP.

Second, in the Decision condition, the Consumers state a higher average WTP when the level of transparency increases. In particular, the average WTP is significantly higher under high transparency than under low transparency ($p < 0.1$ for all positive effort levels). This observation establishes preliminary support that the Consumers value higher transparency.

Third, the difference in the Consumers’ WTP between the Decision condition and the Random condition depends on the level of transparency. Under high transparency, the average WTP is higher in the Decision condition than in the Random condition. The difference is significant when $e \geq 100$ ($p < 0.1$). In contrast, under either medium or low transparency, the average WTP is not significantly different between the Decision condition and the Random condition (two-sided Wilcoxon rank-sum test, $p > 0.1$ for all effort levels). Although we define reciprocity based on the rate of increase in WTP given an increase in $e$, the above result regarding the level of WTP still suggests that the effect of reciprocity may not be universal. There seems to exist an interaction effect between transparency and reciprocity.

To formally test our hypotheses, we estimate the following random-effects two-sided Tobit model with the Consumers’ WTP as the dependent variable:

$$WTP^*_jk = \text{Intercept} + \alpha_{TM} \cdot T_M + \alpha_{TL} \cdot T_L + \alpha_R \cdot R + \alpha_{RTM} \cdot R \cdot T_M + \alpha_{RTL} \cdot R \cdot T_L + \beta \cdot e_k$$

$$+ \beta_{TM} \cdot T_M \cdot e_k + \beta_{TL} \cdot T_L \cdot e_k + \beta_R \cdot R \cdot e_k + \beta_{RTM} \cdot R \cdot T_M \cdot e_k + \beta_{RTL} \cdot R \cdot T_L \cdot e_k + \delta_j + \epsilon_{jk}. \quad (1)$$

The variable $WTP^*$ is the latent variable for WTP in the Tobit model. The subscript $j$ is the index for a Consumer participant and $k$ is the level of effort exerted by the Firm. The variable $e_k$ with $k = 1, 2, \ldots, 7$ represents the seven possible effort levels in the set $\{0, 20, 40, 60, 80, 100, 120\}$. The dummy variables $T_M$ and $T_L$ indicate the Medium and Low Transparency conditions, respectively.

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11 All $p$ values are derived from one-sided Wilcoxon rank-sum tests unless otherwise stated. We conduct one-sided tests due to the directional nature of our hypotheses.
The dummy variable $R$ indicates the Random condition. The interaction terms among the dummy variables are included as independent variables in Equation (1) to investigate the interaction effect between transparency and reciprocity. The term $\delta_j$ represents the individual-specific error, and $\epsilon_{jk}$ is the independent error across WTP decisions.

We apply a random-effects two-sided Tobit model for the following reasons. First, the dependent variable WTP is bounded between 0 and 120, with approximately 28% of our observations taking the value of 0. Therefore, corner solution outcomes occur in our data and using a Tobit model to correctly account for them is desirable (Wooldridge 2010, pp. 667-689). Second, due to our use of the strategy method, we have seven WTP observations from each Consumer, corresponding to the seven possible effort levels. We accommodate such repeated measures by employing the random-effects approach; i.e., we incorporate an individual-specific error term $\delta_j$. Our choice of regression model is well established and common in the related literature (e.g., Fehr et al. 1998, Charness 2004, List 2005). In our setting, since the variable WTP is not actually censored, we are not interested in studying the uncensored latent variable WTP$. Instead, we focus on the marginal effects of the key explanatory variables in Equation (1). Appendix A presents the estimation results of Equation (1) and the methods to compute marginal effects.

### 3.1. Hypothesis 1: Is the Consumer’s WTP Increasing in the Level of Transparency?

We begin by analyzing the effect of transparency on the Consumer’s WTP in the Decision condition. Figure 2 shows how the average WTP changes with the effort level in each Transparency condition. We observe that the average WTP under high transparency is higher than that under medium or low transparency. Similarly, except when $e = 0$, the average WTP under medium transparency is higher than that under low transparency.

To formally test Hypothesis 1, we analyze the marginal effects of $T_L$ and $T_M$ in Equation (1), as well as the differences between these marginal effects, which we label as $\Delta_T$. The marginal effects of $T_L$ ($T_M$) show the differences in average WTP between the High and Low (Medium) Transparency conditions. A negative value indicates that the average WTP is higher under high transparency than under low or medium transparency. Similarly, the values of $\Delta_T$ show the differences in average WTP between the Medium and Low Transparency conditions. A negative value indicates that the average WTP is higher under medium transparency than under low transparency.

Table 3 summarizes the marginal effects of $T_L$, $T_M$, and their differences, $\Delta_T$. We observe that all marginal effects are negative, with the marginal effects of $T_L$ being statistically significant. Thus, we support Hypothesis 1B (WTP increases as transparency increases) when comparing the High and Low Transparency conditions. The Consumer’s WTP significantly increases if the level of transparency in the Firm’s social responsibility practices increases from low to high. Conversely,
Hypothesis 1A (WTP does not differ across different levels of transparency) is supported when comparing the High and Medium Transparency conditions. The incremental improvement from medium to high transparency does not yield a significantly higher WTP from the Consumer, regardless of the effort level. Finally, the values of $\Delta_T$ are also negative but only significant at $e_k = 120$. Therefore, we partially support Hypothesis 1B when we compare the Medium and Low Transparency conditions. The incremental improvement from low to medium transparency can yield a significantly higher WTP from the Consumer only at a high effort level.

