EXPERIMENTAL STUDIES ON THE EFFECTS OF INTENTIONAL RECIPROCITY IN A MANAGEMENT CONTROL SETTING

Dissertation

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Abstract

This dissertation extends the literature of intentional reciprocity in a management control setting. Study 1 investigates how principals’ choice of a committed penalty contract or a discretionary penalty contract affects agents’ perceptions of principals’ intentions. It finds that agents do not seem to perceive principals’ choice of a discretionary penalty as negatively as they perceive the choice of a committed penalty contract. Study 2 investigates how principals’ choice of a no penalty contract affects agents’ perceptions of principals’ intentions. It finds that agents’ effort is lower when a no penalty contract is chosen by the principals than when a no penalty contract is chosen by the experimenter. This suggests that principals’ choice of no penalty is not perceived positively by agents. Study 3 investigates how agents’ prior expectation regarding principals’ wage offers affect agents’ perceptions of principals’ intentions. It finds that agents’ prior expectation does not seem to cause a significant change in agents’ perceptions of principals’ intentions. Study 4 investigates how salience of principals’ alternative contract choice affects agents’ perceptions of principals’ intentions. It finds that when principals choose a discretionary penalty contract instead of a no penalty contract, agents’ effort is significantly higher when agents’ responses are elicited by a strategy method than when they are elicited by a direct response method. However, when principals choose a no penalty contract instead of a discretionary penalty contract, agents’ effort is not different between a strategy method and a direct response method. Study 5 investigates how one-way or two-way communication affects agents’ perceptions of principals’ intentions. It finds that although principals seem to offer the high wage most frequently in one-way communication, agents’ effort does not seem to be different between no communication, one-way communication and two-way communication. The main-take away from this dissertation is that principals should be aware that their contract choices
can convey their intentions to agents and that this may change agent’s behavior for better or worse depending on the context.
Dedication

To Richard Young and Douglas Schroeder - advisors, mentors, friends. None of this would be possible without your years of support.

To Franklin Davis - husband, patient friend, sounding board, gentle critic, and tea-maker-in-chief. Thank you so much for all you do!
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Chapter 1
Introduction

One essential problem in management accounting is that principals and agents have misaligned interests. According to the traditional economic theory that assumes people only have pecuniary motives, one standard solution to this principal-agent problem is for principals to design complete contracts with explicit ex ante controls, i.e. punishments and bonuses, to motivate agents to behave in principals' interests. However, extensive experimental studies have documented that people frequently choose actions that do not maximize their monetary payoffs. These results immediately call into question the effectiveness of complete contracts with ex ante controls.

In the past decade, prior literature has provided three main theories attempting to explain people’s non-pecuniary motives. To better understand where my dissertation stands in the literature and its contributions, next I discuss the three theories and show simplified models for other-regarding social preferences that have been used in prior literature in a management control setting. The first explanation is altruism. It states that people not only care about their own material well-being but also care about others’ material well-being. The basic altruism model for the agent’s utility can be formed as

$$U_A(\Pi) = \Pi_A + \alpha \Pi_P$$ \hfill (1.1)

Similarly, the basic altruism model for the principal’s utility can be formed as

$$U_P(\Pi) = \Pi_P + \beta \Pi_A$$ \hfill (1.2)

where $\Pi_A$ denotes the payoff to the agent, $\Pi_P$ denotes the payoff to the principal. $\alpha$ and
\( \beta \) are the altruism parameter and it is generally accepted that \( 0 < \alpha \leq 1 \) and \( 0 < \beta \leq 1 \). Equation (1.1) shows that the agent’s utility depends not only on his own payoff but also the principal’s payoff.

The second explanation is fairness and distributional preference, meaning it incorporates distributional concerns over the outcomes. It assumes that people not only care about their own material payoffs but also care about others’ material well-being relative to their own. The two pioneering work, Fehr & Schmidt (1999) and Bolton & Ockenfels (2000), model the fairness concern by altering the second term in Equation (1.1) to a relative payoff comparison. Based on Fehr & Schmidt (1999), the basic outcome-based equity model \(^1\) for the agent’s utility can be formed as

\[
U_A(\Pi) = \Pi_A - \alpha [\max(\Pi_P - \Pi_A, 0)] - \beta [\max(\Pi_A - \Pi_P, 0)] \tag{1.3}
\]

Similarly, the basic outcome-based equity model for the principal’s utility can be formed as

\[
U_P(\Pi) = \Pi_P - m [\max(\Pi_A - \Pi_P, 0)] - n [\max(\Pi_P - \Pi_A, 0)] \tag{1.4}
\]

where \( \alpha, \beta, m, \) and \( n \) capture the marginal disutility from disadvantageous and advantageous inequality. In their models it is assumed that \( 0 \leq \beta \leq \alpha \) and \( 0 \leq n \leq m \). Equation (1.3) implies that the agent will not only experience increasing utility from his own payoff, but also decreasing utility from any payoff inequity between himself and the principal. Specifically, the agent’s utility is decreased if the principal’s payoff is more than his own payoff or less than his own payoff and this relationship is asymmetric, that is, the agent has higher aversion when the principal gets more payoff than when the agent gets more payoff. In other words, the agent’s utility is decreased if he is treated unfairly by the principal or treats the principal unfairly.

Researchers soon discovered that distributional motives alone were inadequate to explain

\(^1\)In Fehr & Schmidt (1999), the agent’s utility function is a linear function of the social comparison between his own payoff and others’ payoff. However, in Bolton & Ockenfels (2000) explicitly allows for nonlinear preferences. Specifically, the social comparison function is based on the proportion of total payoffs a player receives.
experimental results. Blount (1995) is one of the first studies to show that intentions matter, because she finds in an ultimatum game whether the offer is made by a human or is generated by a computer makes a difference in the minimum acceptable offers. Falk et al. (2003) further investigates the role of intentions in “mini” ultimatum games. They find that given the same offer from the Proposer, the rejection rate from a Responder differs if the offer that is not chosen is altered.

Their results leads to the third explanation - intentional reciprocity. Distinct from equity, it expands the theory of fairness preference, it asserts that people not only care about their own material payoffs but also care about how kind others are perceived to be to them. The leading model for the idea of intention-based reciprocity is Rabin (1993). His model captures an essential feature of reciprocity that people are kind to those who are kind to them. The basic framework of intentional reciprocity can be formed as

\[ U_A(II) = \Pi_A + f_P f_A \]  \hspace{1cm} (1.5)

Similarly, the basic outcome-based equity model for the principal’s utility can be formed as

\[ U_P(II) = \Pi_P + \tilde{f}_A f_P \]  \hspace{1cm} (1.6)

where \( f_P \) denotes the principal’s kindness to the agent, \( f_A \) denotes the agent’s kindness to the principal and \( \tilde{f}_A \) denotes the principal’s belief on agent’s kindness to him. Equation (1.5) implies that besides caring about the material payoff, if the agent believes that the principal treats him unkindly (\( f_P < 0 \)), then he will reciprocate with a negative response (\( f_A < 0 \)) to reduce the principal’s payoff, leading to an increase in his own utility. On the other hand, if the agent believes that the principal treats him kindly (\( f_P > 0 \)), then he will be willing to reciprocate with a positive response (\( f_A > 0 \)), also leading to an increase in his own utility, despite that the agent sacrifices the money to benefit the principal.

Charness & Rabin (2002), an influential successor to these studies, allows one model to incorporate distributional preference from Equation (1.3) and Equation (1.4), and intentional reciprocity from Equation (1.5) and Equation (1.6). Charness & Haruvy (2002)
introduces a relatively parsimonious model that incorporates all three theories above - altruism from Equation (1.1) and Equation (1.2), distributional preference from Equation (1.3) and Equation (1.4), and intentional reciprocity from Equation (1.5) and Equation (1.6).

As suggested by the prior literature, reciprocity which is affected by perceived intentions, plays a critical role in the agent’s behavior, and in return this can significantly affect the principal’s payoff. Chapter II aims to answer the question that is raised in the beginning of the introduction about the effectiveness of control-based contracts. It investigates how perceived intentions behind choosing control-based contracts affect agents’ effort and principals’ payoffs. In Chapter III, I further investigate how the perceived intentions behind choosing no control-based contracts affect agents’ effort and principals’ payoffs. Taking a different perspective than choices of controls, Chapter IV through VI examine how external factors that are not part of the mechanisms in the games, such as agents’ prior expectations, salience of alternative contracting choice and communication, affect agents’ effort and principals’ payoffs.

A large number of previous experimental studies in economics and accounting question the effectiveness of control-based contracts by applying the idea of intentional reciprocity from Rabin (1993). The conclusion is that although, consistent with the traditional economic theory, there are benefits of using control-based contracts, traditional game theorists may overlook potential hidden costs of controls (Falk & Kosfeld 2006). The reason is that when the principal chooses to impose a control-based contract, the agent can perceive such choice as a negative signal that the principal does not trust the agent to perform well. The principal, therefore, decides to use an intrusive control to “force” the agent to behave in the principal’s interests ($f_P < 0$ in Equation (1.5)). Being distrusted may cause the agent to retaliate ($f_A < 0$ in Equation (1.5)). The managerial implication is that, anticipating agents’ negative perceptions of controls, principals need to be cautious when they decide to implement them.

The key problem with control-based contracts that have documented the effect of retaliation is that those controls are intrusive, because they explicitly specify the agent’s obligations ex ante before the principal observes the agent’s action. It is commonly accepted that if the agent believes that the principal is treating him unkindly by choosing
intrusive controls, that is, if \( f_P < 0 \), then it results in \( f_A < 0 \). However, it is unclear whether the principal’s choice of less intrusive controls will be perceived as unkind intentions to the agent, that is, whether less intrusive controls will lead to a negative \( f_P \).

Furthermore, from the principal’s perspective, understanding the potential costs and benefits of choosing a no control contact, an intrusive control contract and a middle ground - a less intrusive control contract can help them improve the effectiveness of contract designs and gain higher profits.

I apply a one-shot gift-exchange game to function as a basis for an employment contract. In a “No Penalty” contract, subjects play a standard gift-exchange game. This contract can be interpreted as a fixed-wage employment contract in practice. In a “Committed Penalty” contract, subjects play a gift-exchange game with an addition of a penalty if the agent fails to meet the obligation before the principal observes the agent’s actions. This contract can be interpreted as a complete employment contract in practice. In a “Discretionary Penalty” contract, subjects play a gift-exchange game wherein the principal decides whether to punish the agent if the agent fails to meet his obligation after the principal observes the agent’s actions. This contract can be interpreted as an incomplete employment contract in practice.

In both the “Committed Penalty” and “Discretionary Penalty” contracts, if the penalty is used, it is costly to both the principal and the agent (it costs more for the agent than the principal).

The costs and benefits of each contract is shown in the table as below. In a “No Penalty” contract, on one hand, the cost is that the principal may receive the minimum effort because no control can be imposed on the agent. On the other hand, if using it can signal trust, the agent may positively reciprocate the principal by putting in high effort. In a “Committed Penalty” contract, the benefit is to increase the agent’s effort to the principal’s desirable level. Unfortunately, as discussed earlier, using it may signal distrust and the agent may retaliate by decreasing the effort. In a “Discretionary Penalty” contract, the benefit is to keep some control on the agent’s effort, although costly. However, the fact that a penalty decision can be made after observing the agent’s actions may not be perceived as an intrusive choice, instead, it may be perceived as legitimate. Therefore, it is unclear if there is a hidden cost of using a Discretionary Penalty contract.
In Chapter II and III, I conduct two experiments with a 3x2 experimental design as shown below. The three rows represent that the principal’s contract choice is a No Penalty contract, a Committed Penalty or Discretionary Penalty contract. The two columns represent that either the principal endogenously chooses to use the contract or the experimenter randomly assigns the contract.

<table>
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<th>Benefits</th>
<th>Costs</th>
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<tr>
<td>No Penalty</td>
<td>reciprocity from trust</td>
</tr>
<tr>
<td>Committed Penalty</td>
<td>intrusive control on agents’ effort</td>
</tr>
<tr>
<td>Discretionary Penalty</td>
<td>less intrusive control on agents’ effort</td>
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Chapter II focuses on the difference in agents’ effort between Endogenous and Exogenous treatments under either a Committed Penalty contract or a Discretionary Penalty contract (when the alternative contract is a No Penalty contract). That is, in the 3x2 table above, Chapter II compares agents’ effort in the last two rows across the Endogenous and the Exogenous treatment.

Chapter III focuses on the difference in agents’ effort between Endogenous and Exogenous under a No Penalty (when either the alternative contract is a Committed Penalty contract or a Discretionary Penalty contract). That is, in the 3x2 table above, Chapter III compares agents’ effort in the first row across the Endogenous and the Exogenous treatment.

I find that 1) agents’ effort is lower when principals choose a Committed Penalty contract than when such contract is exogenously assigned by the experimenter, although the effect is only marginally significant when medium wages are offered. However, in contrast, agents’ effort is not significantly different between the endogenous and exogenous treatment when a Discretionary Penalty contract is chosen, 2) agents’ effort is significantly lower when
principals choose a No Penalty contract regardless of the alternative contract than when a No Penalty contract is exogenously assigned by the experimenter, 3) the exogenous No Penalty contract generates no different effort than exogenous Committed Penalty contract but it generates significant higher effort than the exogenous Discretionary Penalty contract, 4) there is no significant difference in principals’ payoffs between the endogenous and the exogenous treatment when a Committed Penalty contract or a Discretionary Penalty contract is chosen. However, principals’ payoffs are significantly lower when a No Penalty contract is chosen by the principals than when such contract is chosen by the experimenter.

The most important take-away from these two chapters is that the ideal contract is a contract that imposes no control - but this comes with one extremely large caveat. This only works in an environment that is clean of any mention of a contractual penalty. In other words, if principals realize the benefit of a contract with no controls, they must establish the contract without doing anything that introduces the idea of punishment to their agents. Once the possibility of punishment “contaminates” agents’ thinking, the benefits of a contract with no controls vanish.

However, for principals that cannot provide a ‘clean’ environment or for some other reason believe they cannot offer a contract without imposing some kind of control, these studies also have a lesson - intrusiveness matters. To the extent possible, principals who feel the need to rely on controls should select a control that is less intrusive to limit the negative “side effects” of imposing the control.

Chapter IV examines whether agents’ perceptions on principals’ intentions are affected by agents’ different prior expectations. Study 3 manipulates agents’ expectations regarding their probable future wage offers. More specifically, I randomly assign subjects to an Expect High Wage treatment (EHW) and an Expect Low Wage treatment (ELW). In both treatments, subjects play a gift-exchange game where principals offer a wage from 20 and 60, and agents choose an effort from 0.1 to 1. In EHW and ELW, before subjects played the game, I showed agents a history of wage offers from a previous session that I conducted earlier\(^2\). In order to avoid using deception, before this experiment, I purposely ran a few

\(^2\)Principals only know that a history of wage offers from a previous session will be shown to agents but principals do not get to see the history of wage offers.
small sessions with only 4 to 10 subjects in each session to obtain variation in the principals’ wage offers. In one session, 95% principals offered a high wage of 60, and in the other session, 83% principals offered a low wage of 20. I do not find significant difference in effort between EHW and ELW conditional on received wage.

Chapter V investigates how the salience of principals’ alternative contract choice affects the agents’ perception of the intentions behind principals’ choice. It uses the same game as that in Chapter II in which the principal chooses between a Discretionary Penalty contract and a No Penalty contract which is based on a direct response method. In addition, Chapter VI uses a strategy method to elicit agents’ effort decisions. This means that before principals decide between implementing a Discretionary Penalty contract or a No Penalty contract, agents make their decisions on effort contingent on each of these two possibilities. I find there is a significant difference in agents’ effort between these two methods when a Discretionary Penalty contract is chosen. However, I do not find a significant difference in agents’ effort between these two methods when a No Penalty contract is chosen.

Chapter VI examines whether communication between principals and agents can help principals to convey their intentions to avoid the problems that arise when agents misinterpret principal’s intentions. I conduct three treatments: No Communication, One-Way Communication and Two-Way Communication. In No Communication, subjects play a standard gift-exchange game. In One-Way Communication, agents may send a free-form message to their principal before the principal makes a wage offer. In Two-Way communication, like One-Way Communication, the agent can send a free-form message to their principal before the principal makes a wage offer, but the difference in this case is that the principal can also send the agent a free-form message along with the chosen wage offer. I find no significant difference in effort across all the treatments.

The main takeaway from this dissertation is the delicacy of influence of intentions. That is, perceived intentions depend on subtle factors. This strongly suggests that principals must be cognizant of, and careful about, the way their actions are perceived. In particular, imposing or loosening controls must be done with care. This does not mean controls cannot be used, so long as they are carefully designed to avoid the impression of bad intentions.

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3When agents make their contingent effort choices, they learn principals’ wage offers and requested effort.
When principals impose controls or remove them, these studies suggest that they should employ great care, not only to achieve their own goals, but to ensure that they do so in a way that does not give their agents the wrong impression. The finding that intrusive controls are less effective than less intrusive controls may be intuitive, but the finding that the removal of controls can also backfire is an important new insight.

The delicacy of intentionality also means that factors that are not normally considered may play a role. The pre-existing expectations of agents and the salience of principal’s choices to agents both have the potential to impact agent’s behavior. Likewise, there are indications that communication, if handled properly, may have a positive impact on outcomes. It is true that these factors, as explored in this study did not lead to differences that were significant. However, due to limitations inherent in the design of the treatments and the relatively small sample sizes, there is reason to suspect that this lack of significance may disappear with further investigation. And, given the delicacy that intentionality has already shown, further exploration is certainly warranted.

In addition, there is an interesting implication that arises from these studies. Although intentionality in general is delicate – at either end of the spectrum when intentions are clear, good/bad intentions or trust/distrust are easy to interpret and appear to generate consistent responses. When the behavior is ambiguous the situation becomes much more complex. When the action by a principal is open to multiple interpretations, small changes in the situation can have large impacts on the outcome. This suggests that it is even more important for principals to choose contracts with caution when acting in a way that is open to both positive and negative interpretations.
Chapter 2

Study 1: How Does Committed Penalty or Discretionary Penalty Affect Perceptions of Intentions?

2.1 Introduction

Principal-agent relations are typically characterized by a conflict of interest. A traditional solution for principals is to impose a control in an employment contract which explicitly specifies a penalty policy *ex ante* to motivate employees to perform in accordance with principals’ best interests (Zimmerman 2006; Baiman 1990). However, inconsistent with traditional economic theory that assumes agents are wealth-maximizers, extensive prior research in accounting and economics shows that when principals actively commit to implement such a penalty contract *before* observing agents’ actions, it can negatively affect agents’ motivation to cooperate with their principals (Kuang & Moser 2009; Christ 2013; Christ et al. 2012; Tenbrunsel & Messick 1999; Falk & Kosfeld 2006; Fehr & Rockenbach 2003; Fehr & List 2004; Fehr & Gächter 2002). This occurs because agents can perceive principals’ intention to commit to use a penalty before evaluating their actions as a strong signal that their principals do not trust them to perform well. From agents’ perspective, principals are attempting to use a committed penalty contract to intrusively “force” agents to align their interest with the interest of principals. Principals’ choice of such a penalty can send a message to agents that “help me, otherwise I will hurt you”. As a result, the distrust it implies and the desire to retaliate against this intrusively “forced” alignment can undermine agents’ motivation to cooperate.

It seems that the main takeaway, that a control system, such as a penalty contract, can actually backfire in terms of the effectiveness of a control system, can create an im-
pression that principals should refrain from using a penalty in a contract because it has an adverse effect. However, it is necessary for principals to hold a “stick” to prevent agents from engaging in misbehavior (low effort, dishonesty, fraud, etc.). This creates a dilemma from principals’ perspective because, while a contract with penalty policies is desirable, a committed penalty can have negative effects that severely limit its usefulness. The apparent question is whether there are ways to structure a penalty that effectively mitigate the agency problem while avoiding the unintended negative effect associated with a committed penalty.

Coletti et al. (2005) challenges the idea that control systems reduce trust by assigning subjects to a stronger control system than previous research (Tenbrunsel & Messick 1999) and finds that a strong control system can enhance the level of trust in collaborative environments in relative to no control.

This study investigates how agents perceive principals’ intention when principals choose to impose a discretionary penalty, in which principals do not commit to impose a penalty up front. Instead, they have some discretion to determine whether a penalty will be used after observing agents’ effort. One concrete example of a discretionary penalty can be found in incomplete employment contracts. While some contracts contain incentives that are pre-committed (for example, stock options and performance-based incentives in sports contracts), often many other incentives are ex post - i.e. agents know that some incentive may be enacted, but whether principals punish is a decision made after agents perform the designated duties (Rigdon 2009). This is commonly used in the distribution of the assignment of lunchroom duty to under-performing teachers (Andreoni et al. 2003). Similarly, students often encounter professors who retain the right to raise or lower grades beyond what students earn in exams depending on class participation. Discretionary penalties are also commonly used in management control systems where managers have some ex post discretion in the evaluation of agents’ performance (Murphy & Oyer 2001). This subjective performance evaluation allows principals to use non-contractible information to assess actions and efforts that objective measures are not able to capture, creating a more complete judgment on agents’ performance (Bol 2008).

The immediate concern that arises for principals is whether, as with a committed
penalty, agents will perceive principals’ intention when principals choose to implement a discretionary penalty as a signal of distrust and thereby undermining agents’ performance.

The prior study that is most relevant to this study is Kuang & Moser (2009). They employ a gift-exchange game (Fehr et al. 1993) where principals offer wages in the first stage and agents choose effort in the second stage. Based on traditional economic theory that only assumes wealth-maximization, regardless of the wage offer, agents should choose the minimum effort. Anticipating this, principals should offer the minimum wage. They have two treatments: one endogenous treatment where principals either offer a “forcing” contract where it is in agents’ best interest to choose the highest effort thus maximizing principals’ payoff or offer a trust contract (i.e. gift-exchange game) in which principals lack control over agents’ effort choice, and one exogenous treatment where a “forcing” contract is assigned by the experimenter. Their study finds that principals experience significantly lower effort when the “forcing” contract is offered by principals relative to when the “forcing” contract is offered by the experimenter. Their finding provides evidence that agents retaliate when they feel distrusted and feel “forced” to maximize principals’ payoff.

The design of the “forcing” contract in Kuang & Moser (2009) displays a common feature of a committed penalty used in the prior literature (Christ 2013; Christ et al. 2012; Tenbrunsel &Messick 1999; Falk & Kosfeld 2006; Fehr & Rockenbach 2003; Fehr & List 2004; Fehr & Gächter 2002): a committed penalty system “forces” agents to behave in principals’ interest. However, a discretionary penalty system is inherently less intrusive than a committed penalty system, because the retention of an option to use a penalty is not equivalent to predetermining the imposition of a penalty. A discretionary penalty can be perceived as non-intrusive and legitimate means to enforce the social norm of punishing unfair agents. Therefore, it is possible that, in contrast to a committed penalty, agents may not perceive principals’ intention to impose a discretionary penalty as a signal of distrust, and it may not undermine agents’ effort.

I experimentally test this hypothesis by applying the gift-exchange game from Kuang & Moser (2009) with the modification that principals can request their desired effort from 4If agents choose any effort lower than the highest effort, they will be penalized by receiving lower pay.
agents when they offer a wage (hereafter called “a modified gift-exchange game”). In Experiment 2 (Discretionary) principals choose between a discretionary penalty and no penalty. In Experiment 1 (Committed) principals choose between a committed penalty and no penalty. The purpose of Experiment 2 (Experiment 1) is to examine the effect of a discretionary penalty (a committed penalty) on agents’ effort when principals actively choose to implement it. Although previous studies have explored the effect of a committed penalty, those experiments are conducted in different games or similar games with different experimental parameters. In order to lend more credibility to the result of the effect of a discretionary penalty in Experiment 2, in Experiment 1, I design a committed penalty that is comparable to a discretionary penalty in Experiment 2. These two penalties are monetarily equivalent if a penalty is used. The only difference is whether principals commit to use a penalty before observing agents’ effort.

Experiment 2 (Discretionary) has one endogenous treatment, where principals choose either to implement a discretionary penalty or no penalty at all, and one exogenous treatment where the option of a discretionary penalty is assigned by the experimenter as a control for the sub-game of implementing a discretionary penalty in the endogenous treatment. If principals choose to implement a discretionary penalty (“EN-DP”), subjects effectively play a modified gift-exchange game with a third stage in which principals can decide whether to impose a penalty on agents after observing agents’ effort. If principals choose to implement no penalty at all (“EN-NDP”), subjects effectively play a modified gift-exchange game. In the exogenous treatment, the experimenter assigns subjects to the treatment where principals automatically have an option to decide whether to use a penalty on agents after observing agents’ effort (“EX-DP”). Agents are only eligible for a penalty if their actual effort is lower than principals’ requested effort. If a penalty is used, it is costly to both principals and agents. Since the only apparent difference between EN-DP and EX-DP is whether the option to implement a discretionary penalty is intentionally

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5I add principals’ requested effort into a standard gift-exchange game for two reasons. First, it is easier for us to interpret slack as the difference between requested effort and actual effort. Second, it provides a base for when a penalty may be imposed. Principals can only penalize agents who choose lower effort than requested effort.

6“EN” (“EX”) comes from the first two letters of the word endogenous (exogenous) and “DP” comes from the word discretionary penalty (“NDP” comes from the word no discretionary penalty).
chosen by a principal or not, principals’ intentions regarding their choice should not affect agents’ effort when principals do not actively choose in the exogenous treatment. Thus, the difference in agents’ effort between EN-DP and EX-DP allows me to isolate the effect of agents’ perception of principals’ intention to impose a discretionary penalty from other factors, such as wage and requested effort that could also affect the agents’ perception about principals.

Experiment 1 (Committed) has one endogenous treatment where principals choose either to implement a committed penalty or no penalty at all, and one exogenous treatment where a committed penalty is assigned by the experimenter as a control for the sub-game of implementing a committed penalty in the endogenous treatment. If principals choose to implement a committed penalty (“EN-CP”), subjects effectively play a modified gift-exchange game with a third stage in which principals commit to implement a penalty on agents before observing agents’ effort. If principals choose to implement no penalty at all (“EN-NCP”), similar to EN-NDP in Experiment 2, subjects effectively play a modified gift-exchange game. In the exogenous treatment, the experimenter assigns subjects to the treatment where a committed penalty is automatically in place before agents choose effort (“EX-CP”). The requirement of the eligibility for being penalized and the cost of a penalty are identical to that in Experiment 2. Adopting the same analysis as that in Experiment 2, the difference in agents’ effort between EN-CP and EX-CP captures agents’ perception of principals’ intention to impose a committed penalty.

Experiment 2 finds that, consistent with the possibility that a discretionary penalty may not be perceived as distrust, agents do not exert lower effort when principals choose to implement a discretionary penalty than when such a penalty is assigned by the experimenter. It suggests that agents do not seem to feel resentment because of principals’ choice of that penalty. This can be explained by agents’ perception of a discretionary penalty as non-intrusive and legitimate because it offers a way not only for principals to enforce fair effort but also for agents to “communicate” what they think is fair effort. This perception of non-intrusiveness and legitimacy lead agents to expect that principals will want to retain an

\[7^{\text{“EN” (“EX”) comes from the first two letters of the word endogenous (exogenous) and “CP” comes from the word committed penalty (“NCP” comes from the word no committed penalty).}}\]
option for a discretionary penalty when offered a choice. As a result, a choice to implement a discretionary penalty will not come as a surprise to agents and will not be perceived as a signal of distrust and intrusively “forcing” an alignment of interests.

Experiment 1 finds that, consistent with prior literature, agents exert lower effort when principals choose to implement a committed penalty than when such a penalty is assigned by the experimenter. It suggests that agents seem to feel resentment because of principals’ choice of that penalty. This resentment can be caused by agents’ perception of a committed penalty as distrust and as intrusive an alignment of interests. The result in Experiment 1 provides additional evidence for Experiment 2 and implies that, in contrast with committing to penalize agents before observing their effort, when principals retain the discretion to penalty agents after observing their effort, agents do not seem to perceive principals’ intentions when implementing a discretionary penalty as a negative signal.

This study provides several contributions to academic literature and practice. The results of this study will be of interest to researchers who have studied management controls. While an existing body of studies (Kuang & Moser 2009; Tenbrunsel & Messick 1999) shows that implementing committed controls undermines agents’ intrinsic motivation to cooperate because of perceived distrust, limited studies have explored the perceived intention when principals choose to retain the discretion for controls. Although previous experimental studies (Rankin et al. 2008; Hannan et al. 2006; Douthit & Stevens 2015) show that discretionary controls can be effective in reducing budgetary slack, how agents perceive principals’ intention when principals choose discretionary controls has not yet been explored. This study contributes to this stream of literature by showing that the effect of discretionary controls on agents’ performance seems to be the opposite of what has been found with committed controls. Specifically, retaining the discretion to use a control ex post does not necessarily undermine agents’ motivation to work. This finding has important managerial implications and demonstrates that the way principals structure control systems matters. For instance, retaining the ability to use a penalty, which is perceived as non-intrusive and legitimate, may attenuate agents’ adverse reactions to controls and may be an efficient solution to mitigate the agency problem.

The remainder of the paper proceeds as follows. The second section presents related
theories and develops the hypotheses. The third section describes the experimental setting, design and procedure. The fourth section shows results and provides interpretations. The fifth section concludes and suggests directions for future research.

2.2 Related Literature and Hypotheses

The aim of this study is to understand, in contrast to a committed penalty contract, how agents perceive the intentions motivating principals’ choices of implementing a discretionary penalty system. This study conducts two experiments. Experiment 2 examines the effect of implementing a discretionary penalty contract on agents’ effort. As a comparable study to Experiment 2, Experiment 1 examines the effect of implementing a committed penalty contract on agents’ effort.

The approach to understanding agents’ perceptions in Experiment 2 and Experiment 1 is to compare agents’ effort between the endogenous treatment with discretionary penalty (committed penalty) chosen and the corresponding exogenous treatment with discretionary penalty (committed penalty) assigned because the only apparent difference between these two treatments is principals’ intentions as perceived by agents. To mitigate the confounding effect of wage and requested effort on agents’ effort, it is important to hold them constant in the comparison of effort across these two treatments.\(^8\)

As a benchmark, it is helpful to understand what traditional economic theory would predict in EN-DP (EN-CP) and EX-DP (EX-CP) before making any further behavioral predictions. For Experiment 2, based on traditional economic theory that only assumes wealth-maximization, by backward induction, it is not sequentially rational for principals to use a penalty because it is costly to them and does not influence agents’ effort. Anticipating no penalties, irrespective of the wage offer and requested effort, agents should choose the minimum effort of 0.1. Anticipating this, principals should always offer the minimum wage of 20. Furthermore, principals’ intentions when principals choose should not matter to agents, in other words, whether the choice is made by the principal or the experimenter.

\(^8\)Although in the endogenous treatment principals self-select into EN-DP and EN-NDP, agents are randomly matched with these principals. That means agents in EN-DP can be treated as a random population as those in EX-DP. Hence, a comparison of agents’ effort between EN-DP and EX-DP satisfies randomization.
should not make a difference in agents’ effort. Hence, traditional economic theory would predict that EN-DP and EX-DP should generate the same behavioral results: minimum wage and minimum effort, and a penalty will never be used.

For Experiment 1, the equilibrium analysis in Section 3 shows that it is optimal for principals to offer the minimum wage and request effort of 0.5 and it is agents’ best interest to choose effort of 0.5 in EN-CP. Again, consistent with traditional economic theory that only assumes intention irrelevance, EN-CP and EX-CP should generate the same behavioral results: minimum wage, requested effort of 0.5, and agents’ effort of 0.5.

However, a great number of prior studies in accounting and economics show that besides wealth, people also have preferences for social norms, such as fairness, trust, reciprocity and honesty (Rankin et al. 2003; Hannan et al. 2006; Evans et al. 2001). Therefore, I expect that some principals are likely to show trust to agents by offering more than the minimum wage and some agents are likely to reciprocate this trust by choosing more than the minimum effort in both Experiment 1 and Experiment 2.

For Experiment 2, prior studies (Rankin et al. 2008; Douthit & Stevens 2015; Falk et al. 2005; Fehr & Gächter 2000; Fehr & Gächter 1998; Fehr et al. 1997) suggest that people punish “free-riders” even if the punishment is costly to them, so I expect that some principals are likely to use a penalty when agents’ effort falls below their requested effort and agents are likely to anticipate a possibility of being penalized.

In addition, previous literature on intentionality (Blount 1995; Falk et al. 2003) shows that people also care about the intentionality behind their counterparty’s choices. Blount (1995) finds that in an ultimatum game people are more willing to accept inequitable allocations when the allocation is made by chance (by spinning a roulette wheel) than when the allocation is made by a proposer who stands to gain from the inequity of the offer. Falk et al. (2003) conducts four mini ultimatum games and varies the alternative offers. They find that the rejection rate of an inequitable 8/2 offer was the highest in the first 5/5 game. This suggests that perceived intentions are a major driver of reciprocal behavior. Therefore, I would expect that EN-DP and EX-DP in Study 1 (EN-CP and EX-CP in Study 2) should not generate identical behavioral results.

In the following two subsections, I will present the theory and my behavioral predictions.
on how agents may perceive their principals’ intention when principals choose to implement a discretionary penalty contract and a committed penalty contract respectively, and how this perception might affect agents’ effort.

2.2.1 Experiment 1: committed penalty contract

Experiment 1 is served as a comparable study for Experiment 2. Although prior studies have documented a negative effect of a committed penalty in a gift-exchange game, an investment game and a dictator game, we still cannot be certain that the same effect can be replicated in a modified gift-exchange game with a committed penalty. Thus, the purpose of Experiment 1 is to show that a committed penalty that is experimentally comparable to a discretionary penalty in Experiment 2 shows a consistently negative effect as documented in the prior literature.

The reason of a negative effect when principals implement a committed penalty system relies on the theory of “crowding out”. It states that people who would otherwise care about social norms, for instance reciprocity, may, in the presence of external incentives (for example, a punishment), focus on pecuniary gain. In this case we would say that incentives undermine or “crowd out” people’s motivation to reciprocate (Frey 1994). Several examples of this appear in the prior literature.

One example of crowding out comes from an experiment conducted by Gneezy & Rustichini (2000) at a daycare center. Parents there sometimes arrived late to pick up their children, forcing a teacher to stay after closing time. The experimenters imposed a small fine for parents who arrived late. It might be expected that, as a result of this fine, the rate of late arrivals would decrease. However, the experimenters found that the imposition of a fine increased the number of parents who arrived late. One way to explain such behavior is that, before the fine was imposed, the parents would feel guilty for taking up the teacher’s time after hours. After the fine was imposed, the parents might no longer feel guilty for taking up the teacher’s time because from their perspective paying the fine compensated the teacher. So it can be said that parents’ guilt over taking up the teacher’s time was “crowded out” by the fine.

Another example is based on weekly garbage collection in a small town. The town
requires the use of special bags for garbage, provided to residents at no charge. On these bags is an advertisement asking residents to reduce the garbage they throw away in order to protect the environment. But, to further reduce the amount of garbage, the town starts charging 5 cents per bag. Again, one might expect the amount of garbage to decrease since the bags were no longer free. However, Gneezy (2003) indicates that charging a small amount of money per bag may increase the amount of garbage. The reason may be that, before the charge is imposed, people try to reduce their garbage because they think it is very important to protect the environment. The 5 cent charge, once applied, tells them that protecting the environment is only worth 5 cents. 5 cents isn’t much and reducing garbage is time consuming. So why bother reducing the garbage? Once again, it can be said that people’s motivation to protect the environment can be “crowded out” by the charge.

The takeaway from these two examples is that the imposition of external incentives - in both cases, punishments, - can change how people perceive the situation in a way that is counterproductive to the purpose of the incentives.

In a management setting, a large number of prior studies have explored how a committed penalty can negatively affect agents’ motivate to cooperate. Applying a gift-exchange game, Kuang & Moser (2009) shows that when principals choose a “forcing” contract in which agents will be penalized with certainty ex ante if they shirk, principals are worse off than when the experimenter chooses the same contract, because agents feel resentment when they feel “forced” to maximize principals’ payoff. In a similar gift-exchange game to the game in Experiment 1, Fehr & Gächter (2002) allows principals to commit to impose a fine ex ante if the agents’ effort is lower than the principals’ requested effort before observing agents’ effort. They find that agents’ effort is significantly lower when principals commit to impose a fine than when no fine is allowed. Their results suggest that the explicit threat of a committed penalty destroys agents’ willingness to reciprocate voluntarily because the threat signals distrust. Fehr & Rockenbach (2003) uses an investment game to explore the effect of a committed penalty. In an investment game an investor has the choice to invest some or all

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9The difference of game between Fehr & Gächter (2002) and Study 1 is ...(READ THAT PAPER AGAIN!)
In addition, the difference between their study and Study 2 in this paper is that in their study the principals commit to impose a fine before observing the agents’ effort. In contrast, in my study the managers do not commit to impose a sanction and will decide whether to impose a sanction after observing the employees’ effort.
of his endowment with a trustee. The invested amount increases (in this case triples) and the trustee can decide how much, if any, of the increased amount to return to the investor. They allow the investor to commit to impose a fine ex ante on the trustee if the trustee does not return the investor’s requested amount. They find that trustees’ returned amount is significantly lower when the fine is committed to than when the fine is not allowed. Their results suggest that committing to impose a fine leads to lower trustworthiness from trustees because they may feel that investors do not trust them to return fair amount.

All these papers have one common feature: committed penalties make maximizing principals’ payoff in agents’ interest and agents will be penalized if they do not satisfy principals’ preference. Although agents’ strategy space is unchanged, for example, they can still choose lower effort than the requested effort, it is no longer their best interest to do that with the incentives from committed penalty systems. Their findings demonstrate that when agents feel “forced” to maximize principals’ payoff, they will feel that their managers do not trust them to perform well. In retaliation for being distrusted, employees will reduce their motivation to reciprocate.