Table 3  Marginal Effects of $T_L$, $T_M$, and their differences, $\Delta_T$

<table>
<thead>
<tr>
<th>Transparency condition</th>
<th>Effort</th>
<th>$T_L$</th>
<th>$T_M$</th>
<th>$\Delta_T$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>-8.98 (6.49)*</td>
<td>-6.46 (6.75)</td>
<td>-2.52 (5.57)</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>-10.44 (7.12)*</td>
<td>-6.63 (7.48)</td>
<td>-3.81 (6.29)</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>-11.93 (7.74)*</td>
<td>-6.60 (8.17)</td>
<td>-5.34 (7.01)</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>-13.39 (8.33)*</td>
<td>-6.34 (8.81)</td>
<td>-7.05 (7.71)</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>-14.78 (8.89)**</td>
<td>-5.87 (9.40)</td>
<td>-8.91 (8.38)</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>-16.04 (9.42)**</td>
<td>-5.21 (9.90)</td>
<td>-10.83 (9.00)</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>-17.13 (9.90)**</td>
<td>-4.40 (10.31)</td>
<td>-12.74 (9.57)**</td>
</tr>
</tbody>
</table>

Note. Values shown are the marginal effects evaluated at the Decision condition; i.e., at $R = 0$ in Equation (1). Values in parentheses are the standard errors.

*: $p < 0.05$; **: $p < 0.1$; p values are derived from one-sided t tests.
3.2. Hypothesis 2: Does Reciprocity Exist at Each Level of Transparency?

Next, we address whether the Consumer exhibits reciprocity in his WTP for socially responsible products at each level of transparency. If reciprocity exists, then we also study whether it has a positive or negative impact on the Consumer’s WTP; i.e., whether it generates a higher or lower average WTP in the Decision condition than in the Random condition. Figure 3 shows the average WTP under the Decision and Random conditions for all three Transparency conditions. Table 4 summarizes the marginal effects of $R \cdot e_k$ in Equation (1). A negative value indicates that the slope of WTP as a function of $e_k$ is larger in the Decision condition than in the Random condition and hence, reciprocity exists. We divide our discussion by Transparency condition.

Figure 3  Effect of Reciprocity on the Consumer’s WTP by Transparency Condition

We first examine the High Transparency condition. In Figure 3a, we observe that the average WTP increases in the effort level at a faster rate in the Decision condition than in the Random condition; i.e., the solid line has a steeper slope than the dotted line. This observation is confirmed by the marginal effects in the regression. As shown in Table 4 (column 2), under high transparency, all marginal effects are significantly negative. Therefore, reciprocity exists and Hypothesis 2 is supported when transparency is high. Recall from our earlier Wilcoxon rank-sum tests that when the effort is greater than or equal to 100, the average WTP is significantly higher in the Decision condition than in the Random condition ($p < 0.1$, Table 2). Hence, the presence of reciprocity generates a positive effect on the Consumer’s WTP at high effort levels when transparency is high.

We next consider the Medium and Low Transparency conditions. Our results show that the effect of reciprocity diminishes as the level of transparency decreases. First, observe for the Medium Transparency condition in Table 4 that although the marginal effects of $R \cdot e_k$ are negative at all effort levels, they are significant only when $e_k \geq 100$. Hence, reciprocity exists only when the
effort level is high. Nevertheless, the presence of reciprocity at high effort levels does not result in a significantly higher average WTP in the Decision condition than in the Random condition (two-sided Wilcoxon rank-sum test, $p > 0.1$ for all effort levels; see also Figure 3b). Second, observe for the Low Transparency condition in Table 4 and Figure 3c that the slopes of WTP as a function of effort are very similar between the Decision and Random conditions. Hence, reciprocity does not exist under low transparency.

To summarize, we find partial support for Hypothesis 2 and observe an important interaction effect between transparency and reciprocity. When the level of transparency is high, reciprocity exists for all effort levels and has a positive effect on the Consumer’s WTP at high effort levels. When the level of transparency is medium, reciprocity exists only for high effort levels but has no effect on the Consumer’s WTP. Finally, when the level of transparency is low, reciprocity disappears. As will be discussed in §4, this interaction effect can play a critical role in determining how a company should communicate their social responsibility practices to consumers.

3.3. The Impact of Consumers’ Prosocial Orientation

Finally, we investigate how the Consumer’s prosocial orientation may impact his WTP decision. Recall from §2.4 that all participants who had played the Consumer role also played the Uncertain Dictator Game after the Consumer Purchase Game. Each of these participants acted as the dictator and had to select a value $a \in \{0, 20, 40, 60, 80, 100, 120\}$ to be used to generate a payment to the recipient. The level of uncertainty in the actual payment to the recipient was identical to the Transparency condition faced by the dictator when he/she was a Consumer in the Consumer Purchase Game.\footnote{For example, if a participant faced the Low Transparency condition as a Consumer, then the actual payment to his/her recipient in the Uncertain Dictator Game would be uniformly distributed on $[a - 20, a + 20]$.}

We observe that the distribution of the dictators’ decisions are very similar across the three uncertainty scenarios (Kruskal-Wallis test, $p > 0.1$). In particular, the first quartile, median, and third quartile are equal to 0, 20, and 40 tokens, regardless of the level of uncertainty.
The average decision ranges between 22 and 24 depending on the scenario. Therefore, we pool the data from the three uncertainty scenarios and define two types of Consumers according to their prosocial orientation. Those participants who selected \( a \leq 20 \) are considered to be a *low prosocial* type and account for 64% of the total sample (127 participants). Those participants who selected \( a \geq 40 \) are considered to be a *high prosocial* type and account for the remaining 36% of the sample (71 participants). We next investigate the behavior of these two prosocial types with respect to our hypotheses. To do so, we first reestimate Equation (1) with the data from the high prosocial Consumers and from the low prosocial Consumers separately. We then compute for each prosocial type the same marginal effects as before. The detailed regression results and marginal effects are reported in Appendix B.