Falk & Kosfeld (2006) pushes even further on how much principals can restrict agents’ choices with ax ante controls. In a dictator game where dictators can send any amount from 0 to 120 to receivers, they allow receivers to choose the minimum amount (for example 5, 10, 20) that dictators can send. They find that dictators send significant lower amounts when receivers restrict the minimum amount than when the same minimum amount is set by the computer. Perhaps it is not surprising that their results are consistent with the negative effect of committed penalties, because dictators feel resentment and distrusted when receivers restrict their strategy space intrusively.

In Experiment 1, as with prior studies of committed penalties, when principals choose to implement a committed penalty before observing agents’ effort, agents in EN-CP can perceive such a choice as a strong signal that their principals do not trust them to reciprocate. Because if principals trust agents not to shirk, they would not need to threat agents with a penalty. Hence, consistent with previous studies (Kuang & Moser 2009; Fehr & Gächter 2002; Fehr & Rockenbach 2003), agents can feel that such a committed penalty “forces” them to choose effort no lower than the requested effort. Thereby, this can cause
resentment. As a result, agents in EN-CP will not feel obligated to reciprocate principals' non-minimum wage offers. Since principals in EX-CP will not be able to show this distrust because the same committed penalty is not chosen by them, instead, is assigned by the experimenter, agents in EN-CP should feel less obligated to reciprocate than the general population of agents in EX-CP.

Therefore, it is likely that implementing a committed penalty will undermine agents’ effort. That is, agents’ effort will be lower when a committed penalty is chosen by the principal than when a committed penalty is assigned by the experimenter, i.e.

\[
\text{Effort (EN-CP)} < \text{Effort (EX-CP)}
\]

### 2.2.2 Experiment 2: discretionary penalty contract

The key difference between a committed penalty contract and a discretionary penalty contract appears to be that a committed penalty, where agents are told ex ante that they will be penalized for failure to meet principals’ requirement, can be perceived as distrust so to “force” agents to act in principals’ best interest - in other words they have only two choices: comply and avoid the penalty or decline and pay the fine. The intrusiveness caused by the forcibly alignment of interests can cause agents to feel resentful of their principals, thus leading to lower effort.

In contrast to a committed penalty contract, when principals implement a discretionary penalty contract, where a penalty decision is subject to principals’ discretion ex post, although the option to use a penalty is retained, principals make no commitment to use that penalty. Agents may anticipate that there is some probability of being penalized if their effort is less than the requested effort but this decision is not certain. It is possible that if agents’ effort is close to the requested effort even if it is below, principals may think it is reasonable to forego a penalty because they request for too much, but if agents’ effort is much lower than the requested effort, principals may think it necessary to punish this unfair behavior because they request for fair effort. This flexibility not only gives principals a chance to evaluate what is fair to receive but also gives agents a chance to “communicate” what is fair to give based upon principals’ wage offer and requested effort. Therefore, it is
likely that, unlike a committed penalty, agents do not perceive implementing a discretionary penalty as “forcing” them to maximize principals’ payoff.

Prior studies (Christ 2013) show that when controls are less intrusive, resentment and distrust are gone. Therefore, unlike committed penalty, implementing a discretionary penalty will not be perceived as a signal of distrust and will not cause agents’ resentment.

Instead, agents may perceive implementing a discretionary penalty as legitimate, because it allows principals to evaluate agents’ actions before making a necessary penalty decision. If a discretionary penalty is regarded as legitimate, agents will expect their principals to implement it given such a choice.

Charness & Kuhn (2011) argues that expectations can change how people perceive intentions. When people receive the treatments they already expect, there could be no emotional surprises so there could not be no emotional responses regarding the intentions behind the choices of the treatments. For example, tipping is a strong norm in the U.S. but it is not expected in many other countries. A waiter outside of the U.S. who does not receive a tip will not feel upset and offended but a waiter in the U.S. is very likely to feel upset and offended under the same situation. The reason for this difference is that the waiter outside the U.S. does not expect to get a tip, so he does not see a lack of a tip as a sign of a customer’s bad intentions.

When strongly held expectations on choosing a discretionary penalty are met, there should be no surprises to agents. Thus, the intentions behind this choice of implementing a discretionary penalty system may cease to influence agents’ behavior. As a result, whether the decision on a discretionary penalty is made by the principal or the experimenter should make virtually no difference in agents’ perception on principals’ intentions between EN-DP and EX-DP.

Therefore, it is possible that, in contrast to a committed penalty, implementing a discretionary penalty will not undermine agents’ effort because the retention of the option is perceived as legitimate and strongly expected. That is, agents’ effort will be identical between when a discretionary penalty is chosen by the principal and a discretionary penalty is assigned by the experimenter, i.e.
2.3 Experimental Setting and Design

2.3.1 Experiment 1: Committed Penalty

Experiment 1 uses a modified gift-exchange game and a modified gift-exchange game with a committed penalty. The experimental details of Experiment 1 are provided as follows.

2.3.1.1 Modified Gift-Exchange Game

A gift-exchange game has been extensively used in the literature (Fehr et al. 1993). In this study, the modification to the traditional gift-exchange game is that I allow an opportunity of a cheap talk for principals. The modified gift-exchange game consists of two stages. In the first stage, principals choose a fixed wage $w$ to offer to their agents and requested a desired effort level $^e e$. The role of principals’ requested effort is to establish principals’ stated expectations on how much effort they want from their agents. In addition, you will see that in later game this requested effort will be used as a benchmark for principals’ penalty decision. In the second stage, agents choose an actual effort level $e$. Agents’ actual effort does not need to equal principals’ requested effort, i.e. agents can choose $e \neq ^e e$.

The principal’s payoff function is given by:

$$(120 - w) * e$$

where $w$ represents the principal’s wage offer and $w \in \{20, \ldots, 120\}$\(^{10}\). $^e e$ represents the principal’s requested effort and $^e e \in \{0.1, \ldots, 1\}$. $e$ represents the agent’s actual effort and $e \in \{0.1, \ldots, 1\}$. The higher the effort number is, the higher the cost to the agent. The lower the effort is, the lower the cost to the agent.

The agent’s payoff function is given by:

$$w - c(e)$$

\(^{10}\)Wage can be any integer between 20 and 120. The higher the number, the higher the wage offer.
where \(c(e)\) represents the cost of the agent’s actual effort, an increasing function in \(e\).

The agent’s cost of effort is shown below.

<table>
<thead>
<tr>
<th>(e)</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>(c(e))</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

### 2.3.1.2 Behavioral Prediction Based on Standard Economic Theory

The modified gift-exchange game is a sequential game. By the backward induction, regardless of how much the wage is offered, it is rational for the agent to put in the minimum effort of 0.1 because it is the least costly choice. Anticipating the agent’s effort choice, the principal should always offer the minimum wage of 20. The principal’s requested effort should not play a role in the agent’s effort decision because it should be perceived as the principal’s cheap talk.

Therefore, based on standard economic theory that assumes people are purely self-interested, the optimal strategy in this game is

\[
\{ w^* = 20, e^* = 0.1, \text{ and } \hat{e} \text{ does not affect } e \} 
\]

### 2.3.1.3 Modified Gift-Exchange Game With Committed Penalty

The modified gift-exchange game with committed penalty has the first and the second stage which are identical to the modified gift-exchange game. It adds a third stage where before principals observe agents’ effort, they commit to penalize agents if agents’ actual effort is less than principals’ requested effort. If agents are eligible to be penalized, the penalty reduces of principals’ payment by 2 and reduces agents’ payment by 6. Thus, if agents are eligible to be penalized, the principal’s payoff function is given by:

\[
(120 - w) \times e - 2
\]

and the agent’s payoff function is given by:

\[
w - c(e) - 6
\]
2.3.1.4 Behavioral Prediction Based on Standard Economic Theory

The modified gift-exchange game with committed penalty is also a sequential game. By the backward induction, for agents, given a wage offer, they need to calculate the benefit and the cost of shirking (i.e. put in effort less than requested effort) and no shirking (i.e. put in effort equal or greater than requested effort). If they shirk, it is rational for them to shirk fully, that is, they should put in the minimum effort of 0.1 because it is the least costly option. Given a wage and requested effort, if the benefit of shirking is greater than the cost, it is agents’ best interest to shirk. Likewise, if the cost of shirking is greater than the benefit, it is agents’ best interest to meet principals’ requested effort. More specifically, given a wage, if agents shirk, they will shirk fully and their payoff will be

\[ w - c(0.1) - 6 \]  

(2.7)

If agents do not shirk, they will merely meet principals’ requested effort and their payoff will be

\[ w - c(\hat{e}) \]  

(2.8)

When the payoff in Equation (1) is greater than that in Equation (2), which results in \( \hat{e} > 0.5 \), it is agents’ best interest to shirk, i.e. \( e^* = 0.1 \). Likewise, when the payoff in Equation (1) is less than or equal to that in Equation (2), which results in \( \hat{e} \leq 0.5 \), it is agents’ best interest to meet principals’ requested effort, i.e. \( e^* = \hat{e} \).

For principals, regardless of agents’ effort, they should always offer the minimum wage of 20. However, unlike Study 1, principals’ requested effort will affect agents’ effort decision because the eligibility of a penalty is dependent on the requested effort. If principals request any effort greater than 0.5, agents will shirk and principals’ payoff will be

\[ (120 - w) * 0.1 - 2 \]  

(2.9)

If principals request any effort less than or equal to 0.5, agents will meet principals’ requested effort and principals’ payoff will be
As we see in Equation (4), it is principals’ best interest to request effort of 0.5 to maximize their payoff, i.e. \( \hat{e}^* = 0.5 \).

Therefore, based on standard economic theory that assumes people are purely self-interested, the optimal strategy in this game is

\[
w^* = 20, \; \hat{e}^* = 0.5, \; e^* = 0.5
\]

### 2.3.2 Experiment 2: Discretionary Penalty

Experiment 2 also uses a modified gift-exchange game the same as that in Experiment 1. In addition, it uses a modified gift-exchange game with discretionary penalty. The difference between a committed penalty in Experiment 1 and a discretionary penalty in Experiment 2 is that in Experiment 1 principals commit to impose a penalty on agents if agents’ effort does not meet their requested effort before observing agents’ effort, while in Experiment 2 principals do not commit to a penalty up front before observing agents’ effort but leave the discretion of a penalty decision after observing agents’ effort if agents’ effort does not meet their requested effort. The experimental details of Experiment 2 are provided as follows.

#### 2.3.2.1 Modified Gift-Exchange Game With Discretionary Penalty

The modified gift-exchange game with discretionary penalty has the first and the second stage which are identical to the modified gift-exchange game. It adds a third stage where after principals observe agents’ effort, they can decide whether to penalize agents if agents’ actual effort is less than principals’ requested effort\(^{11}\). If agents are eligible to be penalized, the penalty is both costly to principals and agents. In order to set up monetary equivalent penalty as that in Experiment 1, the penalty reduces of principals’ payment by 2 and reduces agents’ payment by 6\(^{12}\). Thus, if a principal decides to impose the penalty after observing

\(^{11}\)In the experiment the manager is not allowed to sanction the employee if the employee’s actual effort is equal to or greater than the manager’s requested effort.

\(^{12}\)The rationale for making the sanction costly to both principals and agents is because, in practice, it is common that when principals take actions based on agents’ performance, making such decisions may require
an agent’s effort, the principal’s payoff function is given by:

\[(120 - w) \times e - 2\]

and the agent’s payoff function is given by:

\[w - c(e) - 6\]

If the principal decides not to impose a penalty, regardless of the agent’s actual effort, neither the principal’s payoff nor the agent’s payoff will be reduced, in which case their payoff functions are exactly the same as in the modified gift-exchange game.

2.3.2.2 Behavioral Prediction Based on Standard Economic Theory

The modified gift-exchange game with discretionary penalty is also a sequential game. By the backward induction, for principals, regardless of how much the effort agents choose, it is not rational to penalize, because 2 will be directly deducted from their payoff and they will not gain anything. Anticipating no penalty, it is agents’ best interest to put in the minimum effort of 0.1. Anticipating agents’ effort choice, principals should always offer the minimum wage of 20. Again, principals’ requested effort should not play a role in agents’ effort decision.

Therefore, based on standard economic theory that assumes people are purely self-interested, the optimal strategy in this game is

\[\{p^* = 0, w^* = 20, e^* = 0.1, \text{ and } \hat{e} \text{ does not affect } e\}\]

where \(p\) denotes principals’ penalty decision. \(p = 1\) means the principal imposes a penalty and \(p = 0\) means the principal does not impose the penalty.

resources. For example, managers may need to spend money on monitoring systems in order to verify the employees’ performance or when managers fire their employees, they may need to spend extra money on training new employees. In addition, the amount of the penalty was set at a level that was expected to be neither too small nor large. In practice, there are often limits to managers’ sanctioning possibilities. In real world situations a manager may only be able to impose a medium level penalty on an employee due to legal regulations, social norms, etc.
2.3.3 Treatments in Experiment 1

In Experiment 1, I conduct one endogenous treatment and one exogenous treatment as a control for one sub-game of the endogenous treatment. The key difference between the endogenous treatment and its corresponding exogenous treatment is whether the implementation of a committed penalty is actively chosen by the principal or is randomly assigned by the experimenter. In the endogenous treatment, ex ante principals choose either to impose a committed penalty before observing agents’ effort (“EN-CP” condition) or no penalty at all (“EN-NCP” condition). This experiment aims to investigate how agents perceive principals’ intention when principals choose to implement a committed penalty contract and how this perception will affect agents’ effort. The challenge is to disentangle the effect of agents’ perceived intention on effort from other factors in the game, i.e. wage offers and requested effort. The corresponding exogenous treatment where an option of a discretionary penalty is assigned by the experimenter can be used as a control for that sub-game of the endogenous treatment (“EX-CP” as a control for “EN-CP”). Since principals are not able to make the choice in the exogenous treatment, principals’ intention regarding the choice should not affect agents’ effort. Thus, while in the endogenous treatment agents’ effort can be affected by their perception on principals’ choice of a committed penalty, wages and requested effort, in the exogenous treatment agents’ effort can only be affected by wages and requested effort. If the only apparent difference between the each branch of the endogenous treatment and its corresponding exogenous treatment is principals’ perceived intentions, a difference in agents’ effort between EN-CP and EX-CP will allow me to investigate how agents’ perception of principals’ intentions of committing to use a penalty affects agents’ effort. Figure 1 shows the timeline of decisions for the endogenous and exogenous treatment in Experiment 1.
2.3.3.1 Behavioral Prediction in Experiment 1 Based on Standard Economic Theory

Standard economic theory that only assumes people are self-interested would predict that since the structure of the game and the parameters in the game are identical between the endogenous treatment and the exogenous treatments, whether the choice is chosen by the principal or the experimenter should not play a role in agents’ effort. In other words, the intentions behind principals’ choices do not matter. Therefore, the optimal strategies in the endogenous treatment will be identical to those in its corresponding exogenous treatment.

2.3.4 Treatments in Experiment 2

In Experiment 2, I conduct one endogenous treatment and one exogenous treatment as a control for one sub-game of the endogenous treatment. The key difference between the endogenous treatment and its corresponding exogenous treatment is whether the implementation of a discretionary penalty is actively chosen by the principal or is randomly assigned by the experimenter. In the endogenous treatment, ex ante principals choose either to impose a discretionary penalty which allows principals to make a penalty decision after observing agents’ effort (“EN-DP” condition) or no penalty at all (“EN-NDP” condition). This study aims to investigate how agents perceive principals’ intention when principals choose to implement a discretionary control system and how this perception will affect agents’ effort.
The challenge is to disentangle the effect of agents’ perceived intention on effort from other factors in the game, i.e. wage offers and requested effort. The corresponding exogenous treatment where an option of a discretionary penalty is assigned by the experimenter can be used as a control for that sub-game of the endogenous treatment (“EX-DP” as a control for “EN-DP”). Since principals are not able to make the choice in the exogenous treatment, principals’ intention regarding the choice should not affect agents’ effort. Thus, while in the endogenous treatment agents’ effort can be affected by their perception on principals’ choice of a discretionary penalty, wages and requested effort, in the exogenous treatment agents’ effort can only be affected by wages and requested effort. If the only apparent difference between the each branch of the endogenous treatment and its corresponding exogenous treatment is principals’ perceived intentions, a difference in agents’ effort between EN-DP and EX-DP will allow me to investigate how agents’ perception of principals’ intentions of retaining the option to penalize affects agents’ effort. Figure 1 shows the timeline of decisions for the endogenous and exogenous treatment in Study 1.
Figure 2.2: Timeline of Decisions for All Treatments in Experiment 2
2.3.4.1 Behavioral Prediction in Experiment 2 Based on Standard Economic Theory

Like the analysis in Experiment 1, based on traditional economic theory that intentions behind principals’ choices do not matter, the optimal strategies in the endogenous treatment will be identical to its corresponding exogenous treatment.

2.3.5 Experimental Procedure

Participants in both Experiment 1 and Experiment 2 are undergraduate students from the Fisher College of Business at The Ohio State University. Upon arrival at the laboratory, participants gave their informed consent to participate. They received an ID number from the experimenter when they signed in, and sat in front of the computer which had the same ID number. This number eliminates any possibility that the experimenter may acquire personal information about the participants and facilitates final payment to the participants. Before the experiment began, the experimenter read the instructions aloud to all participants and any questions regarding the instructions were answered by the experimenter privately. Then a quiz (14 questions in the endogenous treatment and 11 questions in EX-CP in Experiment 1; 14 questions in the endogenous treatment and 11 questions in EX-DP in Experiment 2) was given to the participants to fill out to ensure that the participants fully understood the experiments. In order to reinforce subjects’ understanding and familiarize them with the computer program used for the game, subjects in all treatments next participated in four practice rounds. Subjects were told that their decisions in the practice rounds would not be used in the experiments and that the purpose was to give them hands-on experience with the process and possible outcomes without affecting their payoff.

At the beginning of the experiments, half of the subjects were randomly assigned as “employers” and the other half of the subjects were randomly assigned as “employees”. The initial role assigned to each player was retained throughout the experiments. In order to eliminate any reputation effect, each “employer” was randomly re-matched with an “employee” for each period. As a result, subjects in this study played a one-shot game in all
treatments. 7 sessions (5 sessions for the endogenous treatment and 2 sessions for the ex-
ogenous treatment) were conducted in Experiment 2. Subjects played for 10 periods in each
session.

All participants received a $5 show-up fee. Their final payoff depended on their per-
formance during the experiments. The period used to determine a subject’s payoff was
randomly chosen from one of the periods (a volunteer subject rolled a ten-sided dice to de-
terminate the period number in front of all subjects immediately after the experiments ended).
This random period payoff rules out the possibility of strategic planning on performance
in one particular period. All the amount of payments in the experiments are expressed in
Lira, an experimental currency. At the end of the experiments, Liras were converted to
dollars at the rate of 2 Lira = 1 Dollar.