We first confirm that the effect of transparency on the Consumers’ WTP does not vary significantly between prosocial types. As in the pooled result, both types of Consumers state a significantly higher WTP under high transparency than under low transparency, whereas their WTP does not differ significantly between high and medium transparency. The only difference we observe with respect to Hypothesis 1 occurs when we compare both Consumer types’ WTP between medium and low transparency. For the high prosocial Consumers, the average WTP is significantly higher under medium transparency for all positive effort levels. Conversely, for the low prosocial Consumers, the average WTP is significantly higher under medium transparency only for high effort levels (see Table 7 in Appendix B). Therefore, when comparing medium and low transparency, Hypothesis 1B is fully supported for the high prosocial Consumers and partially supported for the low prosocial Consumers.

**Figure 4  Effect of Reciprocity among High Prosocial Consumers**

(a) High Transparency  
(b) Medium Transparency  
(c) Low Transparency

The key difference in behavior that we observe between the two types of Consumers is with regard to how reciprocity plays a role in determining their WTP decisions. Figures 4 and 5 present the
high and low prosocial Consumers’ WTP decisions for each Transparency and Selection condition. As shown in Figures 4a–4c, the high prosocial Consumers do not exhibit reciprocity in any of the Transparency conditions; i.e., the slope of the solid line is never significantly steeper than that of the dotted line (see Table 8 in Appendix B). Hence, we do not find support for Hypothesis 2 for the high prosocial Consumers. Our findings suggest that high prosocial Consumers’ WTP decisions are driven by the expected payment to the Worker (i.e., the value of \( e \)) and the level of transparency.

In sharp contrast, the low prosocial Consumers’ behavior is significantly affected by reciprocity. First, Figure 5a is very similar to Figure 3a. The solid line being steeper than the dotted line shows that reciprocity exists for the low prosocial Consumers under the High Transparency condition (see Table 8 in Appendix B). In addition, similar to Figure 3a, reciprocity has a positive effect on WTP at a high effort level since the average WTP is higher in the Decision condition than in the Random condition \( (p < 0.1 \text{ for } e = 120) \).13 Second, as shown in Figure 5b, we continue to observe the presence of reciprocity for the low prosocial Consumers under the Medium Transparency condition. However, in this case, reciprocity has a negative effect on WTP as it drives the average WTP at low effort levels to be lower in the Decision condition than in the Random condition \( (p < 0.1 \text{ for } \)...

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13 A high percentage of the WTP decisions from low prosocial Consumers is exactly equal to zero (38.8% versus only 9% from high prosocial Consumers). The large fraction of zero values can hurt the statistical power of the Wilcoxon rank-sum test (Lachenbruch 2002, Delucchi and Bostrom 2004). To address this issue, researchers have suggested a two-part model in which the two data samples are compared with respect to two aspects: (i) the proportion of zeros and (ii) the distribution of the non-zero values. We follow this approach to compare the low prosocial Consumers’ WTP decisions between the Decision and Random conditions given an effort level. We compare proportions via a Chi-squared test and we compare distributions via a one-sided Wilcoxon test. Under high and medium transparency, the proportions of zero values are not significantly different, but the distributions of positive WTP decisions significantly differ between the two conditions. Under low transparency, the proportions of zero values are significantly larger for the Decision condition, but the distributions of positive WTP decisions are not significantly different. The \( p \) values reported correspond to the significant results.
e \in \{20, 40\} and not significant at other effort levels). Finally, as shown in Figure 5c, reciprocity does not exist under the Low Transparency condition as the slope of the solid line is not significantly higher than that of the dotted line. Hence, we partially support Hypothesis 2 for the low prosocial Consumers: reciprocity exists under high and medium transparency, but it does not exist under low transparency.

Notice that in the Low Transparency condition we observe a behavior unique to the low prosocial Consumers. The average WTP in this condition is significantly lower than that in the Random condition at all positive effort levels, except for e = 120 (p < 0.05 for e \in \{20, 40, 60, 80\}, p < 0.1 for e = 100). Hence, when the level of transparency is low, the low prosocial Consumers seemingly penalize the Firm regardless of the chosen effort under the Decision condition. As will be discussed in the next section, we postulate that this behavior is due to the low prosocial Consumers’ perception of responsibility alleviation.

4. General Discussion and Conclusion

We design an incentivized controlled laboratory experiment to investigate how transparency, indirect reciprocity, and individual prosocial orientation jointly affect consumers’ valuations of a company’s social responsibility practices. Our key findings are threefold. First, consumers universally value a substantial increase in transparency – from low to high – by stating a higher WTP. Second, the occurrence of indirect reciprocity in the aggregate consumer population depends on the level of transparency. Under high transparency, consumers are driven by reciprocal motives and reward companies for actively exerting a high effort with a higher WTP. Under medium transparency, indirect reciprocity is only observed at high effort levels and it does not significantly affect consumers’ WTP. Under low transparency, indirect reciprocity does not exist. Third, when consumers are divided by their intrinsic prosocial orientation, we demonstrate that transparency and indirect reciprocity play very different roles in affecting high versus low prosocial consumers’ valuations of social responsibility. High prosocial consumers do not exhibit reciprocal motives. Instead, their WTP is driven by the outcome of the firm’s actions and the level of transparency. In sharp contrast, low prosocial consumers exhibit significant reciprocal motives when transparency is high or medium. Under high transparency, indirect reciprocity has a positive effect on WTP at high effort levels. Under medium transparency, it has a negative effect on WTP at low effort levels. Finally, when transparency is low, we observe that low prosocial consumers state an average WTP that is actually lower in the Decision condition than in the Random condition.