In Experiment 1, a total of 80 subjects participated in the experiments with 46 subjects
in the endogenous treatment and 18 subjects in EX-CP. In Experiment 2, a total of 172
subjects participated in the experiments with 130 subjects in the endogenous treatment
and 42 subjects in EX-DP. The endogenous treatment in both experiments lasted for about
1.5 to 2 hours and the exogenous treatment lasted for about 1 hour. The average payment
including the show-up fee to a subject was $25. All experiments were computerized, using
z-Tree (Fischbacher 2007).

Figure 3 shows a screenshot of the z-Tree interface for the endogenous treatment EN-DP
in Experiment 2. In this case, in stage one the principal chose to implement a discretionary
penalty system, offered a wage of 60 and requested an effort of 0.5. In stage two, the
matched agent received the principal’s decisions in stage one and chose an effort of 0.4.
In stage three, the principal needed to decide whether to impose a penalty on the agent
because the agent’s actual effort of 0.4 did not meet the principal’s requested effort of 0.5.
Since the word “penalty might have a experimental demanding effect on agents’ behavior,
in the experiments I used a neutral term “reduce the pay” to mitigate this concern.
Stage 1

The Role of Employer

You need to choose whether to reserve or give up the right to reduce the employee's pay.

You also need to offer your employee a wage from 20 Lira to 120 Lira and request your desired effort level from 0.1 to 1.0.

Your decision on reserving or giving up the right:
- Reserve the right to reduce the employee's pay
- Give up the right to reduce the employee's pay

Your wage offer:

Your desired effort level:
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1.0

Continue

Figure 2.3: Screenshots of z Tree

continued
### Stage 2

<table>
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<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
</tr>
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<tr>
<td>Cost</td>
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<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

---

**The Employee's Effort Level**

Your employer chose to **reserve the right to reduce the employee's pay**.

Your employer was choosing a wage from 20 Lira to 120 Lira. Your employer paid you a wage of 80 Lira and requested a desired effort level of 0.5 from you.

---

**Your effort level:**

- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1.0

---

continued
2.4 Results

2.4.1 Agents’ Behavior

Table 2.1 shows average statistics for EN-CP, EX-CP, EN-DP and EX-DP.

Figure 2.4 shows that although agents’ effort is slightly lower in EN-CP than that in EX-CP and agents’ effort is slightly higher in EN-DP than that in EX-DP, these effects are not statistically significant. This result still holds after controlling for principals’ wage and requested effort in an OLS regression and Tobit regression.

In Table 2.2, I perform a Tobit regression model with all three treatments. To address a repeated measure problem, i.e. observations of the dependent variable are not independent, since each employee plays the game for 10 periods, in this study, all regressions that involve within-subject observations include each subject as a cluster variable to control for repeated measures and estimate robust standard error after adjusting for within cluster correlations.

A Tobit regression model controls for the fact that dependent variable, Effort, is a censored value at 0.1.
Table 2.3 provides evidence for the difference in effort between EN-DP and EX-DP. Table 2.3 Column (1) shows that without controlling for the wage and the requested effort, there is no significant difference in effort between EN-DP and EX-DP. Table 2.3 Column (4) shows that after controlling for the wage and the requested effort, there is still no significant difference in effort between EN-DP and EX-DP. I further test if the difference in effort varies with different levels of the wage and the requested effort. Table 2.3 Column (7) shows that as the wage or the requested effort increases, effort between EN-DP and EX-DP is not likely to be significantly different. The results in Table 2.3 provide partial evidence for the possibility that agents did not perceive principals’ intention when principals chose to retain the option to impose a control as a signal of distrust, in other words, informal controls did not seem to “crowd out” agents’ motivation to reciprocate.

The potential concern with the results in Table 2.3 is that, since the wage and requested effort can significantly affect the dependent variable effort, it is important to ensure that the observations between EN-DP and EX-DP have the same wage and the requested effort, i.e. the observations between the endogenous treatment and the exogenous treatment have good common support on the wage and the requested effort. Since controlling the wage and the requested effort in the Tobit regression models cannot ensure that I have good common support, based on a perfect matching strategy, I plot the observations that match on the same wage and the requested effort between EN-DP and EX-DP in Figure 2.6.

Figure 2.6 shows that there is no clear pattern in effort between EN-DP and EX-DP and they closely follow each other. To formally test the difference in effort across these two conditions, in Figure 2.8 I split up the data into low wage ($20 \leq w < 40$), medium wage ($40 \leq w < 60$) and high wage ($60 \leq w < 120$) and perform a t test in the difference in effort. Figure 2.8 shows that in all the levels of the wage there is no significant difference in effort between EN-DP and EX-DP, although it seems that EN-DP has slightly higher effort than EX-DP. Consistent with the results in Table 2.3, this result provides further evidence to support the possibility of no “crowding out” effect.

In contrast to a discretionary penalty contract, Figure 2.5 and Figure 2.7 show that choosing a committed penalty contract yields a marginally significant lower effort when the contract is chosen by principals than randomly assigned ($p$ value=$0.08$) when medium
wages are offered.
Table 2.1: Descriptive Statistics for EN-CP, EX-CP, EN-DP and EX-DP

<table>
<thead>
<tr>
<th></th>
<th>EN-CP</th>
<th>EX-CP</th>
<th>EN-DP</th>
<th>EX-DP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Principal’s wage</td>
<td>49.98 (16.91)</td>
<td>50.30 (18.23)</td>
<td>47.23 (15.93)</td>
<td>48.64 (15.95)</td>
</tr>
<tr>
<td>Principal’s effort</td>
<td>0.54 (0.16)</td>
<td>0.60 (0.21)</td>
<td>0.64 (0.19)</td>
<td>0.62 (0.21)</td>
</tr>
<tr>
<td>Agent’s effort</td>
<td>0.37 (0.22)</td>
<td>0.39 (0.25)</td>
<td>0.35 (0.26)</td>
<td>0.34 (0.24)</td>
</tr>
<tr>
<td>Principal’s payoffs</td>
<td>24.12 (15.50)</td>
<td>24.33 (15.74)</td>
<td>23.52 (17.53)</td>
<td>22.23 (15.66)</td>
</tr>
<tr>
<td>Agent’s payoffs</td>
<td>43.49 (16.30)</td>
<td>43.11 (17.35)</td>
<td>41.18 (14.76)</td>
<td>42.88 (15.56)</td>
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<td>Number of Observations</td>
<td>182</td>
<td>70</td>
<td>583</td>
<td>210</td>
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</table>

* The numbers in the apprentices are the standard deviation.
* EN-CP standards for the endogenous treatment where a *committed penalty* contract is chosen instead of a no penalty contract by the principal.
* EX-CP standards for the exogenous treatment where a *committed penalty* contract is chosen by the experimenter.
* EN-DP standards for the endogenous treatment where a *discretionary penalty* contract instead of a no penalty contract is chosen by the principal.
* EX-DP standards for the exogenous treatment where a *discretionary penalty* contract is chosen by the experimenter.
Figure 2.4: Average Effort on by Treatment EN-CP, EX-CP, EN-DP and EX-DP
Table 2.2: Effort in Endogenous and Exogenous Committed Penalty

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<th></th>
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<tbody>
<tr>
<td>EN-CP</td>
<td>-0.27</td>
<td>-0.025</td>
<td>-0.024</td>
<td>-0.03</td>
<td>0.144</td>
<td>0.141</td>
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<td></td>
<td>(0.048)</td>
<td>(0.046)</td>
<td>(0.047)</td>
<td>(0.046)</td>
<td>(0.141)</td>
<td>(0.146)</td>
<td>(0.168)</td>
</tr>
<tr>
<td>Wage</td>
<td>0.004***</td>
<td>0.004***</td>
<td>0.007***</td>
<td>0.004***</td>
<td>0.006**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.002)</td>
<td>(0.001)</td>
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<tr>
<td>Requested Effort</td>
<td>0.06</td>
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<td>-0.112</td>
<td>0.079</td>
<td>0.013</td>
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<tr>
<td></td>
<td>(0.14)</td>
<td>(0.14)</td>
<td>(0.13)</td>
<td>(0.193)</td>
<td>(0.208)</td>
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<tr>
<td>Wage*EN-CP</td>
<td>-0.003</td>
<td>-0.003</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
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<td></td>
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<tr>
<td>Requested Effort*EN-CP</td>
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<td>-0.203</td>
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<td>(0.265)</td>
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<td>Constant</td>
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<td>0.13*</td>
<td>0.293***</td>
<td>0.169*</td>
<td>0.053</td>
<td>0.062</td>
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<td></td>
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<td>(0.08)</td>
<td>(0.078)</td>
<td>(0.09)</td>
<td>(0.126)</td>
<td>(0.124)</td>
<td>(0.137)</td>
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<td>No. of Obs.</td>
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<td>252</td>
<td>252</td>
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<td>252</td>
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<tr>
<td>Pseudo R-Squared</td>
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<td>0.051</td>
<td>0.052</td>
<td>0.045</td>
<td>0.002</td>
<td>0.043</td>
<td>0.001</td>
</tr>
</tbody>
</table>

81 left-censored obs. at effort <=0.1, 171 uncensored obs.

* p <0.10, ** p <0.05, *** p <0.01. Numbers in parenthesis are robust standard errors.

The data used in this table only include ones from EN-CP and EX-CP. EN-CP is the treatment dummy. EN-CP equals to 1 if the observations are from EN-CP and equals to 0 if the observations are from EX-CP.
Table 2.3: Effort in Endogenous and Exogenous Discretionary Penalty

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
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<th>(4)</th>
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<th>(6)</th>
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<tr>
<td>EN-DP</td>
<td>0.012</td>
<td>0.022</td>
<td>0.009</td>
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<td>-0.042</td>
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<td>(0.065)</td>
<td>(0.064)</td>
<td>(0.065)</td>
<td>(0.1)</td>
<td>(0.122)</td>
<td>(0.123)</td>
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<td>Wage</td>
<td>0.007***</td>
<td>0.007***</td>
<td>0.006**</td>
<td>0.007***</td>
<td>0.006***</td>
<td>0.006***</td>
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<tr>
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<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.002)</td>
<td>(0.001)</td>
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<tr>
<td>Requested Effort</td>
<td>0.235**</td>
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<td>-0.017</td>
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<td>(0.097)</td>
<td>(0.106)</td>
<td>(0.104)</td>
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<td>(0.225)</td>
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<td>Wage*EN-DP</td>
<td>0.002</td>
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<td>0.001</td>
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<td>0.104</td>
<td>0.054</td>
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<td></td>
<td>(0.002)</td>
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<td>(0.003)</td>
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<td>(0.227)</td>
<td>(0.248)</td>
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<td>(0.067)</td>
<td>(0.066)</td>
<td>(0.071)</td>
<td>(0.087)</td>
<td>(0.109)</td>
<td>(0.106)</td>
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<tr>
<td>Pseudo R-Squared</td>
<td>0.0001</td>
<td>0.055</td>
<td>0.009</td>
<td>0.055</td>
<td>0.056</td>
<td>0.056</td>
<td>0.056</td>
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</table>

329 left-censored obs. at effort <=0.1, 464 uncensored obs.
* p <0.10, ** p <0.05, *** p <0.01. Numbers in parenthesis are robust standard errors.
The data used in this table only include ones from EN-DP and EX-DP. EN-DP is the treatment dummy.
EN-DP equals to 1 if the observations are from EN-DP and equals to 0 if the observations are from EX-DP.
* EN-CP standards for the endogenous treatment where a committed penalty contract is chosen instead of a no penalty contract by the principal.
* EX-CP standards for the exogenous treatment where a committed penalty contract is chosen by the experimenter.

Figure 2.5: Average Effort on Matched Wage and Requested Effort by Treatment EN-CP and EX-CP
* EN-DP standards for the endogenous treatment where a discretionary penalty contract instead of a no penalty contract is chosen by the principal.
* EX-DP standards for the exogenous treatment where a discretionary penalty contract is chosen by the experimenter.

Figure 2.6: Average Effort on Matched Wage and Requested Effort by Treatment EN-DP and EX-DP
* EN-CP standards for the endogenous treatment where a committed penalty contract is chosen instead of a no penalty contract by the principal.
* EX-CP standards for the exogenous treatment where a committed penalty contract is chosen by the experimenter.

Figure 2.7: Average Effort on Matched Wage and Requested Effort by Treatment EN-CP and EX-CP Splitting by Wage
* EN-DP standards for the endogenous treatment where a discretionary penalty contract instead of a no penalty contract is chosen by the principal.

* EX-DP standards for the exogenous treatment where a discretionary penalty contract is chosen by the experimenter.

Figure 2.8: Average Effort on Matched Wage and Requested Effort by Treatment EN-DP and EX-DP Splitting by Wage
2.4.2 Principals’ Payoffs

Figure 2.9 shows that consistent with Figure 2.4, principals’ payoff is slightly lower in EN-CP than that in EX-CP but slightly higher in EN-DP than that in EX-DP. Although this effect is not statistically significant, it may still suggest that there is some benefit for principals to choose a less intrusive penalty contract. This result still holds after controlling for principals’ wage and requested effort in an OLS regression and Tobit regression.
* EN-CP standards for the endogenous treatment where a committed penalty contract instead of a no penalty contract is chosen by the principal.
* EX-CP standards for the exogenous treatment where a committed penalty contract is chosen by the experimenter.
* EN-DP standards for the endogenous treatment where a discretionary penalty contract instead of a no penalty contract is chosen by the principal.
* EX-DP standards for the exogenous treatment where a discretionary penalty contract is chosen by the experimenter.

Figure 2.9: Average Principals’ Payoff on by Treatment EN-CP, EX-CP, EN-DP and EX-DP
2.5 Conclusion

This study finds that the choice of a discretionary penalty contract affects agents’ effort in ways that are roughly reversed as compared to the prior literature surrounding a committed penalty contract. Agents do not exert lower effort when principals choose a discretionary penalty contract than when such a contract is chosen by the experimenter. This appears to occur because agents may view a discretionary penalty contract as a legitimate and expected way to enforce fair behavior. The reason is that a discretionary penalty contract does not “force” agents to maximize principals’ best interest and provide the principals an opportunity to ask for fair effort they perceive and provide agents some room to “communicate” what they perceive as fair effort in response, with a reasonable expectation of avoiding penalties. As a result, agents’ motivation to reciprocate principals’ generous wage offers does not appear to be “crowded out”.

The results in this study may be sensitive to the size of punishments. Gneezy (2003) finds that the “crowding out” effect is sensitive to the size of the imposed punishments. When the punishments are small, people’s intrinsic motivation is likely to be undermined by the imposition of the punishments. However, when the punishments are large, people are more likely to comply with the incentives from the punishments. Future research can explore how the agents’ perception on principals’ choice of a discretionary penalty contract changes with the size of punishments.
Chapter 3

Study 2: Is There Positive Reciprocity When Choosing No Penalties

3.2 Introduction

It is well established in the literature around principal – agent relationships, and particularly in employment relationships that the principal or employer has incentive to impose controls. Controls provide a way for the principal to ensure they are getting results in exchange for the money they pay the agents. However, there are also reasons for principals to be cautious in imposing controls. The wrong control, imposed in the wrong way may anger agents. This in turn can lead to negative outcomes for the principal. Agents may become less productive, or may even take actions that sabotage the principal’s goals.

Many principals are aware of these potential negative consequences and may adopt strategies to avoid them. One strategy to try to deal with this issue is for principals to show trust. In other words, principals may try to improve their relationship with their agents by making agents aware that the principal will not be imposing certain controls. Naturally, these controls would be ones that the principal believes would cause agents to react negatively. The principal may think that 1) because the agent is aware that the control could have been imposed and 2) because they also know the principal chose not to impose the control, that the agents will be more reciprocal and more productive.

The question in this experiment is; does this really happen? When principals show their choice to forgo controls to agents, do the agents respond positively? This experiment seeks to determine whether committing not to control will actually lead to a positive response.
3.3 Related Literature and Hypotheses

3.3.1 Experiment 1: forego a committed penalty

3.3.1.1 Trust

When a principal chooses to forgo a committed penalty they are giving up not merely the ability, but the certainty of punishment of an agent who fails to meet the employer’s expectations. The natural conclusion for an agent to draw from this decision is that the principal has decided not to rely on the penalty to enforce compliance, but to rely on the agent to act in a trustworthy manner and reciprocate the principal’s wage offer. The hope, for the principal, is that the agent will put in more effort because of this act of trust. Even if the principal is correct, however, an principal who does not give up a committed penalty because the principal never had one available in the first place is not giving any signal of trust. As such, an agent would have nothing to reciprocate. Therefore, when principals forgo a committed penalty they should receive positive reciprocity in the form of higher effort from their agents, but the same should not occur when the experimenter exogenously assigns no punishment. Thus:

\[ \text{Effort (EN-NCP)} > \text{Effort (EX-NCP)} \]

3.3.1.2 Meeting expectation

However, there is limited evidence in the literature that suggests positive reciprocity actually occurs. Prior studies finds little evidence that people reward a favorable action when it has been deliberately chosen rather than randomly assigned.

Charness & Rabin (2002) designed a two-treatment experiment. In the first treatment, the first mover makes a choice between (other, own) payoffs of (750, 375) or (400, 400). They find 50% people choose (750, 375). In the second treatment, the first mover makes a choice between (own, other) payoffs of (750, 0) or passing the choice to the second mover who would make a choice between (other, own) payoffs of (750, 375) or (400, 400). If the first mover chooses to pass the choice to the second mover, positive reciprocity implies
that the rate of (750, 375) choices should increase, as the first mover could absorb all the profits leaving the second mover nothing. Surprisingly, they found only 39% people chose (750, 375). Charness (2004) showed that the effort level with low wages is lower when the wage was chosen by a self-interested firm than when it was generated exogenously, indicating the negative reciprocity, but there was no difference across treatments in the effort level with high wages, which suggests that there is no evidence of positive reciprocity. Brandts & Charness (2003) found limited positive reciprocity from the responders when the proposers behave consistently with their promised strategy rather than inconsistently. All these studies share an explanation as to the failure to reward good intentions. If one expects kind or favorable treatment and receives it, there no strong emotional change; however, if one has such an expectation and receives unkind or hurtful treatment, the emotional response and the likelihood of retaliation is much stronger.

Thus, as in this study, agents may already expect a favorable treatment, i.e. their principals will elect not to impose punishment on them. As a result, agents may feel no particular gratitude and fail to show any positive reciprocation when employers act according to the agents’ assumptions.

\[ \text{Effort (EN-NCP)} = \text{Effort (EX-NCP)} \]

### 3.3.1.3 Semantic priming

Furthermore, the mere possibility of a punishment may prime both principals and agents with concerns about self-interested behavior by the other side, tempting them to undertake self-interested behavior to protect themselves, as game theory predicts. The concept of priming comes from the literature on cognitive psychology. The central theory of Collins & Loftus (1975) is the spreading activation process, that is, when the memory representation of a concept is activated, the activation spreads to neighboring stored representations. The greater the semantic similarity of two concepts, the higher the probability of activation of one of them if the other is activated. Their spreading activation model is well-accepted, because it provides explanations for an important phenomenon called semantic priming. Semantic priming is an increase in the speed or accuracy of a decision that occurs as a consequence
of prior exposure to some of the information in the decision context, without any intention or task-related motivation. Typical experiments on the priming effect examine differences in the subjects’ behavior between treatments where subjects are exposed to some previous information and control treatments. Sandry et al. (2011) provided experimental evidence that subjects who previously read stories of immoral behavior impose higher punishments for immoral behaviors by their partners. The priming effect quickly attracted marketing researchers’ attention. North et al. (1999) conducted a field experiment in a grocery store. For two weeks, French and German music were played on alternating days and the amount of French wine and German wine sold was measured. They found that more French wine was sold on days when French music was playing and more German wine was sold on the German music days. A simple auditory prime effect made a significant difference on buying behavior, even if consumers were not consciously aware of.

Regarding the priming effect of social norms, Bicchieri (2006) suggested that social norms might be similarly represented in memory within an organized cognitive structure, so that whenever a specific norm is made salient, we access the representation of that norm and of other norms that are closely related. Harvey & Enzle (1981) showed that observing a helping norm, when followed by an opportunity to help, increases the probability of helping.

In the present study priming is at issue when principals make a decision as to imposing punishment. The mere act of making that choice reminds both principals and agents of what self-interested strategies are available to play. This is because both parties, and particularly the employers who are actually making the choice, must consider the justification for punishment. Why should a system that hands out punishment be imposed? What might agents do that would warrant punishment? Consideration of these questions primes principals and agents for self-interested behavior by rendering the cognitive structures associated with selfishness salient. Principals are primed to consider ways to mitigate the possibility that slacking by agents could harm them and may seek to protect themselves from that harm by offering a low wage. Agents are primed with the idea that slacking is a possibility and could be advantageous, and will be more likely to pursue it. This situation leads to the first prediction:
3.3.2 Experiment 2: forego a discretionary penalty

3.3.2.1 Failure to meet expectations

However, as discussed in Hypothesis 1, when principals retain the option to impose a control, they are doing something rather different than principals in prior studies who choose to impose formal controls. A key distinction is that principals who choose to retain the option still have the ability to forego sanctioning an agent who fails to meet the requested effort. If the choice to retain the option does not plainly signal distrust, then the choice to abandon it does not clearly signal trust. As a result, agents are left to determine why a principal would abandon the option to make a decision about how to respond to agents’ actions without having a chance to evaluate those actions.

The obvious answer is that principals who abandon the option to sanction are not willing to evaluate agents’ actions because they know it is not rational to incur a cost to sanction. However, these principals still have a good reason to keep their options open by retaining the option to sanction because even if they know they are not going to sanction they can still bluff - pretending to be willing to sanction in the hope that agents will be more cooperative if they believe sanctions are possible. Thus, principals who are rational and are not interested in evaluating their agents would still appear to have something to gain and little to lose by bluffing. So why are there principals who still want to restrict their own options up front?

Prior literature in economics provides explanations for why individuals make commitments that have no apparent strategic purpose - referred to as commitment devices (Bryan et al. 2010). There is evidence that people often use commitment devices in practice, such as having federal taxes withheld or contributing to restrictive retirement accounts (Lazear 2000). Schwartz et al. (2015) argues that superiors are likely to use commitment devices to restrict themselves in order to avoid funding high budgetary proposal which allows subordinates to have more budgetary slack. Gul & Pesendorfer (2001) provides an intuitive
example on commitment devices that can be used as an analogy to the abandonment of an informal control in my experiments. An individual might prefer, for health reasons, to have a salad instead of a hamburger for lunch. However, that same individual might realize he will be tempted to order hamburger if he goes to a regular restaurant where both options are available. Thus, in order to avoid the temptation, he would rationally choose to go to a vegetarian restaurant, committing to a salad.

Similarly, rational principals who know that incurring a cost to sanction unfair effort does not bring them a material advantage may decide that they are not willing to sanction. The reason that these principals “lock” themselves into abandoning the option, and do not try to gain an advantage from bluffing may be due to a desire to avoid an emotional temptation to irrationally use sanctions. This temptation could easily arise in the face of unfair effort choices by agents. To avoid incurring a cost via irrational sanctions, they burn all the bridges that might lead to that outcome by choosing to abandon the option to impose a sanction ex ante. Their strong unwillingness to enforce the social norm of sanctioning unfair effort at a cost may indicate to agents that their principals do not think it is worthwhile to enforce the social norm of fairness. Even if agents understand that principals have made an effort request and would like agents to comply, agents have also received a signal that principals do not desire this strongly and will not be disappointed if employees fail to reciprocate. As a result, agents in EN-NDP will not feel guilty if they do not reciprocate. Since principals in EX-NDP are assigned with no option to impose a sanction and never know of the existence of informal sanctions, there is no way for agents to know how willing their principals are to enforce the social norm of fairness if they had an option to choose. Thus, the agents in EN-NDP should believe that their principals are unwilling to enforce the social norm of fairness and the general population of agents in EX-NDP should not have such a belief. As a result, the agents in EN-NDP should feel less obligated to reciprocate than the agents in EX-NDP.

Therefore, it is possible that, in contrast to formal controls, abandoning the option to impose a control will undermine the agents’ motivation to reciprocate. That is, agents’ effort will be lower when the option to impose a control is abandoned by the principal than when the option to impose a control is removed by the experimenter, i.e.
3.4 Experimental Setting and Design

3.4.1 Experiment 1:

Experiment 1 is identical to the Experiment 1 in Study 1.

3.4.2 Experiment 2:

Experiment 2 is identical to the Experiment 2 in Study 1.

3.4.3 Experimental Procedure

The experimental procedure in this study is the same as that in Study 1.

3.5 Results

3.5.1 Agents’ Behavior

Table 3.4 shows the average statistics for EN-NCP, EX-NCP, EN-NDP and EX-NDP.

Figure 3.10 shows that agents’ effort in EX-NCP/EX-NDP is statistically lower than that in EN-NCP (p-value<0.01) and that in EN-NDP (p-value of 0.02). This result still holds after controlling for principals’ wage and requested effort in an OLS regression and Tobit regression.

Figure 3.12 shows that although there is no clear pattern in effort between EN-NDP and EX-NDP when the wage is low, there is a dramatic difference in effort when the wage is relatively high. When the wage is between 50 and 70, EN-NDP seems to generate much lower effort than EX-NDP. To formally test the difference in effort across these two conditions, in Figure 3.14 I split up the data into low wage (20 ≤ w < 50) and medium wage (50 ≤ w ≤ 70). I exclude the data with high wage above 70 because there are only 3 observations in EN-NDP and EX-NDP. I perform a t test in the difference in effort. Figure 3.11 shows that effort in EN-NDP (mean=0.43) is significantly lower than effort in EX-NDP (mean=0.53)
when the wage is relatively high (p value=0.03), although there is no difference in effort when the wage is low. Consistent with the results in Table 3.5, this result provides further evidence to support the possibility that forgoing the option of using an ex post penalty was not perceived positively.

In contrast to this effect, Figure 3.11 and Figure 3.13 provide strong evidence that when principals commit not to use a penalty while a committed penalty is available, agents put much lower effort. This surprising result is more pronounced when medium wages and high wages are offered.
Table 3.4: Descriptive Statistics for EN-NCP, EX-NCP, EN-NDP and EX-NDP

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<tr>
<th></th>
<th>EN-NCP</th>
<th>EX-NCP</th>
<th>EN-NDP</th>
<th>EX-NDP</th>
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<td>56.96 (17.9)</td>
<td>54.27 (17.86)</td>
<td>56.10 (23.55)</td>
<td>54.27 (17.86)</td>
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<td>Principal’s requested effort</td>
<td>0.56 (0.25)</td>
<td>0.69 (0.21)</td>
<td>0.6 (0.26)</td>
<td>0.69 (0.21)</td>
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<td>Agent’s effort</td>
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<td>0.34 (0.27)</td>
<td>0.42 (0.25)</td>
<td>0.1</td>
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<td>Principal’s payoffs</td>
<td>15.01 (13.57)</td>
<td>24.88 (12.49)</td>
<td>19.47 (14.65)</td>
<td>24.88 (12.49)</td>
<td>10</td>
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<td>Agent’s payoffs</td>
<td>54.71 (17.83)</td>
<td>49.19 (15.23)</td>
<td>52.31 (22.39)</td>
<td>49.19 (15.23)</td>
<td>20</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>48</td>
<td>200</td>
<td>67</td>
<td>200</td>
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* The numbers in the apprentices are the standard deviation.
* EN-NCP standards for the endogenous treatment where a no penalty contract is chosen instead of a committed penalty contract by the principal.
* EN-NDP standards for the endogenous treatment where a no penalty contract is chosen instead of a discretionary penalty contract by the principal.
* EX-NCP/EX-NDP standards for the exogenous treatment where a no penalty contract is chosen by the experimenter.
* EX-NCP is identical to EX-NDP.
* EX-NCP standards for the exogenous treatment where a no penalty contract is chosen by the experimenter.
* EX-NDP is identical to EX-NCP.
* EN-NCP standards for the endogenous treatment where a no penalty contract instead of a committed penalty contract is chosen by the principal.
* EN-NDP standards for the endogenous treatment where a no penalty contract instead of a discretionary penalty contract is chosen by the principal.

Figure 3.10: Average Effort on by Treatment EX-NCP/EX-NDP, EN-NCP and EN-NDP
Table 3.5: Effort in Endogenous and Exogenous No Committed Penalty

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<tr>
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<th>(4)</th>
<th>(5)</th>
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<tr>
<td>EN-NCP</td>
<td>-0.299***</td>
<td>-0.3***</td>
<td>-0.233***</td>
<td>-0.282***</td>
<td>0.324**</td>
<td>-0.204</td>
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<td>(0.067)</td>
<td>(0.065)</td>
<td>(0.067)</td>
<td>(0.066)</td>
<td>(0.156)</td>
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<td>Wage</td>
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<td>0.011***</td>
<td>0.012***</td>
<td>0.01***</td>
<td>0.012***</td>
<td>(0.001)</td>
<td>(0.001)</td>
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<tr>
<td>Requested Effort</td>
<td>0.478***</td>
<td>0.141</td>
<td>0.135</td>
<td>0.175*</td>
<td>0.104</td>
<td>(0.115)</td>
<td>(0.116)</td>
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<tr>
<td>Wage*EN-NCP</td>
<td>-0.01***</td>
<td>(0.003)</td>
<td>(0.001)</td>
<td>0.141</td>
<td>0.135</td>
<td>0.175*</td>
<td>0.104</td>
</tr>
<tr>
<td>Requested Effort*EN-NCP</td>
<td>-0.126</td>
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<td>(0.195)</td>
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<td>0.54</td>
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77 left-censored obs. at effort <=0.1, 171 uncensored obs.
*p <0.10, ** p <0.05, *** p <0.01. Numbers in parenthesis are robust standard errors.
The data used in this table only include ones from EN-NCP and EX-NCP. EN-NCP is the treatment dummy.
EN-NCP equals to 1 if the observations are from EN-NCP and equals to 0 if the observations are from EX-NCP.

Table 3.6: Actual Effort by Treatment EN-NDP and EX-NDP

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<tr>
<td>EN-NDP</td>
<td>-0.148*</td>
<td>-0.159**</td>
<td>-0.101</td>
<td>-0.138*</td>
<td>0.286*</td>
<td>-0.166</td>
<td>0.172</td>
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<td></td>
<td>(0.08)</td>
<td>(0.073)</td>
<td>(0.079)</td>
<td>(0.072)</td>
<td>(0.155)</td>
<td>(0.155)</td>
<td>(0.153)</td>
</tr>
<tr>
<td>Wage</td>
<td>0.011***</td>
<td>0.01***</td>
<td>0.012***</td>
<td>0.01***</td>
<td>0.013***</td>
<td>(0.001)</td>
<td>(0.001)</td>
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<tr>
<td>Requested Effort</td>
<td>0.527**</td>
<td>0.223*</td>
<td>0.192**</td>
<td>0.208**</td>
<td>0.103</td>
<td>(0.1)</td>
<td>(0.116)</td>
</tr>
<tr>
<td>Wage*EN-NDP</td>
<td>-0.007***</td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>0.141</td>
<td>0.135</td>
<td>0.175*</td>
<td>0.104</td>
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<td>Requested Effort*EN-NDP</td>
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<td>0.247</td>
<td>(0.235)</td>
<td>(0.21)</td>
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<td>Constant</td>
<td>0.379***</td>
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<td>0.016</td>
<td>-0.294***</td>
<td>-0.418***</td>
<td>-0.286**</td>
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<tr>
<td>Pseudo R-Squared</td>
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<td>0.394</td>
<td>0.128</td>
<td>0.415</td>
<td>0.464</td>
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79 left-censored obs. at effort <=0.1, 188 uncensored obs.
*p <0.10, ** p <0.05, *** p <0.01. Numbers in parenthesis are robust standard errors.
EN-NCP standards for the endogenous treatment where a no penalty contract is chosen instead of a committed penalty contract by the principal.

EX-NCP standards for the exogenous treatment where a no penalty contract is chosen by the experimenter.

Figure 3.11: Average Effort on Matched Wage and Requested Effort by Treatment EN-NCP and EX-NCP
EN-NDP standards for the endogenous treatment where a no penalty contract is chosen instead of a discretionary penalty contract by the principal.

EX-NDP standards for the exogenous treatment where a no penalty contract is chosen by the experimenter.

Figure 3.12: Average Effort on Matched Wage and Requested Effort by Treatment EN-NDP and EX-NDP
* EN-NCP standards for the endogenous treatment where a no penalty contract is chosen instead of a committed penalty contract by the principal.

* EX-NCP standards for the exogenous treatment where a no penalty contract is chosen by the experimenter.

Figure 3.13: Average Effort on Matched Wage and Requested Effort by Treatment EN-NCP and EX-NCP Splitting by Wage
EN-NDP standards for the endogenous treatment where a no penalty contract is chosen instead of a discretionary penalty contract by the principal.
* EX-NDP standards for the exogenous treatment where a no penalty contract is chosen by the experimenter.

Figure 3.14: Average Effort on Matched Wage and Requested Effort by Treatment EN-NDP and EX-NDP Splitting by Wage
3.5.2 Principals’ Payoffs

Figure 3.15 shows that consistent with Figure 3.10, principals’ payoff is significantly higher in EX-NCP/EX-NDP than that in EN-NCP (p-value<0.01) and EN-NDP (p-value<0.01). This result still holds after controlling for principals’ wage and requested effort in an OLS regression and Tobit regression. This suggests that principals’ best strategy is to offer a no penalty contract without mentioning an idea of penalties.
* EX-NCP standards for the exogenous treatment where a *no penalty* contract is chosen by the experimenter.
* EX-NDP is identical to EX-NCP.
* EN-NCP standards for the endogenous treatment where a *no penalty* contract instead of a committed penalty contract is chosen by the principal.
* EN-NDP standards for the endogenous treatment where a *no penalty* contract instead of a discretionary penalty contract is chosen by the principal.

Figure 3.15: Average Principals’ Payoff on by Treatment EX-NCP/EX-NDP, EN-NCP and EN-NDP
3.5.3 Principals’ Payoffs for All Exogenous Treatments

It is helpful for principals to know which wage and requested effort can generate the highest payoff for all the exogenous treatments EX-CP, EX-DP and EX-NCP/EX-NDP (from Study 1 and Study 2). The table below shows the average wage and requested effort under the 1st, 2nd, 3rd and 4th quantile of principals’ payoffs for the exogenous treatments. The results show that EX-CP seems to generate the highest payoffs for principals in the 4th quantile of principals’ payoffs. In the 4th quantile of principals’ payoffs for all the three treatments, a wage of 50-60 and a requested effort of 0.7-0.8 seem to generate the highest payoff for principals. We know that a wage of 50 to 60 is a middle wage choice from 20 to 120 and a requested effort of 0.7-0.8 is a relatively high effort choice from 0.1 to 1. Therefore, the results suggest that a good strategy for principals can be offering a medium wage and asking for high effort.

<table>
<thead>
<tr>
<th></th>
<th>EX-CP</th>
<th>EX-DP</th>
<th>EX-NCP/EX-NDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Quantile</td>
<td>(\pi_p)</td>
<td>(\tilde{w})</td>
<td>(\tilde{e})</td>
</tr>
<tr>
<td>Principals’ Payoffs</td>
<td>5</td>
<td>47</td>
<td>0.7</td>
</tr>
<tr>
<td>2nd Quantile</td>
<td>20</td>
<td>55</td>
<td>0.5</td>
</tr>
<tr>
<td>Principals’ Payoffs</td>
<td>33</td>
<td>45</td>
<td>0.5</td>
</tr>
<tr>
<td>3rd Quantile</td>
<td>46</td>
<td>58</td>
<td>0.8</td>
</tr>
<tr>
<td>Principals’ Payoffs</td>
<td>46</td>
<td>58</td>
<td>0.8</td>
</tr>
</tbody>
</table>

3.6 Conclusion

This study finds that agents exert significantly lower effort when principals choose to give up a control or abandon the option to impose a control. Principals’ abandonment of the option may be perceived as unwillingness to incur a cost in order to enforce fair effort. Principals’ decision to strongly prioritize self-interested behavior may signal to agents that fairness is not worthwhile from the principals’ perspective – and agents react accordingly. Surprisingly, principals appear to be “punished” by seeming to show trust.

Principals should understand that abandonment of a legitimate “stick” can have significant unanticipated downsides and does not appear to reliably signal trust.
Chapter 4
Study 3: Does Prior Expectation Affect Perceptions of Intentions?

3.2 Introduction

There is a mystery in the existing literature: “hurting hurts more than help helps” (Offerman 2002). Put another way, contrary to assumptions about human behavior, people respond asymmetrically to good and bad intentions.

Prior literature (Charness & Rabin 2002; Charness 2004; Offerman 2002; Brandts & Charness 2003) finds that people punish unfavorable and ill-intentioned behavior strongly even when punishment comes at a cost to the punishing party. However, they find limited evidence that people will reward favorable and well-intentioned behavior at a cost.

Limited studies (Cox 2004 and Cox et al. 2008) find significant positive reciprocity. Cox & Deck (2005) and Cox & Deck (2006) find a fixed result on positive reciprocity depending on whether the game was double blind or single blind.

Although findings on intention-based positive and negative reciprocity are mixed, the general result is that the effect of bad intentions on negative responses is much stronger than the effect of good intentions on positive responses, in other words, negative reciprocity is stronger than positive reciprocity.

These results are relevant to managerial accounting research. Intentions issues often occur when principals make contracting choices. Some contracts can be perceived as more favorably intended than others. However, if principals intend to offer a favorable contract to agents by showing trust in the hope that agents will be trustworthy and reciprocate, and agents do not reward such good intentions, the consequences can be costly for principals
because when they show trust they make themselves vulnerable to agents. Thus, making a contract choice to show good intentions is not effective for principals.