In this section, we first introduce carefully-reasoned behavioral explanations to our key observations. We then discuss how a company can use our results to (i) determine when consumers value transparency in social responsibility contexts and (ii) shape their strategies for communicating their social responsibility practices to consumers.
4.1. Risk Aversion versus Self-Serving Bias

We first discuss why the Consumers’ average WTP is higher under the High and Medium Transparency conditions than under the Low Transparency condition. Our finding suggests that people are less willing to pay a high price for a socially responsible product when the resulting social outcomes are highly uncertain (i.e., transparency is low). One potential explanation is that our Consumer participants are risk-averse and dislike paying for an uncertain outcome, even if the uncertainty only impacts the Worker’s payoffs. To investigate this hypothesis, we elicit the Consumer participants’ risk attitudes by using the multiple price list method (Holt and Laury 2002). Our results show that when comparing WTP between the High and Low Transparency conditions, the difference in WTP is significant only for non-risk-averse Consumers (see Appendix C). Therefore, risk aversion cannot explain our observations.

Instead, we posit that our Consumer participants’ behavior in the Decision condition may be attributed to a self-serving bias. In particular, when Consumers face uncertainty about the final payment to the Workers, they tend to focus on the possibility that the Workers may receive a payment that is lower than the expected value. This is self-serving because it helps the Consumers to justify the selection of a lower WTP and, as a result, a potentially higher payoff to themselves. A recent study by Haisley and Weber (2010) observes a similar behavior in a dictator game context. They find that when the distribution of the recipients’ payoff is unknown, dictators overestimate the recipients’ expected payoff and contribute less than when this distribution is known. By overestimating, the dictators justify keeping a larger amount for themselves. While further study is needed to fully understand the role of self-serving biases in our setting, our study suggests a new and interesting context in which a self-serving bias reduces one’s willingness to help others at his/her own cost.

4.2. Responsibility Alleviation by Low Prosocial Consumers under Low Transparency

We next discuss the observation that low prosocial Consumers state a lower WTP in the Decision condition than in the Random condition under low transparency. This unexpected result occurs even when the effort level is high (e.g., $e = 100$). Such seemingly “penalizing” behavior is not due to indirect reciprocity, because a reciprocal Consumer would not punish the Firm if the Firm actively exerts a high effort. Instead, we postulate that the low prosocial Consumers’ behavior under low transparency is driven by their perception of responsibility alleviation.

When the Firm makes an active decision in the Decision condition, both the Firm’s and the Consumer’s decisions determine the final outcome of the game and the payoffs to all three players. Conversely, in the Random condition, the Consumer is the only player who makes an active decision to influence the final payoffs of all three parties. Therefore, the Consumer is likely to feel
more responsible for the Worker’s well-being in the Random condition and less so in the Decision condition. With a decreased sense of responsibility for the final outcomes, the Consumer’s low intrinsic prosocial orientation motivates him to state a lower WTP in the Decision condition than in the Random condition when transparency is low. We indeed find evidence in the post-experiment survey that our participants are potentially influenced by responsibility alleviation. For example, a participant who played the Consumer role in the Low Transparency, Random condition stated that “being [the Consumer] made me feel pressured as the decision maker...that affects other people.”

The concept of responsibility alleviation is introduced by Charness (2000) in a gift exchange game regarding direct reciprocity. Similar behavior is also documented by Dana et al. (2007), who study a dictator game in which the decisions of two dictators jointly affect the recipient’s payoff. They observe that each dictator is inclined to choose an action that puts the other dictator in a position such that he/she is the one responsible for ensuring a fair payment to the recipient. Importantly, no studies have demonstrated the interaction between responsibility alleviation and uncertainty, nor have any studies shown the differing strength of this phenomenon in individuals with different intrinsic prosocial orientation. Our results suggest conditions under which responsibility alleviation is more likely to be induced. That is, when individuals have an inherently low prosocial orientation and there is substantial uncertainty in the outcome of their actions. This observation is related to the psychological finding that proselfs (i.e., low prosocial individuals) are more prone than prosocials (i.e., high prosocial individuals) to make selfish decisions under uncertainty (de Kwaadsteniet et al. 2006).

Responsibility alleviation may also occur when the level of transparency is medium or high. Nevertheless, our results suggest that in those cases its effect is overshadowed by that of reciprocal motives. Quantifying the relative effects of indirect reciprocity and responsibility alleviation on consumers’ valuations of social responsibility would be an interesting direction for future research.

4.3. Managerial Implications
Our results have important practical implications on (i) when a company can benefit from increased transparency in its supply chain, and (ii) how a company should communicate social responsibility information to consumers. Supply chain transparency is an emerging business challenge for companies. As Patagonia’s Director of Environmental Strategy states, “transparency...is really becoming an expectation now. People want to know more about the supply chains making the products they’re buying” (Patagonia 2014). At the same time, increasing the transparency of its supply chain can be a costly and time-consuming investment for a company (Doorey 2011). Our findings suggest that consumers are willing to pay more for products when a company adopts supply chain transparency with respect to its social responsibility practices. This is particularly true when
the company improves the transparency of a non-transparent supply chain. As the transparency further improves, however, the increase in consumers' willingness-to-pay diminishes. Going forward, as companies debate whether to increase the transparency of their supply chains, our results underscore the potential revenue benefits from this often costly investment.