For this reason, understanding what may cause this limited positive reciprocity is important to accounting researchers. It is in principals’ interests to know how to get better results from their agents and understanding why behavior that principals would expect to get a positive result fails, is necessary to avoid wasting principals’ time and resources.

The cause of the asymmetric effect of intentions is a problem that is not fully resolved in the literature. Offerman (2002) proposes a theory of self-serving attribution bias as one possible explanation. The self-serving bias allows people to take credit for the helpful actions of someone else because helpful actions are expected and when they are delivered, there is no reason for emotional surprise for good intentions. On the other hand, the self-serving bias allows people to blame hurtful actions on others because hurtful actions are not expected and when they are delivered, it causes emotional resentment in response to bad intentions.

Consistent with the theory of self-serving attribution bias, Charness & Kuhn (2011) argues that this asymmetric effect of intentions might be caused by people’s expectation on receiving favorably intended actions. When people who hold this expectation receive kind actions that are already expected, there is no emotional reaction. But when people who hold this same expectation receive unkind actions, there is likely to be a strongly negative emotional reaction to bad intentions.

In addition to these clues above. Cooper & Kagel (2015) states that “Good or bad behavior can often be defined only in relationship to what situation the actors believed they faced. For instance, consider defection in a prisoner’s dilemma. This is an unkind act if cooperation is expected by the other player, but most people would agree that defection is perfectly reasonable if the other player is expected to defect. Beliefs must play a critical role in any theory that attempts to capture this aspect of reciprocity.”

Taken together, it seems likely that these asymmetric reactions to good and bad intentions can be explained by people’s prior expectations. Specifically, the way that a person interprets the kindness or unkindness of an act depends on that person’s prior expectations. It may matter less what the actual treatment was than whether it is consistent with what
the person believes the treatment should be.

The purpose of this paper is to experimentally test whether agents’ prior expectations affect agents’ perception of the intentions behind principals’ contracting choice.

To address this research question, I conduct two experiments with a 2x2 experimental design. A simplified one-shot gift-exchange game is used in both experiments. In the first stage, principals offer a wage from two choices: high wage or low wage. In the second stage, the research question calls for a manipulation of subjects’ expectation. Since subjects can have heterogeneous expectations before they walk into the lab, it is challenging for the experimenter to learn their expectations. Expectations are often established by social norms. In other words, I would build my expectations based on what other people are doing. With this idea of creating a norm in the lab to establish agents’ expectation, in Experiment 1, I deliberately run a few sessions with very few subjects for less 6 periods each session. The hope is to obtain skewed wage offers for Experiment 2. Experiment 1 provides a history of wage offers which will be shown to agents in Experiment 2 with a hope of establishing their expectations on wage offers. In Experiment 1, 95% principals offered a high wage of 60 from one period in one session, while 83% principals offered a low wage of 20 from one period in one session. Subsequently, in Experiment 2 I conduct two treatments. I show the history of high wage to agents in Expect High Wage treatment and the history of low wage to agents in Expect Low Wage Treatment before agents learn principals’ actual wage offers. In order to check if agents’ expectations on wage offers are successfully manipulated by the history of wage offers from a previous session, agents in both treatments will need to make a guess about their principals’ actual wage offers after seeing the history. Their guesses are incentivized and they will receive an extra bonus if their guesses on wage offers are the same as principals’ actual wage offers. Thus, agents have an incentive to truthfully report their expectations. Agents can face four conditions: receive high wage (“RHW” condition), receive low wage (“RLW” condition), in Expect High Wage treatment (“EHW” condition) and Expect Low Wage treatment (“ELW” condition).

The main purpose is to see whether, when a high wage or a low wage is offered, a different prior expectation regarding wage affects agents’ reciprocal effort choice. In other words, whether agents’ effort under RHW and EHW will be different from agents’ effort.
under RHW and ELW. Similarly, whether agents’ effort under RLW and EHW will be different from agents’ effort under RLW and ELW.

The main analysis is to see when a high wage or a low wage is offered, whether a different prior expectation on the wage affects agents’ reciprocal effort choice. In other words, whether agents’ effort under RHW and EHW will be different from agents’ effort under RHW and ELW. Similarly, whether agents’ effort under RLW and EHW will be different from agents’ effort under RLW and ELW.

When a wage of 60 is offered instead of 20, it likely means that principals are showing trust to agents in the hope of receiving high effort. Whether this good intention will be interpreted positively by agents may depend on agents’ expectation regarding which wage will be offered. If agents do not expect principals to be trusting and expect a wage of 20, when 60 is offered, it would become a positive surprise to agents beyond their expectations. However, if agents already expect principals to trust them and expect a wage of 60, when 60 is offered, it may not cause any emotional reaction. Therefore, when a high wage of 60 is offered, the positive effect of good intention from principals on agents’ reciprocal effort choice should be stronger when they expect a wage of 20 than when they expect a wage of 60.

Similarly, when a wage of 20 is offered instead of 60, it is likely a signal that principals do not trust their agents to provide high effort. The degree to which agents react negatively to this signal may depend on agents expectation regarding which wage will be offered. If agents expect to be offered a wage of 20 it may not cause any emotional reaction. On the other hand, if agents were expecting a wage of 60 and 20 is offered, this will cause a negative surprise for agents and their reaction should be strongly negative. Therefore when a low wage of 20 is offered agents effort should be lower due to a stronger negative emotional reaction when agents expect a wage of 60 than when they expect a wage of 20.

In summary, this study predicts that when agents receive treatment that is better than the treatment they expect they should respond positively through effort that is higher than what they would offer had they received the same treatment but also expected to receive it. Similarly, when agents receive treatment that is worse than what they expect their effort should be lower as compared to when they receive the same poor treatment but expect it.
This study finds that, consistent with these predictions, agents’ effort is higher when they receive unexpectedly positive treatment and lower when they receive unexpectedly negative treatment. However, none of these results are consistently significant. This may be in part an artifact of the experimental procedure which puts some constraints on agents’ ability to respond to unexpectedly negative treatment. However, since there is less limitation on agent’s ability to respond to unexpectedly positive treatment, it seems likely that the true effect is, at most, marginally significant. As the data makes clear, employers can change their employees’ perceptions but it seems to be a tricky process that may have only limited benefits.

The remainder of the paper proceeds as follows. The second section presents related theories and develops the hypotheses. The third section describes the experimental setting, design and procedure. The fourth section shows results and provides interpretations. The fifth section concludes and suggests directions for future research.

3.3 Related Literature and Hypotheses

3.3.1 Related Literature

Four experimental studies examine the effect of intentions on positive and negative reciprocity.

Charness & Rabin (2002) designs a three-treatment experiment. In the first treatment, the first mover makes a choice between (other, own) payoffs of (750, 375) or (400, 400). They find 50% people chose (750, 375) which establishes a benchmark that half of the players are willing to sacrifice 5 to increase the other players’ payoff by 350. In the second treatment, the first mover makes a choice between (own, other) payoffs of (750, 0) or passing the choice to the second mover who would make a choice between (other, own) payoffs of (750, 375) or (400, 400). If the first mover chooses to pass the choice to the second mover, positive reciprocity implies that the rate of (750, 375) choices should increase, as the first mover could absorb all the profits leaving the second mover nothing by optioning out. Surprisingly, they find only 39% people chose (750, 375). In the third treatment, the first mover makes a choice between payoffs of (550, 550) or passing the choice to the second mover who would
make a choice between payoffs of (750, 375) or (400, 400). Negative reciprocity would imply that if the first mover’s passing the choice clearly signals unfavorable intention to the second mover by forcing the second mover to receive a lower payoff, fewer people would choose (750, 375). They find that the number of people who chose (750, 375) decreases significantly to 11%. Their results suggest that people are more likely to respond negatively to ill-intentioned behavior than to respond positively to well-intentioned behavior.

In a gift-exchange game, Charness (2004) shows that the effort level with low wages is lower when the wage was chosen by a self-interested firm than when it was generated exogenously, indicating negative reciprocity, but there was no difference across treatments in the effort level with high wages, which suggests that there is no evidence of positive reciprocity.

Offerman (2002) studies players’ responses to a helpful or hurtful choice which is made by an interested party or generated at random. The responders can sacrifice one unit to either increase or decrease the first mover’s payoff by four. This study finds that following the hurtful choice, responders paid to hurt first movers significantly more often than when the choice was randomly assigned. However, following the helpful choice, the effect of perceived good intentions in encouraging responders to reward first movers is not significant.

Brandts & Charness (2003) conducts a cheap-talk game with a possibility for punishment and reward. One player sends a message about his/her intended strategy (favorable or unfavorable) to another player. After playing the game, the other player can punish or reward the first player at a cost. They find that the other player was twice as likely to punish an unfavorable play by the first player if that first player did not follow the intended strategy than if that first player did. However, they find limited evidence for rewarding favorable play chosen by the first player.

All these studies share a common explanation as to the failure to reward good intentions. If one expects kind or favorable treatment and receives it, there no strong emotional change; however, if one has such an expectation and receives unkind or hurtful treatment, the emotional response and the likelihood of retaliation is much stronger.
3.3.2 Hypotheses

This study explores the effect of pre-existing expectations on agents’ perceptions of principals’ intentions when offering a high or low wage. As discussed above, when agents expect a high wage and receive a high wage, they should not have any strong emotional reaction to this expected outcome. However, when agents expect a low wage and receive a high wage they should have a strong positive emotional reaction due to the surprise of receiving better than expected treatment. As a result, agents should reciprocate with more effort when expectations are low and wages are high than when expectations and wages are both high. Thus, I predict that:

Effort (Receive high wage, Expect high wage) < Effort (Receive high wage, Expect low wage)

Similarly, when agents expect a high wage but receive a low wage, their effort should be much lower than when they expect a low wage and receive a low wage, because receiving a low wage when expectations are high should be a surprise and lead to a strong negative emotional reaction. By contrast when expectations are low and wages are low there will not be strong emotional reaction to this expected outcome. Therefore, I predict that:

Effort (Receive low wage, Expect high wage) < Effort (Receive low wage, Expect low wage)

3.4 Experimental Setting and Design

Experiment 1 is to find a screwed distributed wage - high wage and low wage for the high and low wage expectation manipulation in Experiment 2. Specifically, I deliberately conducted four sessions with very few subjects. The hope is that, due to small subjects pool, it is likely to obtain one period in a session where high wage is offered with high probability and one period in a session where low wage is offered with high probability. In Experiment 2, before subjects play the game, I showed the history (high wage or low wage) from Experiment 1 to
agents before agents make their decisions. The hope is to set up agents’ prior expectation on principals’ wage offer. In addition, in order to check if the expectation manipulate is successful, before agents observe principals’ wage offer, agents were asked to guess how much wage to be offered. If agents’ guess is consistent with principals’ actual wage, agents will get a bonus.

3.4.1 Experiment 1: Without History

Experiment 1 conducts a gift-exchange game that has been extensively used in the prior literature (Fehr et al. 1993). The only modification to the traditional gift-exchange game is that I restrict principals’ wage choice to be from two choices - low wage and high wage, instead of many choices. The reason for this restriction is that this study aims to investigate whether prior expectation on wage offer affects agents’ perception on principals’ intentions. Restricting wage offer to be either 20 or 60 can allow agents and researchers to have a clear interpretation on wage offers, that is, if 20 is offered, that sends a clear signal to agents that their principals do not trust them. If 60 is offered, that sends a clear signal to agents that their principals trust them. If the wage has too many choices, then it is challenging to interpret principals’ intentions.

The modified gift-exchange game consists of two stages. In the first stage, principals choose a fixed wage to offer to their agents. In the second stage, after observing principals’ wage offers, agents choose effort.

The principal’s payoff function is given by:

\[(120 - w) \times e\]

where \(w\) represents the principal’s wage offer and \(w \in \{20, 60\}\). \(e\) represents the agent’s actual effort and \(e \in \{0.1, \ldots, 1\}\). The higher the effort number is, the higher the cost to the agent. The lower the effort is, the lower the cost to the agent.

The agent’s payoff function is given by:

\[w - c(e)\]
where \( c(e) \) represents the cost of the agent’s actual effort, an increasing function in \( e \).

The agent’s cost of effort is shown below.

<table>
<thead>
<tr>
<th>( e )</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
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<th>0.6</th>
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</tr>
</thead>
<tbody>
<tr>
<td>( c(e) )</td>
<td>0</td>
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<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

3.4.2 Experiment 2: With History

Experiment 2 uses the same gift-exchange game as in Experiment 1. In addition, before agents choose the effort, they are provided a history of wage offers from one period in a previous session in Experiment 1 that is selected by the experimenter. Depending on the treatment, either a history that 95% principals offered the high wage is provided or a history that 83% principals offered the low wage is provided. The history for high and low wage treatment is shown in Appendix F and G. Experiment 2 aims to investigate whether agents’ prior expectations on wage offers affect their perception of principals’ intentions on choosing wages. The purpose of showing agents a history of wage offers from a previous session is to establish agents’ expectation on wage offers in the current session. Although it is challenging to know how agents form their prior expectations on wage offers before they walk into the lab, it is reasonable for me to believe that if I can establish a norm on wage offers in the lab, agents would use that norm to form their expectations. In order to check if the manipulation on agents’ expectations is successful, I incentivize agents to make a guess on how much wage they expect to receive when they are shown the history of wage offers, but before principals make wage offers. If their guess matches with principals’ actual wage offer, they will receive an extra bonus of 15 Guilders.

3.4.3 Treatments in Experiment 2

Study 3 uses a 2x2 experimental design. I conduct two treatments: Expect High Wage (“EHW” condition) and Expect Low Wage (“ELW” condition). In EHW, agents are provided a history of wage offers from a previous session in which 95% principals offered a high wage of 60. In ELW, agents are provided a history of wage offers from a previous session in which 83% principals offered a low wage of 20. When principals endogenously choose to offer a high wage of 60, it forms a Receive High Wage condition (“RHW” condition).
When principals endogenously choose to offer a low wage of 20, it forms a Receive Low Wage condition ("RLW" condition). A comparison in agents’ effort between an agent who receives a high wage of 60 under EHW and an agent who receives the same high wage of 60 under ELW will allow me to understand whether agents’ prior expectations on wage offer affects their perceptions of principals’ high wage offer instead of low wage offer. Similarly, a comparison in agents’ effort between an agent who receives a low wage of 20 under EHW and an agent who receives the same low wage of 20 under ELW will allow me to understand whether agents’ prior expectation on wage offers affects their perceptions of principals’ low wage offer instead of high wage offer.

3.4.3.1 Behavioral Prediction in Experiment 2 Based on Standard Economic Theory

Based on standard economic theory that only assume wealth maximization, the behavioral prediction in Experiment 2 should be identical to a traditional gift-exchange game. By the backward induction, regardless of how much the wage is offered, it is rational for the agent to put in the minimum effort of 0.1 because it is the least costly choice. Anticipating the agent’s effort choice, the principal should always offer the minimum wage of 20. In addition, standard economic theory assumes that agents’ prior expectation on wage offers should not play a role in their effort.

Therefore, the optimal strategy under both EHW and ELW is

\[ \{w^* = 20, e = 0.1\} \]

3.4.4 Experimental Procedure

Participants in Experiment 1 and Experiment 2 were recruited from undergraduate students from the Fisher College of Business at The Ohio State University. Upon arrival at the laboratory, participants gave their informed consent to participate. They received an ID number from the experimenter when they signed in, and sat in front of the computer which had the same ID number. This number eliminates any possibility that the experimenter may acquire personal information about the participants and facilitates final payment to
the participants. Before the experiment began, the experimenter read the instructions aloud to all participants and any questions regarding the instructions were answered by the experimenter privately. Then a quiz (9 questions in Experiment 1 and 10 questions Experiment 2) was given to the participants to fill out to ensure that the participants fully understood the experiments.

At the beginning of the experiments, half of the subjects were randomly assigned as “employers” and the other half of the subjects were randomly assigned as “employees”. The initial role assigned to each player was retained throughout the experiments. In order to eliminate any reputation effect, each “employer” was randomly re-matched with an “employee” for each period. As a result, subjects in this study played a one-shot game, rather than a repeated game in all treatments. 4 sessions were conducted for Experiment 1, in which 8 subjects playing for 5 periods in session 1, 12 subjects playing for 6 periods in session 2, 10 subjects playing for 5 periods in session 3 and 8 subjects playing for 5 periods in session 4. 5 sessions were conducted for Experiment 2, in which 20 subjects each session playing for 10 periods in Expect High Wage Treatment (2 sessions) and 20 subjects each session playing for 10 periods in Expect Low Wage Treatment (3 sessions).

All participants received a $5 show-up fee. Their final payoff depended on their performance during the experiments. The period used to determine a subject’s payoff was randomly chosen from one of the periods (a volunteer subject rolled a ten-sided dice to determine the period number in front of all subjects immediately after the experiments ended). This random period payoff rules out the possibility of strategic planning on performance in one particular period.

A total of 38 subjects participated in Experiment 1 and 100 subjects participated in Experiment 2 (40 subjects in Expect High Wage Treatment and 60 subjects in Expect Low Wage Treatment). Each treatment in Experiment 2 lasted for about an hour. The average payment including the show-up fee to a subject was $15. All experiments were computerized, using z-Tree (Fischbacher 2007).
3.5 Results

Table 3.7 shows the results of agent’s predictions with respect to the wage offer they will receive in the upcoming period. It is subdivided between agents who were led to expect a high wage and agents who were led to expect a low wage. Overall, the results indicate that the manipulation of subjects’ expectations were successful. In the EHW treatment, the vast majority of subjects reported an expected wage of 60 with only a few reporting they expected a wage of 20. Importantly the number who expected 60 was at its height in the first period and the number that expected 20 was at its lowest point in the same period. The first period is important because it should show agent’s expectations before they are influenced by experience playing the game. In the EHW treatment, over subsequent periods there was some decline in the number of agents who expected a wage of 60 but it was relatively small. In the ELW treatment the first period again shows that the manipulation of subjects expectations was successful – with the vast majority of agents reporting that they expected to receive a wage of 20, though this number declined in later periods. Unlike the EHW however, this decline occurred rapidly beginning after Period 2. This is likely due to the fact that most subjects in the game tended to offer a high wage, thus the in-game experience for EHW subjects was largely consistent with their pre-established expectations while the experience for ELW subjects was inconsistent.

Table 3.8 compares the effort across the two treatments. The first comparison is between overall effort across all periods and the subsequent comparisons are for effort in Period 1 and effort in Periods 1 and 2. As noted above, the early periods in this game are important because as the game progresses subjects may begin to base their expectations less on the data shown them by the experimenter than on their actual in-game experience. As such the first few periods of the game are the place where the effects of changing agents’ expectations should be most substantial. The table shows that while the direction was as expected – i.e. effort was lower when expectations were high, the results were not significant. However, the results overall closely approach significance as do the results for periods 1 and 2 combined. The results for period 1 alone do not approach significance but this may be due to the low power of that single period. As noted above, Table 3.7 does not show a substantial number
of agents changed their expectations until after Period 2.