Our study also takes an important first step to examine the type of information and the level of detail that consumers desire when a company communicates its social responsibility practices. We show that if a company targets all consumers, regardless of their prosocial orientation, then it can benefit from providing information about its social responsibility efforts only if the information provided is highly transparent. This is because under high transparency, indirect reciprocity exists and has a positive effect on consumers' WTP. If the company targets specific types of consumers, then the particular communication strategy depends on the intrinsic prosocial orientation of the consumers. If the targeted population naturally cares about others' well-being (i.e., high prosocial consumers), then attention should be placed more on communicating social responsibility outcomes through transparent information and less on communicating the amount of effort exerted by the company. This occurs because high prosocial consumers are primarily driven by the outcomes of the social responsibility practices and do not exhibit reciprocal motives towards a company's effort. Conversely, if a company seeks to target consumers that are more driven by self-interest (i.e., low prosocial consumers), then it should focus on first improving the transparency of the information. Only when highly transparent information is available should the company then communicate its exerted effort. Otherwise, emphasizing exerted effort when the level of transparency is not high can inadvertently hurt the company. Without transparent information, the low prosocial consumers are more inclined to punishing low efforts with lower willingness-to-pay, or they find it easier to justify their low willingness-to-pay by shifting responsibility for the third parties' well-being onto the company.

Our research yields valuable insights into the impact of transparency on consumers' valuations of a company's social responsibility practices. We hope that these insights will motivate others to further study additional behavioral factors that can drive consumers' and companies' decisions regarding social responsibility.
Acknowledgments

The authors thank Atalay Atasu, Beatrice Boulu-Reshef, Charles Holt, Elena Katok, Özalp Özer, and Duncan Simester for their constructive comments. The authors are thankful to the staff at the MIT Behavioral Research Lab and the VeconLab at the University of Virginia for their generous support in conducting the experimental sessions. The discussions during the authors’ presentations at the 2014 Behavioral Operations Conference (Cologne, Germany), 2014 Mostly OM Workshop (Beijing, China), Experimental Economics Reading Group at the University of Virginia, and Behavioral Lab, Operations Management Seminar, and Marketing Seminar at the MIT Sloan School of Management, were also beneficial.

Appendix A: Regression Results for the Pooled Data and Method for Computing Marginal Effects

Table 5 presents the regression results for Equation (1) using the data from all Consumer participants.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate (s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.36 (10.10)</td>
</tr>
<tr>
<td>$T_M$</td>
<td>-13.48 (13.96)</td>
</tr>
<tr>
<td>$T_L$</td>
<td>-19.63 (13.93)*</td>
</tr>
<tr>
<td>$R$</td>
<td>-7.17 (13.15)</td>
</tr>
<tr>
<td>$R \cdot T_M$</td>
<td>14.43 (18.57)</td>
</tr>
<tr>
<td>$R \cdot T_L$</td>
<td>21.31 (18.21)</td>
</tr>
<tr>
<td>$e_k$</td>
<td>0.42 (0.04)***</td>
</tr>
<tr>
<td>$T_M \cdot e_k$</td>
<td>0.06 (0.06)</td>
</tr>
<tr>
<td>$T_L \cdot e_k$</td>
<td>-0.03 (0.06)</td>
</tr>
<tr>
<td>$R \cdot e_k$</td>
<td>-0.14 (0.05)***</td>
</tr>
<tr>
<td>$R \cdot T_M \cdot e_k$</td>
<td>0.06 (0.08)</td>
</tr>
<tr>
<td>$R \cdot T_L \cdot e_k$</td>
<td>0.10 (0.08)</td>
</tr>
<tr>
<td>$\sigma_\delta$</td>
<td>48.10 (3.12)***</td>
</tr>
<tr>
<td>$\sigma_\epsilon$</td>
<td>19.43 (0.48)***</td>
</tr>
</tbody>
</table>

Note. Values in parentheses are the standard errors. ***, p < 0.01; *, p < 0.1; p values are derived from one-sided t tests.

We next discuss the methodology employed to compute all marginal effects. Due to the non-linearity of the Tobit regression model in Equation (1), the marginal effects of the independent variables vary with the value of the effort, $e_k$, and the treatment conditions (Transparency and Selection) at which they are evaluated. Let $x$ be the vector of independent variables from Equation (1), excluding the interaction terms; i.e., $x = (T_M, T_L, R, e_k)$. The marginal effect of a dummy variable (e.g., $T_M$) is computed by taking discrete differences in the expected value of WTP when the dummy variable changes from zero to one (see for example Wooldridge 2010). For example, the marginal effect of $T_M$ given $x$ is computed as follows:\footnote{Since the dummy variables $T_L$ and $T_M$ cannot be simultaneously equal to 1, the marginal effects of $T_M$ are only evaluated at $T_L = 0$. Similarly, the marginal effects of $T_L$ are only evaluated at $T_M = 0$.}

$$\text{ME}(T_M|x) = \frac{\Delta E[WTP|x]}{\Delta T_M} = E[WTP|x_1 = (T_M = 1, T_L, R, e_k)] - E[WTP|x_0 = (T_M = 0, T_L, R, e_k)].$$
In contrast, the marginal effect of \( e_k \) given \( x \), which we denote as \( \text{ME}(e_k|x) \), is computed by estimating the partial derivative of the expected value of WTP with respect to \( e_k \), evaluated at \( x \). Formally,

\[
\text{ME}(e_k|x) = \frac{\partial \mathbb{E}[\text{WTP}|x]}{\partial e_k}.
\]

To compute the marginal effects of the interaction terms (e.g., the variable \( R \cdot e_k \)), we follow the approach introduced by Ai and Norton (2003) to take cross derivatives (or differences) of the expected value of WTP with respect to the interacting variables. In particular, the marginal effect of \( R \cdot e_k \) given \( x \) is computed as the difference in the marginal effect of \( e_k \) when \( R = 1 \) and when \( R = 0 \). Formally,

\[
\text{ME}(R \cdot e_k|x) = \frac{\Delta \mathbb{E}[\text{WTP}|x]}{\Delta R} = \text{ME}(e_k|x_1 = (T_M, T_L, R = 1, e_k)) - \text{ME}(e_k|x_0 = (T_M, T_L, R = 0, e_k)).
\]

The marginal effects of the three-way interaction terms (\( R \cdot T_M \cdot e_k \) and \( R \cdot T_L \cdot e_k \)) are computed in a similar manner as those of the two-way interaction terms.