Table 3.9 further breaks down the results not only based on expected wage but also based upon the wage actually received. As in the prior table, it begins by comparing effort across all periods and then compares first, Period 1 alone, then Periods 1 and 2, Periods 1, 2 and 3 and finally Periods 1, 2, 3 and 4 combined. As above, the direction of the results is as predicted – effort is higher when expectations are low than when they are high, but also as before the results are not significant though they approach significance in some instances.
Table 3.7: Frequency of Expected Wage

<table>
<thead>
<tr>
<th></th>
<th>Expect High Wage Treatment</th>
<th>Expect Low Wage Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expected Wage = 60</td>
<td>Expected Wage = 20</td>
</tr>
<tr>
<td>All periods</td>
<td>153</td>
<td>47</td>
</tr>
<tr>
<td>Period 1</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>Period 2</td>
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</tr>
<tr>
<td>Period 9</td>
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</tr>
<tr>
<td>Period 10</td>
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### Table 3.8: Difference in Effort across Treatments

<table>
<thead>
<tr>
<th>Period</th>
<th>Conditions</th>
<th>t-statistics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All periods</td>
<td>Effort</td>
<td>Expected Wage=60</td>
<td>Effort</td>
</tr>
<tr>
<td></td>
<td>0.33 (N=200)</td>
<td>0.38 (N=300)</td>
<td>-1.86</td>
</tr>
<tr>
<td>Period 1</td>
<td>Effort</td>
<td>Expected Wage=60</td>
<td>Effort</td>
</tr>
<tr>
<td></td>
<td>0.35 (N=20)</td>
<td>0.39 (N=30)</td>
<td>-0.46</td>
</tr>
<tr>
<td>Period 1 and 2</td>
<td>Effort</td>
<td>Expected Wage=60</td>
<td>Effort</td>
</tr>
<tr>
<td></td>
<td>0.33 (N=40)</td>
<td>0.46 (N=60)</td>
<td>-1.9</td>
</tr>
</tbody>
</table>

* Significant at p<0.01: ***; significant at p<0.05: **; significant at p<0.1: *

* The numbers in the apprentices are the number of observations under each condition.
Table 3.9: Difference in Effort Conditional on Received Wage

<table>
<thead>
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<th>Period</th>
<th>Conditions</th>
<th>t-statistics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All periods</td>
<td>Effort</td>
<td>Received Wage=20, Expected Wage=60</td>
<td>0.19 (N=88)</td>
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<tr>
<td></td>
<td>Effort</td>
<td>Received Wage=60, Expected Wage=60</td>
<td>0.43 (N=112)</td>
</tr>
<tr>
<td>Period 1</td>
<td>Effort</td>
<td>Received Wage=20, Expected Wage=60</td>
<td>0.14 (N=8)</td>
</tr>
<tr>
<td></td>
<td>Effort</td>
<td>Received Wage=60, Expected Wage=60</td>
<td>0.49 (N=12)</td>
</tr>
<tr>
<td>Period 1 and 2</td>
<td>Effort</td>
<td>Received Wage=20, Expected Wage=60</td>
<td>0.14 (N=17)</td>
</tr>
<tr>
<td></td>
<td>Effort</td>
<td>Received Wage=60, Expected Wage=60</td>
<td>0.47 (N=23)</td>
</tr>
<tr>
<td>Period 1, 2 and 3</td>
<td>Effort</td>
<td>Received Wage=20, Expected Wage=60</td>
<td>0.17 (N=28)</td>
</tr>
<tr>
<td></td>
<td>Effort</td>
<td>Received Wage=60, Expected Wage=60</td>
<td>0.44 (N=32)</td>
</tr>
<tr>
<td>Period 1, 2, 3 and 4</td>
<td>Effort</td>
<td>Received Wage=20, Expected Wage=60</td>
<td>0.18 (N=36)</td>
</tr>
<tr>
<td></td>
<td>Effort</td>
<td>Received Wage=60, Expected Wage=60</td>
<td>0.43 (N=44)</td>
</tr>
</tbody>
</table>

* Significant at p<0.01; ***, significant at p<0.05; **, significant at p<0.1: *

* The numbers in the apprentices are the number of observations under each condition.
3.6 Conclusion

While it is clear from the results that it is possible to change employee's expectations, either through experience or through ex ante exposure to information, the results also suggest that working with employee expectations is a delicate process and might require a large investment of employer's in time and energy for a relatively small return. At the least, employers should be cautious and develop a very strong understanding of their own goals and of their employee's expectations before trying to change those expectations.

This study does not find a significant increase in effort when employee's expectations were low as opposed to when they were high. However, there was a difference. Effort was consistently higher when employees began with low expectations, and in some cases the difference was large enough to be marginally significant. It may be that with a different experimental design the significance of the results would increase. For one thing, the current design may make it hard to distinguish the behavior of agents who expect a high wage but receive a low wage from agents who expect a low wage and receive a low wage – both are likely to put in the minimum effort.

However, even a modification on the current experimental design may not make the significance of the outcome more than marginal. The impact of expectations may be limited because some people may respond positively even when their expectations are met.
Chapter 5
Study 4: Does Salience of Alternatives Affect Perceptions of Intentions?

4.1 Introduction

Principals often make contract choices. When they make a contracting choice, there are direct consequences with respect to the terms of the contracts, but the choice itself may also act as a signal of the intentions behind it. Importantly, how such signals are perceived by agents may affect agents’ performance positively or negatively.

Prior literature (Kuang & Moser 2009; Christ 2013; Christ et al. 2012) shows that the way that agents perceive principals’ intentions matters in terms of the effectiveness of the contract. However, principals’ intentions may not be perceived accurately by agents. Or, to put it another way, agents may perceive intentions that principals do not have, or do not intend to convey. Inaccurate perceptions can lead to unintended consequences – as when agents mistake a well-intended action by the principal as a signal of ill intent. The natural question then, is whether there are ways to mitigate (or exacerbate) the problem of mismatched perceptions of intentions sent by principals to agents.

Prior studies provide some clues to the solution to this problem. Brandts & Charness (2011) conducts a literature review on the behavioral difference between a direct response method and a strategy method. In a direct response method, also called “hot” method, the second mover responds to the first mover’s observed action, while in a strategy method, also called as “cold” method, the second mover decides on a contingent action for every possible first mover’s move without first observing the first mover’s action. Put in terms more practical for purposes of this study, in the direct response method, agents simply
respond to whatever offer is put before them. By the time an offer is put before the agents, it is the one and only option. By contrast, in the strategy method, agents are called upon to make plans contingent on a contracting choice their principal has not yet made. They do not simply respond to one offer, or try to guess which contract the principal will choose, but instead select, in advance, a response to every offer their principal might make. The strategy method increases the salience to the agent of the principal’s options. In the direct method agents may know what the principal’s options are, but that may appear to have very little relevance to the agent since they are called upon only to respond to the whatever choice the principal does make – not those that might have been made. By contrast, in the strategy method, the principal’s options matter a great deal more – that is, they are far more salient – because the agent must consider and develop a response to all of the options.

When a principal makes a choice between contracts, one way that a difference in perceived intent between principals and agents may arise is due to differences in awareness of the choice itself. For example, if agents are not fully aware that the principal has made a choice at all they may not perceive any intention behind the contract offered to them – no matter how generous the principal’s actual intent. Similarly, if agents do not know or have not fully considered the alternatives the principal has chosen between it may meaningfully change their perception of the contract being offered. Thus, context and emphasis may also play a role. An agent who is asked to plan out responses to dealing with multiple potential contracts that their principal might choose may react very differently to that principal’s actual choices than an agent who is made an offer and is expected to react to that offer alone. It is possible that at least some of the mismatch between agents’ perception of principals’ intentions and principals’ actual intentions arises because the options that the principal has are not made sufficiently salient to agents.

This is not to say that an agents’ reaction to greater context is obviously positive or negative. Under some circumstances an agent might have a stronger emotional reaction to a choice if it is presented directly where more context might reveal that it is actually superior to other options the principal might have chosen. For example, workers might be angry if their managers cut their wages, but might be less upset if managers explained that the alternative was to lay off a large number of their fellow employees. In the alternative,
context in a more complicated situation might lead to an emotional response where one might otherwise be lacking. For example, an increase in the local property tax rate of 0.2% to increase funding for schools might not elicit outrage, but knowing that the money could come instead from revoking the multi-million dollar property tax exemption for a closely-held business owned by the mayor might get a very different reaction from residents.

This complexity increases the value of this study which seeks to understand the effects of increasing the salience of principal’s contract choice by comparing agents reactions when they are asked to respond directly to a choice made by their principal compared to when they respond to each possible choice their principal might make in the future. This study investigates whether making alternative contracting choice salient affect (helps or hurts) principals to convey the intent behind their contract choice to ensure agents receive a desirable message.

To address this research question, using a modified gift-exchange game, I conduct two treatments: direct response method treatment and strategy method treatment. In both treatments, principals choose between a discretionary penalty contract and a no penalty contract. In a discretionary penalty contract, in the first stage, principals offer a wage and request an effort level. In the second stage, after learning of principals’ decisions, agents choose their effort. In the third stage, after observing agents’ effort, principals can decide whether to punish agents if agents’ effort is less than principals’ requested effort. The punishment is costly to both principals and agents. In a no penalty contract, subjects play only the first stage and the second stage.

The only difference between these two treatments is how agents’ decisions on effort are elicited. In the direct response method treatment, after learning principals’ wage, requested effort and which contract was chosen, agents choose effort. In the strategy method treatment, after learning principals’ wage and requested effort, agents make effort decisions contingent on each of the two contracts if one was chosen hypothetically. The game continues based on principals’ actual contract choice. Their payoffs are also based on principals’ actual contract choice. Since agents do not know ex ante which contract principals would choose, agents have an incentive to truthfully elicit their effort decisions.

Prior literature has not yet reached a consensus on when a strategy method can cause
a behavioral deference than a direct response method. I provide detailed discussion on possible behavioral predictions in my experiments in the following section. I find that there is no difference in agents’ effort between these two methods when principals choose a no discretionary penalty contract. However, a strategy method yields significantly higher effort than a direct response method when principals choose a discretionary penalty contract. This might be explained by the fact that a strategy method, a “cold” elicitation procedure, “cools down” any emotional negative effect that is likely caused by the choice of a discretionary penalty contract.

The remainder of the paper proceeds as follows. The second section presents related theories and develops the hypotheses. The third section describes the experimental setting, design and procedure. The fourth section shows results and provides interpretations. The fifth section concludes and suggests directions for future research.

4.2 Related Literature and Hypotheses

4.2.1 Related Literature

The strategy method (Selten 1967) is a very useful tool in experimental research. Since subjects plan responses for a number of different scenarios it greatly eases data collection - in every round of the game the subjects following this method produce multiple data points instead of just one. All of those data points are produced under the same conditions because there is no way for the subjects to anticipate which of the scenarios will actually occur.

Based on the standard economic theory, the strategy method should generate the same behavior as the direct response method, because the experimental procedure – involving only observed actions or contingent decision without first observing actions - should make no difference on the second mover’s action if the first mover’s action is the same.

Brandts & Charness (2000) examines whether these two elicitation procedures cause a difference in people’s non-pecuniary behavior. They conduct two simple games – a Prisoner’s dilemma and a Chicken game and compare subjects’ behavior between a treatment using the direct response method and an otherwise identical treatment using the strategy method. They find that there is no statistical difference in subjects’ responses across the
two treatments.

Schotter et al. (1994) studies behavioral differences with respect to the direct/strategy distinction and to the presentation of games in either normal or extensive form. They conduct a complex game in which one player makes three choices and a simpler game where one player makes two choices. They find, consistent results as Brandts & Charness (2000), in their simpler game that there is no behavioral difference between the strategy method and the direct method treatments if the representation of the game is held constant.

Taken together, the results from Schotter et al. (1994) and Brandts & Charness (2000) suggest that in games of low complexity, the strategy method does not affect subjects’ decision differently than the direct response method. However, this finding does not necessarily apply to games of greater complexity.

There are later studies that find no behavioral differences between these two methods. In an ultimatum game, Armantier (2006) finds that only 6% responders change their acceptance decisions which they ex ante make hypothetically after seeing the proposer’s actual offer. Similarly, Fong et al. (2007) finds that only 15% trustees change their decisions on the amount to return to their trustors which they ex ante make hypothetically after seeing the trustors’ actual investment. Brandts et al. (2009) finds almost no difference in cooperation rates across these two methods in a repeated social-dilemma game. Falk & Kosfeld (2006) find no significantly difference in agents’ effort choice in a gift-exchange game across these two methods. In a public-goods game, Fischbacher & Gachter (2010) finds that mean contributions are almost identical across these two methods. In an ultimatum game, Guth et al. (2001) finds no difference in the responder’s rejection rate between the hot and the cold method when the proposers’ choice is between lopsided and nearly-equal split or between lopsided and exactly even split. In an offer/demand game with random pie size, Rapoport and Sundali (1996) and Rapoport et al. (1996) finds little difference in results involving a direct response method as compared to those in the identical game in Mitzkewitz & Nagel (1993) involving a strategy method.

However, researchers argue that the difference between these two methods is that the hypothetical decision-making procedure in a strategy method makes it too psychologically cold to players, while the direct response method makes it hot to players because players
make decision on the spot. In other words, players may react more emotionally when asked for a direct response and less emotionally – and potentially more strategically, when asked to prepare for multiple alternatives. Roth (1995) points out that “having to submit entire strategies forces subjects to think about each information set in a different way than if they could primarily concentrate on those information sets that arise in the course of the game.”

Brandts & Charness (2003) conducts a game where the first mover chooses between a favorable and an unfavorable action to the second mover and subsequently the second mover decides whether to punish the first mover at a cost if the unfavorable action is chosen. They find that the rate of punishment in a direct response method is about twice that found with a strategy method. Similar to Brandts & Charness (2003), in the same punishment game, Brosig et al. (2003) varies the cost of punishment between a low-cost punishment and a high-cost punishment. They find that the rate of punishment with low-cost punishment is much higher with a direct response method than a strategy method but no difference with a high-cost punishment. In a simplified trust game, Casari & Cason (2009) finds that the average amount returned is much higher with a direct response method than a strategy method. Murphy et al. (2007) conducts a game in a form of trust dilemma with three people in a group. Each person can stop the game in continuous time. The payoff becomes bigger over time, but each person has an incentive to stop the game. Their study finds that there is more cooperation and greater dispersion of the winning stopping time with a direct response method than a strategy method. In a Prisoner’s dilemma game with sanctioning opportunities, Falk et al. (2005) finds that the level of cooperators’ sanctions of defectors in a direct response method is twice as in a strategy method.

A more complete discussion on the difference between a direct response method and a strategy method can be found in Brandts & Charness (2011). Their study attempts to discern underlying determinants of when a direct response method leads to a different result than a strategy method. Based on the studies in the prior literature, they propose that three dimensions may matter: whether decisions involve emotions, whether the number of alternative choices is greater than two, and whether the game is one shot or repeated.

Although statistically they find that emotions do not seem to explain the difference, it is worth noting that among the five studies which find behavioral differences between the
hot and cold method, there is a common feature, that is, subjects seem to act more based on social norms – higher rate of punishment at a cost (Brandts & Charness 2003; Brosig et al. 2003; Falk et al. 2005), higher amount returned at a cost (Casari & Cason 2009), or greater cooperation at a cost (Murphy et al. 2007) - in a direct response method than a strategy method.

A possible explanation for this result could be that when people need to make a decision on spot, the immediate response may turn up the temperature and trigger stronger emotional reactions. Particularly, when people feel they are being treated unfairly, their resentment may be stronger in a hot treatment than a cold treatment, thus leading to more negative responses, for example, higher rate of punishment even if it is not economically rational. Likewise, when people feel treated fairly, their tendency to reciprocate could be stronger in a hot treatment than a cold treatment, thus leading to more positive responses, for example: higher amount returned or greater cooperation against their benefit.

Despite the fact that there is no clear consensus in theories in the prior literature about the determinants on when these two methods are different, these five limited studies can still help in making a reasonable ex ante behavioral prediction across these two methods in my experiments.

As briefly noted above, there are basically two important features this prediction could be based on. The first basis for a prediction is social norms – as discussed above, a number of studies seem to suggest that the direct response method yields a significantly different outcome if people are reacting to an apparent violation of social norms. This would lead to a prediction that agents will have a stronger negative response when principals make choices that appear to violate social norms when the direct method is used. That is when agents respond directly to a violation of social norms they do so more emotionally and more negatively. However, when the agents must consider several different options only some of which violate social norms, agents’ emotional reaction to any given choice may be reduced. In other words, when planning out responses to multiple options agents may ‘cool down’ relative to their response to a single norm-violating choice.

The second basis for a prediction comes from the character of prior games – specifically their simplicity. It is possible while the results of the five studies discussed above may hold
true in simple scenarios, more complex scenarios could yield the opposite result. Basically, this line of reasoning supposes that at some point the structure of the game or the information presented to agents will be complex enough that it does not produce an emotional reaction out of context. Once this point is reached, an agent responding directly to a scenario may not immediately understand that social norms are implicated and therefore may not react emotionally when they are violated. Similarly, when principals are behaving in an unusual way, agents may not recognize this when presented with only one alternative. By contrast, when the strategy method is used, the agent will have sufficient context – and will be able to see how the different choices compare to one another. This increased understanding may lead the agent to recognize what the agent in the direct method could not – that one or more of the possible choices is unexpected or violates social norms such that an emotional reaction would be warranted if the principal were to make that choice.

4.2.2 Hypotheses

This study investigates whether making the alternative contract salient affects agents’ perception on principals’ intentions behind the contracting choice. The game is identical to Experiment 2 in Study 1: a modified gift-exchange game with a discretionary penalty.

With a direct response method, Session 2.2 in Study 1 discusses in detail the agents’ behavioral predictions when principals choose a discretionary penalty contract instead of a no penalty contract and Session 3.3 in Study 2 discusses how expect agents are predicted to behave when principals choose a no penalty contract instead of a discretionary penalty contract.