Finally, to estimate the standard errors of all marginal effects, we apply the Delta Method. Define \( z \) as the vector of all independent variables from Equation (1), including all interaction terms. Similarly, define \( \tilde{\text{ME}}(z|x) \) as the vector of all marginal effects given \( x \), such that \( \tilde{\text{ME}}(z|x) = \text{ME}(z|x) \). The marginal effects' variance-covariance matrix, which we denote as \( V(z|x) \), is computed as follows (see Ai and Norton 2003):

\[
V(z|x) = \frac{\partial}{\partial \gamma'} \tilde{\text{ME}}(z|x) \hat{\Omega}_\gamma \frac{\partial}{\partial \gamma} \tilde{\text{ME}}(z|x),
\]

where \( \gamma \) represents the vector of coefficients from Equation (1) and \( \hat{\Omega}_\gamma \) is the estimator of the variance-covariance matrix of \( \gamma \). Under some regularity conditions, the \( t \) statistic of each marginal effect has an asymptotic standard normal distribution, which allows us to test their statistical significance.

Using the above formulas and estimating \( \mathbb{E}[\text{WTP}|x] \) with the regression results from Table 5, all marginal effects that are relevant to our hypotheses are presented in §3. For example, Table 3 presents the marginal effects of the dummy variables \( T_L \) and \( T_M \), evaluated at \( x = (T_M = 0, T_L = 0, R = 0, e_k) \) and at all effort levels. The variance of their differences is computed using the above variance-covariance matrix \( V(z|x) \). Similarly, Table 4 presents the marginal effects of the interaction term \( R \cdot e_k \), evaluated at all three Transparency conditions and at all effort levels.

### Appendix B: Regression Results and Marginal Effects by Prosocial Type

In this section, we present the regression results from Equation (1) and the corresponding marginal effects by the Consumer’s prosocial orientation. To perform our analysis, we first reestimate Equation (1) for high and low prosocial Consumers separately. These regression results are presented in Table 6. We then use the same methodology introduced in Appendix A to compute the marginal effects of \( T_L \), \( T_M \), and their differences, \( \Delta_T \), and \( R \cdot e_k \) for high and low prosocial Consumers. We present these results in Tables 7 and 8.
Table 6  Regression results for Equation (1), by Prosocial Type

<table>
<thead>
<tr>
<th>Variable</th>
<th>High prosocial Estimate (s.e.)</th>
<th>Low prosocial Estimate (s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>32.19 (9.23)**</td>
<td>-11.07 (14.39)</td>
</tr>
<tr>
<td>$T_M$</td>
<td>-7.13 (12.51)</td>
<td>-21.60 (20.23)</td>
</tr>
<tr>
<td>$T_L$</td>
<td>-21.32 (11.93)**</td>
<td>-24.67 (21.34)</td>
</tr>
<tr>
<td>$R$</td>
<td>-4.59 (12.74)</td>
<td>-3.07 (18.28)</td>
</tr>
<tr>
<td>$R \cdot T_M$</td>
<td>-8.62 (16.93)</td>
<td>25.82 (26.98)</td>
</tr>
<tr>
<td>$R \cdot T_L$</td>
<td>10.39 (16.85)</td>
<td>30.97 (26.61)</td>
</tr>
<tr>
<td>$e_k$</td>
<td>0.43 (0.06)**</td>
<td>0.42 (0.05)**</td>
</tr>
<tr>
<td>$T_M \cdot e_k$</td>
<td>0.03 (0.08)</td>
<td>0.09 (0.08)</td>
</tr>
<tr>
<td>$T_L \cdot e_k$</td>
<td>0.02 (0.08)</td>
<td>-0.14 (0.09)*</td>
</tr>
<tr>
<td>$R \cdot e_k$</td>
<td>-0.04 (0.08)</td>
<td>-0.20 (0.07)**</td>
</tr>
<tr>
<td>$R \cdot T_M \cdot e_k$</td>
<td>0.15 (0.11)*</td>
<td>-0.10 (0.10)</td>
</tr>
<tr>
<td>$R \cdot T_L \cdot e_k$</td>
<td>0.06 (0.11)</td>
<td>0.18 (0.11)**</td>
</tr>
<tr>
<td>$\sigma_\delta$</td>
<td>24.56 (2.32)**</td>
<td>54.73 (4.91)**</td>
</tr>
<tr>
<td>$\sigma_\epsilon$</td>
<td>18.64 (0.69)**</td>
<td>19.27 (0.64)**</td>
</tr>
</tbody>
</table>

Note. Values in parentheses are the standard errors. ****: $p < 0.01$; ***: $p < 0.05$; *: $p < 0.1$; $p$ values are derived from one-sided $t$ tests.

Table 7  Marginal Effects of $T_L$, $T_M$, and their differences, $\Delta_T$, by Prosocial Type

<table>
<thead>
<tr>
<th>Effort</th>
<th>$T_L$</th>
<th>$T_M$</th>
<th>$\Delta_T$</th>
<th>$T_L$</th>
<th>$T_M$</th>
<th>$\Delta_T$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-16.04 (9.20)**</td>
<td>-5.85 (10.30)</td>
<td>-10.19 (8.23)</td>
<td>-8.32 (7.26)</td>
<td>-7.48 (7.16)</td>
<td>-0.84 (5.80)</td>
</tr>
<tr>
<td>20</td>
<td>-17.32 (9.59)**</td>
<td>-5.78 (10.58)</td>
<td>-11.55 (8.76)*</td>
<td>-10.46 (7.99)</td>
<td>-8.01 (8.11)</td>
<td>-2.44 (6.60)</td>
</tr>
<tr>
<td>40</td>
<td>-18.12 (9.88)**</td>
<td>-5.50 (10.75)</td>
<td>-12.62 (9.17)*</td>
<td>-12.85 (8.73)*</td>
<td>-8.36 (9.09)</td>
<td>-4.49 (7.46)</td>
</tr>
<tr>
<td>60</td>
<td>-18.45 (10.12)**</td>
<td>-5.06 (10.88)</td>
<td>-13.39 (9.50)*</td>
<td>-15.47 (9.49)*</td>
<td>-8.48 (10.08)</td>
<td>-6.99 (8.37)</td>
</tr>
<tr>
<td>80</td>
<td>-18.36 (10.36)**</td>
<td>-4.51 (11.00)</td>
<td>-13.85 (9.81)*</td>
<td>-18.28 (10.27)**</td>
<td>-8.36 (11.07)</td>
<td>-9.92 (9.32)</td>
</tr>
<tr>
<td>100</td>
<td>-17.89 (10.58)**</td>
<td>-3.88 (11.10)</td>
<td>-14.01 (10.11)*</td>
<td>-21.23 (11.05)**</td>
<td>-7.97 (12.01)</td>
<td>-13.26 (10.29)*</td>
</tr>
<tr>
<td>120</td>
<td>-17.05 (10.75)*</td>
<td>-3.19 (11.13)</td>
<td>-13.86 (10.36)*</td>
<td>-24.27 (11.83)**</td>
<td>-7.34 (12.90)</td>
<td>-16.92 (11.27)*</td>
</tr>
</tbody>
</table>

Note. Values shown are the marginal effects evaluated at the Decision condition; i.e., at $R = 0$ in Equation (1). Values in parentheses are the standard errors. ****: $p < 0.05$; *: $p < 0.1$; $p$ values are derived from one-sided $t$ tests.

Table 8  Marginal Effects of the Interaction Term $R \cdot e_k$, by Prosocial Type

<table>
<thead>
<tr>
<th>Effort</th>
<th>High prosocial</th>
<th>Medium</th>
<th>Low</th>
<th>Low prosocial</th>
<th>High prosocial</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-0.05 (0.06)</td>
<td>0.01 (0.06)</td>
<td>0.05 (0.06)</td>
<td>-0.09 (0.04)**</td>
<td>-0.06 (0.05)</td>
<td>0.04 (0.03)</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>-0.05 (0.07)</td>
<td>0.04 (0.07)</td>
<td>0.05 (0.06)</td>
<td>-0.10 (0.05)**</td>
<td>-0.08 (0.05)*</td>
<td>0.04 (0.04)</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>-0.05 (0.08)</td>
<td>0.07 (0.07)</td>
<td>0.04 (0.07)</td>
<td>-0.12 (0.05)**</td>
<td>-0.11 (0.05)**</td>
<td>0.04 (0.04)</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>-0.04 (0.08)</td>
<td>0.09 (0.07)*</td>
<td>0.04 (0.07)</td>
<td>-0.13 (0.05)**</td>
<td>-0.13 (0.06)**</td>
<td>0.04 (0.04)</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>-0.04 (0.08)</td>
<td>0.10 (0.07)*</td>
<td>0.03 (0.07)</td>
<td>-0.14 (0.05)**</td>
<td>-0.16 (0.06)**</td>
<td>0.04 (0.05)</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>-0.03 (0.07)</td>
<td>0.10 (0.07)*</td>
<td>0.02 (0.07)</td>
<td>-0.15 (0.05)**</td>
<td>-0.18 (0.06)**</td>
<td>0.04 (0.05)</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>-0.02 (0.07)</td>
<td>0.10 (0.06)*</td>
<td>0.01 (0.06)</td>
<td>-0.16 (0.05)**</td>
<td>-0.20 (0.06)**</td>
<td>0.03 (0.05)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Values in parentheses are the standard errors. ****: $p < 0.01$; ****: $p < 0.05$; *: $p < 0.1$; $p$ values are derived from one-sided $t$ tests.
Appendix C: Marginal Effects of Transparency by Risk Attitudes

Risk attitudes were measured for all participants using the multiple price list method (Holt and Laury 2002). Participants were presented with ten pairs of lotteries and, for each pair, they were asked to choose which lottery, A or B, they would rather play (see Table 9 below). To incentivize their choices, participants were informed that one of the ten pairs of lotteries would be randomly selected at the end of the session. Their payments for this task were determined based on the lottery they chose within the randomly selected pair. As can be seen from the last two columns in Table 9, risk-neutral participants (who maximize their expected payoffs) should choose lottery A for the first four pairs and lottery B for the remaining six pairs. Risk-averse participants, however, could prefer to play lottery A even in cases where its expected payoff is lower than that of lottery B (e.g., pair 5). Each participant is expected to either always prefer lottery B, or to switch his/her preference from lottery A to lottery B only once; i.e., to prefer lottery A up to a certain pair and prefer lottery B thereafter.

Table 9 Lotteries Used in the Risk Attitudes Task

<table>
<thead>
<tr>
<th>Pair number</th>
<th>Lottery A</th>
<th>Lottery B</th>
<th>Lottery A’s expected payoff</th>
<th>Lottery B’s expected payoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(10%, 74; 90%, 60)</td>
<td>(10%, 140; 90%, 6)</td>
<td>61.4</td>
<td>19.4</td>
</tr>
<tr>
<td>2</td>
<td>(20%, 74; 80%, 60)</td>
<td>(20%, 140; 80%, 6)</td>
<td>62.8</td>
<td>32.8</td>
</tr>
<tr>
<td>3</td>
<td>(30%, 74; 70%, 60)</td>
<td>(30%, 140; 70%, 6)</td>
<td>64.2</td>
<td>46.2</td>
</tr>
<tr>
<td>4</td>
<td>(40%, 74; 60%, 60)</td>
<td>(40%, 140; 60%, 6)</td>
<td>65.6</td>
<td>59.6</td>
</tr>
<tr>
<td>5</td>
<td>(50%, 74; 50%, 60)</td>
<td>(50%, 140; 50%, 6)</td>
<td>67.0</td>
<td>73.0</td>
</tr>
<tr>
<td>6</td>
<td>(60%, 74; 40%, 60)</td>
<td>(60%, 140; 40%, 6)</td>
<td>68.4</td>
<td>86.4</td>
</tr>
<tr>
<td>7</td>
<td>(70%, 74; 30%, 60)</td>
<td>(70%, 140; 30%, 6)</td>
<td>69.8</td>
<td>99.8</td>
</tr>
<tr>
<td>8</td>
<td>(80%, 74; 20%, 60)</td>
<td>(80%, 140; 20%, 6)</td>
<td>71.2</td>
<td>113.2</td>
</tr>
<tr>
<td>9</td>
<td>(90%, 74; 10%, 60)</td>
<td>(90%, 140; 10%, 6)</td>
<td>72.6</td>
<td>126.6</td>
</tr>
<tr>
<td>10</td>
<td>(100%, 74; 0%, 60)</td>
<td>(100%, 140; 0%, 6)</td>
<td>74</td>
<td>140</td>
</tr>
</tbody>
</table>

Note. The notation (x%, a; y%, b) represents a lottery consisting of an x% chance of earning a tokens and a y% chance of earning b tokens. Participants were not presented with the expected values of each lottery.

Define \( r_j \) as the minimum pair number for which participant \( j \) prefers to play lottery B over lottery A. Based on the above discussion, we define two types of participants depending on the value of \( r_j \): (i) Risk-averse, if \( r_j > 5 \), and (ii) non-risk-averse, if \( r_j \leq 5 \). Based on the values of \( r_j \), 67.7% of the 198 Consumer participants were risk-averse, while the remaining 32.3% were non-risk-averse.

We next study whether these two types of Consumers (risk-averse and non-risk-averse) behave differently under different Transparency conditions. If risk aversion drives the Consumers’ preference for a high level of transparency discussed in §3.1, then we should observe larger differences in WTP between Transparency conditions for risk-averse Consumers than for non-risk-averse Consumers. We first reestimate Equation (1) with the data from these two types of Consumers separately. Then, we compute the marginal effects of the dummy variables \( T_L, T_M \), and their differences, \( \Delta T \), for both types of Consumers. We report these marginal effects in Table 10.

As can be seen from Table 10, the marginal effects of the dummy variables representing the Low and Medium Transparency conditions, \( T_L \) and \( T_M \), are only significantly negative for non-risk-averse Consumers.
Table 10 Marginal Effects of $T_L$, $T_M$, and their differences, $\Delta_T$, by Risk Attitude

<table>
<thead>
<tr>
<th>Effort</th>
<th>$T_L$</th>
<th>$T_M$</th>
<th>$\Delta_T$</th>
<th>$T_L$</th>
<th>$T_M$</th>
<th>$\Delta_T$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-4.66 (6.62)</td>
<td>-1.49 (7.87)</td>
<td>-3.17 (7.03)</td>
<td>-27.37 (17.21) *</td>
<td>-25.49 (15.61) *</td>
<td>-1.88 (10.96)</td>
</tr>
<tr>
<td>20</td>
<td>-5.48 (7.32)</td>
<td>-1.50 (8.72)</td>
<td>-3.98 (7.83)</td>
<td>-30.74 (18.40) **</td>
<td>-27.67 (16.46) **</td>
<td>-3.07 (12.68)</td>
</tr>
<tr>
<td>40</td>
<td>-6.33 (8.02)</td>
<td>-1.46 (9.56)</td>
<td>-4.87 (8.64)</td>
<td>-33.72 (19.43) **</td>
<td>-29.21 (17.08) **</td>
<td>-4.52 (14.39)</td>
</tr>
<tr>
<td>60</td>
<td>-7.20 (8.72)</td>
<td>-1.38 (10.37)</td>
<td>-5.82 (9.44)</td>
<td>-36.14 (20.29) **</td>
<td>-29.89 (17.46) **</td>
<td>-6.16 (16.02)</td>
</tr>
<tr>
<td>80</td>
<td>-8.05 (9.41)</td>
<td>-1.25 (11.15)</td>
<td>-6.81 (10.22)</td>
<td>-37.86 (20.96) **</td>
<td>-29.94 (17.58) **</td>
<td>-7.92 (17.53)</td>
</tr>
<tr>
<td>100</td>
<td>-8.87 (10.08)</td>
<td>-1.07 (11.89)</td>
<td>-7.80 (10.98)</td>
<td>-38.78 (21.46) **</td>
<td>-29.08 (17.42) **</td>
<td>-9.69 (18.87)</td>
</tr>
<tr>
<td>120</td>
<td>-9.62 (10.73)</td>
<td>-0.85 (12.57)</td>
<td>-8.76 (11.70)</td>
<td>-38.83 (21.76) **</td>
<td>-27.48 (16.98) **</td>
<td>-11.35 (19.98)</td>
</tr>
</tbody>
</table>

Note. Values shown are the marginal effects evaluated at the Decision condition; i.e., at $R = 0$ in Equation (1). Values in parentheses are the standard errors.

**: $p < 0.05$; *: $p < 0.1$; $p$ values are derived from one-sided $t$ tests.

Risk-averse Consumers do not exhibit any significant differences in WTP across Transparency conditions. Based on these results, we rule out the possibility that risk aversion explains the fact that Consumers are willing to pay a higher price as transparency increases.

References