When principals choose a discretionary penalty contract, Study 1 argues that agents may already expect that it principals will choose a discretionary penalty contract over a contract with no such penalty. Such a contract is also not likely to violate social norms. Once this expectation is met, it will not change even when salience is increased via the strategy method. The idea behind the importance of salience is that agents do not fully consider principals options and thus do not understand why a principal might choose such options. Thus making those options more relevant to agents by causing agents to respond to them all may increase agents understanding of the choice being made by principals and
therefore of the intent behind the choice. However, this effect should be much weaker or absent where agents already expect the principal to make a particular choice. This is because an expected action creates no surprise and provokes no reaction. So long as principals do what agents expect them to do, additional salience will not alter agents’ reaction. So I predict that:

\[ \text{Effort (Strategy Method)} = \text{Effort (Direct Response Method)} \]

When principals choose a no discretionary penalty contract, we argue earlier in Study 2 that agents may perceive it as a signal that principals do not value enforcing fairness as a worthy behavior. The result of this perception may be an emotional response. However, exactly when that emotional response is aroused may depend on which line of prediction the paper falls into. If the game in this paper is more like the simple games used in prior papers then the negative emotional response should be worse when agents respond directly – because when the implications of the choice are simple agents are more likely to have an immediate emotional response. By contrast, when agents respond through the strategy method they are not faced with a single alternative and this may decrease their emotional reaction to any individual choice – allowing agents to be “cooler” in their responses. Thus:

\[ \text{Effort (Strategy Method)} > \text{Effort (Direct Response Method)} \]

However, because the game in this paper is arguable more complex in significant ways than prior games, it is possible that it has crossed the threshold discussed above, such that an emotional response requires context. Without the increased consideration that results from making the choices available to principals more salient to agents, agents may not understand what making those choices would imply about principals’ intentions. Once agents actually understand what may be behind the principal’s choice they may have a much stronger reaction than they would have under the direct method. For example, choosing a no penalty contract can be interpreted as a negative signal because agents might decide this signals that principals do not care about social norms enough to enforce them (as discussed in Study 2). However, some agents in the direct method might not give enough
consideration to the choice that the principal made to reach this conclusion. Therefore, when the alternatives available to the principal are made more salient, those agents may recognize this implication and react negatively to it. In other words, without the increased salience provided by the strategy method, agents may miss information or implications that would lead them to react emotionally, but once that context is provided an emotional reaction will occur. Thus, agents’ negative emotional response could be worse when the alternative choice is more salient in a strategy method than a direct response method. Resulting in:

\[
\text{Effort (Strategy Method)} < \text{Effort (Direct Response Method)}
\]

Without seeing the outcome of the game, it is not possible to know which of these two predictions is accurate. I therefore make no prediction as to the outcome when principals choose a contract with no discretionary penalty.

4.3 Experimental Setting and Design

To investigate whether making alternative contracting choice salient affects agents’ perception of principals’ intentions behind each contracting choice, I conduct two treatments in Study 4: Treatment 1 and Treatment 2. Subjects in both treatments play a the same game as that in Experiment 2 from Study 1: a modified gift-exchange game with discretionary penalty. The only difference is the elicitation procedure: Treatment 1 uses a direct response method and Treatment 2 uses a strategy method.

4.3.1 Treatment 1: Direct Response Method

In Treatment 1, principals choose between a discretionary penalty contract which is played as a modified gift-exchange game with discretionary penalty and a no penalty contract which is played as a modified gift-exchange game. Agents make their decisions after observing principals’ decisions.

The modified gift-exchange game consists of two stages. In the first stage, principals choose a fixed wage \(w\) to offer to their agents and requested a desired effort level \(\bar{e}\). In the
second stage, after learning principals’ decisions on wage and requested effort, agents choose an actual effort level \(e\). Agents’ actual effort does not need to equal principals’ requested effort, i.e. agents can choose \(e \neq \hat{e}\).

The principal’s payoff function is given by:

\[
(120 - w) * e
\]

where \(w\) represents the principal’s wage offer and \(w \in \{20, \ldots, 120\}\). \(\hat{e}\) represents the principal’s requested effort and \(\hat{e} \in \{0.1, \ldots, 1\}\). \(e\) represents the agent’s actual effort and \(e \in \{0.1, \ldots, 1\}\). The higher the effort number is, the higher the cost to the agent. The lower the effort is, the lower the cost to the agent.

The agent’s payoff function is given by:

\[
w - c(e)
\]

where \(c(e)\) represents the cost of the agent’s actual effort, an increasing function in \(e\). The agent’s cost of effort is shown below.

<table>
<thead>
<tr>
<th>(e)</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1</th>
</tr>
</thead>
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<tr>
<td>(c(e))</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

The modified gift-exchange game with a discretionary penalty contract consists of three stages. The first stage and second stage are identical to those in the modified gift-exchange game. In the third stage, after principals observe agents’ effort, they can decide whether to penalize agents if agents’ actual effort is less than principals’ requested effort. If agents are eligible to be penalized, the penalty is both costly to principals and agents. The penalty reduces of principals’ payment by 2 and reduces agents’ payment by 6.

Figure 2.2 shows the timeline of decisions for Treatment 1. Before agents choose effort, they learn principals’ decision on wage, requested effort and whether to choose a discretionary penalty contract. Based on all this information, agents make an effort decision.
4.3.2 Treatment 2: Strategy Method

Subjects in Treatment 2 play the same modified gift-exchange game as that in Treatment 1, except that, in the second stage, before agents choose effort, agents make an effort decision contingent on whether principals choose a discretionary penalty contract or choose a no penalty contract. Specifically, conditional on the wage and requested effort on hand, agents indicate their effort decision hypothetically, if their principals choose a discretionary penalty contract or if their principals choose a no penalty contract. After agents make contingent decisions, the game continues to play based on principals’ actual contract choice. Since agents do not know which contract their principals would choose, agents have an incentive to indicate their true effort decisions.

4.3.3 Behavioral Prediction Based on Standard Economic Theory

As the same analysis in Study 1 and Study 2, regardless of which contract principals choose, the optimal strategies should be

\[ \{w^* = 20, e = 0.1\} \]

In addition, standard economic theory would predict that the direct response method and the strategy method should yield the same results. Thus, the optimal strategies should be identical across these two methods.
4.3.4 Experimental Procedure

The experimental procedure is identical to that in Study 1 with a discretionary penalty contract.

2 sessions were conducted for a direct response method and 2 sessions were conducted for a strategy method. Subjects playing for 10 periods in both treatments. A total of 40 subjects participated in the strategy method treatment and a total of 42 subjects participated in the direct response method. Each treatment lasted for about an hour. The average payment including the show-up fee to a subject was $15. All experiments were computerized, using z-Tree (Fischbacher 2007).

4.4 Results

The main result in Figure 4.17 shows that when principals choose a discretionary penalty contract instead of a no penalty contract, agents’ effort is significantly higher under a strategy method than a direct response method (p-value of 0.02), however, when principals choose a no penalty contract instead of a discretionary penalty contract, agents’ effort is no different between a strategy method and a direct response method (p-value of 0.5). These two effects still hold after controlling for principals’ wage and requested effort in a OLS regression and a Tobit regression.

Based on samples that are matched on identical pairs of wage and requested effort, Figure 4.18 and Figure 4.19 show that there is no difference in agents’ effort between these two methods when principals choose a no penalty contract (average effort under strategy method is 0.3; average effort under strategy method is 0.34, p-value of 0.34). However, a strategy method yields significantly higher effort than a direct response method when principals choose a discretionary penalty contract (average effort under strategy method is 0.41; average effort under strategy method is 0.36, p-value of 0.03) conditional on offering medium wages.
Figure 4.17: Average Effort on by Direct Response Method and Strategy Method
Figure 4.18: Average Effort on Matched Wage and Requested Effort by Treatment Strategy Method and Direct Response Method (Discretionary Penalty Chosen)
Figure 4.19: Average Effort on Matched Wage and Requested Effort by Treatment Strategy Method and Direct Response Method (No Discretionary Penalty Chosen)
4.5 Conclusion

This study provides additional evidence to the literature on the determinants of when a strategy method causes a behavioral difference with respect to a direct response method. The results suggest that making alternative choice salience may “cool down” agents’ negative emotional reaction, thus leading to more reciprocal responses.
Chapter 6

Study 5: Does Communication Affect Perceptions of Intentions?

5.1 Introduction

For agents to perceive the intentions behind principals' choices accurately, actions coupled with communication (cheap talk) are likely to be more helpful than actions alone.

Agents sometimes interpret principals’ intentions incorrectly, because it is hard for principals to anticipate what agents expect or what benchmark agents use to define good or bad intentions. For example, in a traditional gift-exchange game, suppose principals can offer low, medium and high wages to agents. It is probably clear to agents that an offer of a low wage signals distrust from principals and an offer of a high wage signals trust from principals. However, it is unclear what intention an offer of a medium wage signals. Some agents could conclude that, because a medium wage is higher than the low wage, principals still are showing trust, while other agents could conclude, under the same circumstances, that the medium wage signals distrust because if their principals really trusted them a high wage would be offered.

Communication provides opportunities for clarity for both principals and agents. Agents can communicate their expectations and principals can communicate their desires and intentions. This information, even if it is merely “cheap talk” can help agents and principals better understand the actions taken by the other party, and set “ground rules” for determining what does and does not constitute acceptable behavior.

This study investigates whether communication between principals and agents can help principals to convey their intentions.
To address this research question, I conduct three treatments in a simplified gift-exchange game: No Communication Treatment as a control treatment for the other two communication treatments, One-Way Communication Treatment and Two-Way Communication Treatment. Subjects in the No Communication Treatment play a traditional gift-exchange game (Fehr et al. 1993) with restricted choices. In the first stage, principals offer a wage from \{20, 30, 40\} and request an effort level from \{0.1, 0.5, 1.0\}. In the second stage, after observing principals’ decisions, agents choose an actual effort level from \{0.1, 0.5, 1.0\}. The lower the effort is, the lower the cost to agents. In the One-Way Communication Treatment, before principals offer the wage, agents are allowed to send a free-form message to principals. The message may not contain any threatening or offensive language, nor contain any self-identifying information. The Two-Way Communication Treatment follows the experimental procedure in the One-Way Communication Treatment, in addition, after observing agents’ messages, principals are also allowed to send a free-form message to their agents at the same time when they offer the wage and request an effort level. The reason for restricting principals’ choices to only three is because it reduces the challenge for agents and the experimenter to interpret principals’ intentions behind their wage offers clearly. Specifically, offering a wage of 20 (a wage of 40) clearly signals distrust (trust). But the signal from a wage of 30 is still unclear. This allows me to capture the effect of communication on perceived intentions of a unclear wage offer of 30 to agents.

Traditional game theorists would predict that the optimal strategy in all three treatments should be that principals offer a wage of 20 and agents put in effort of 0.1. Although extensive experimental studies (Fehr et al. 1993; Hannan et al. 2002; Hannan 2005; Kuang & Moser 2009; Kuang & Moser 2011) have documented that not only do principals offer a wage higher than the minimum wage, but also agents put in higher effort than the minimum effort, when facing a medium or a relatively high wage. A number of agents still chose relative low effort. This cannot be explained by the traditional economic theory that assumes agents only care about monetary payoff because these agents did not choose the minimum effort. It is possible that a good wage was not perceived as positively as it was intended.

One way communication may help improve outcomes for principals in two distinct ways.
First, when agents communicate with principals they can promise to return a high wage in exchange for a high effort. This information may reveal agent’s intentions to the principal such that the principal is more willing to offer a high wage and thereby gains the opportunity for a greater payoff.

Second, agent’s communication to principals can clarify agents’ perception of principals’ intentions. How can a communication from the agent reveal the principals’ intentions? Through the principals’ response. When the principal makes an offer, after receiving a communication from the agent, if the agent requested a high wage from the principal in exchange for high effort, principal’s wage offer will either be consistent, or inconsistent with the agent’s request. If the principal’s offer is high – that is, consistent with what the agent asked for, the agent can be sure that the principal’s offer is a signal of trust. Likewise, if the principal’s offer is inconsistent with agent’s request, then the agent can clearly interpret that as a signal of distrust. By contrast, without communication from the agent, the agent would be less likely to correctly interpret the principal’s behavior. In short, the agent, by communicating can establish ground rules for what counts as trusting or untrusting treatment by the principal.

Two-way communication may provide additional improvement in outcomes beyond that provided by one-way communication. Again, there are two distinct ways in which this could occur. First, allowing principals to send a communication of their own to agents allows them to confirm their intentions to agents – which may provide further improvement to agent’s understanding of principal’s intentions. Also, assuming the principal decides to trust the agent, this second communication may have the added benefit of resulting in the agent feeling guilty if they consider betraying the principal’s trust for their own benefit.

Second, two-way communication may provide a way to soften the blow if the principal decides not to comply when the agent promises high effort in exchange for high wages. Communication from the principal explaining their decision (perhaps even in an apologetic manner) may soften agents negative emotional response leading to less negative reciprocation from agents. For example, if the principal explains that on several previous games their agent promised high effort for a high wage and, when the principal offered the high wage, put in low effort instead, the agent may be sympathetic to the principal. Such sympathy
might reduce agent’s negative response.

In summary, this paper predicts that introducing communication into a simplified-gift exchange game will tend to clarify principals’ intentions to agents. This clarity should generally improve outcomes for principals where principals intend to make a high wage offer or where principals have an opportunity to communicate with agents to reduce agent’s negative impression of the intent behind a lower wage offer.

Unfortunately, this study did not find significant results, however, the data shows promise for future research because the pattern of the results, although insignificant, was consistent with the predictions discussed above, that is; agents’ effort was higher when communication was coupled with a high wage offer and where two-way communication was available to allow principals to communicate with their agents.

The remainder of the paper proceeds as follows. The second section presents related theories and develops the hypotheses. The third section describes the experimental setting, design and procedure. The fourth section shows results and provides interpretations. The fifth section concludes and suggests directions for future research.

5.2 Related Literature and Hypotheses

5.2.1 One-Way Communication

As to the non-financial incentive mechanism communication, common wisdom among many economists is that “talk is cheap”. By this they mean that anyone can promise anything, but in many situations nothing prevents them from reneging on that promise, especially if they will be monetarily better off by doing so. This conjecture is challenged by existing experimental results.

There exist a number of experiments where coordination is improved by the possibility of communication. Isaac & Walker (1988) finds that once a free-form communication is allowed contributions jumped from 2% up to 60%. Cooper et al. (1990) shows that “One-way” communication works better in a battle of sexes than “two-way” communication, because in “two-way” communication each player tended to announce that they will play the strategy that would yield them the higher payoff. “Two-way” communication works better
in a stage hunt game than “one-way” communication, because in “two-way” communication both players are guaranteed the strategy that maximize their payoff. Blume & Ortmann (2007) explores the role of communication in “the minimum effort game” where subjects choose number 1 to 7 and each subject’s payoff not only depends on the number they pick but also the deviation of the chosen number from the lowest chosen number in the group. They found that the ability to send messages that say “I will choose 7” helps coordination.

The main takeaway from these studies is the solution to increase coordination rate is to reduce the amount of strategic uncertainty so that everyone is convinced that everyone else will choose the payoff dominated strategy. Naturally, this does assume that the content of the communication is relevant to the strategic uncertainty and effective in reducing it.

In a “gift-exchange” contract cooperation failure may occur where agents come to inaccurate conclusions about their principal’s intentions and may respond with low effort when they might otherwise reciprocate. Moreover, because principals are more likely to respond with low effort, employers may be hesitant to trust them by offering high wages. One mechanism to reduce this failure is to allow agents to send principals a message. One-way communication offered before principals choose a wage can potentially reveal the agents’ beliefs and intentions to their employers, it may be an effective mechanism to improve cooperation between principals and agents.

Additionally, by sending a message to their principals, agents can set ground rules which will help them interpret principal’s intentions with greater confidence – e.g. if agents ask for a high wage and receive it they can confidently interpret this as a sign of trust, if not it is a sign of distrust. Overall, principals should be more willing to offer high wages and agents should be more willing to reciprocate, thus I predict that:

\[
\text{Effort (No Communication)} < \text{Effort (One-Way Communication)}
\]

### 5.2.2 Two-Way Communication

In two-way communication, in addition to the message sent by employees, the employers may send a free-form message to their principals along with the wage choice and desired effort level. Principals can choose to do several things. One thing it can do is to remind
the employees of what they said previously. The idea of “guilt-aversion” (Charness & Dufwenberg 2006) is that the more one believes a party with whom one is paired is expecting a favorable move, the more likely it is that one chooses the actual move. Schwartz et al. (2014) provides supporting evidence that the reason why people keep their promises is that they do not want to let the other party down.

Another thing they may do is confirm whether or not they will cooperate in accordance with the message that agents previously sent them. This may have the effect of confirming that principal is acting within the bounds of agents request for a high wage, or it may be an opportunity for the principal to soften the blow of a low wage offer in violation of the agent’s request.

In the present study, in addition to the positive effects of one-way communication, as noted above, if the message from employers can successfully lead employees to anticipate feelings of guilt if they renege on their promises, or can reduce their anger at an employer who offers a low wage, it will decrease the likelihood that they will break their promises of high effort for a high wage or decrease the degree to which they negatively reciprocate against an employer who offers a low wage. This leads to my second prediction:

Effort (One-Way Communication) < Effort (Two-Way Communication)

5.3 Experimental Setting and Design

5.3.1 Experimental Setting

In all treatments, subjects play a simplified gift-exchange game that has been extensively used in the literature (Fehr et al. 1993). The simplified gift-exchange game consists of two stages. In the first stage, principals choose a fixed wage \( w \) to offer to their agents and requested a desired effort level \( \hat{e} \). In the second stage, after observing principals’ wage offers and requested effort, agents choose an actual effort level \( e \). Agents’ actual effort does not need to equal principals’ requested effort, i.e. agents can choose \( e \neq \hat{e} \).

The principal’s payoff function is given by:
where \( w \) represents the principal’s wage offer and \( w \in \{20, 30, 40\} \). \( e \) represents the agent’s actual effort and \( e \in \{0.1, 0.5, 1.0\} \). The higher the effort number is, the higher the cost to the agent. The lower the effort is, the lower the cost to the agent.

The agent’s payoff function is given by:

\[
(80 - w) \cdot e
\]

where \( c(e) \) represents the cost of the agent’s actual effort, an increasing function in \( e \).

The agent’s cost of effort is shown below.

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.5</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$1</td>
<td>$5</td>
<td>$10</td>
</tr>
</tbody>
</table>

### 5.3.2 Experimental Design

To address the research question, I conduct three treatments with a 1x3 experimental design. In the No Communication Treatment, subjects play a simplified gift-exchange game without a possibility for any communication. In the One-Way Communication Treatment, before principals choose wage offers in the first stage, agents are allowed to send a free-form message to their principals. In the Two-Way Communication Treatment, in addition to the One-Way Communication Treatment, after observing agents’ messages, principals are allowed to send a free-form message to their agents when they choose wage offers in the first stage.

The No Communication Treatment is a control treatment for the communication treatments. A comparison in agents’ effort between the No Communication Treatment and the One-Way Communication Treatment (and the Two-Way communication Treatment) allows me to capture the effect of communication on agents’ perceptions on principals’ intentions. Figure 5.10 shows the timeline of decisions for the three treatments.
5.3.3 Experimental Procedure

Participants in all three treatments were recruited from undergraduate students from the Fisher College of Business at The Ohio State University. Upon arrival at the laboratory, participants gave their informed consent to participate. They received an ID number from the experimenter when they signed in, and sat in front of the computer which had the same ID number. This number eliminates any possibility that the experimenter may acquire per-
sonal information about the participants and facilitates final payment to the participants. Before the experiment began, the experimenter read the instructions aloud to all participants and any questions regarding the instructions were answered by the experimenter privately. Then a quiz (9 questions in the No Communication Treatment, 10 questions in the One-Way Communication Treatment and 11 questions in the Two-Way Communication Treatment) was given to the participants to fill out to ensure that the participants fully understood the experiments.

At the beginning of the experiments, half of the subjects were randomly assigned as “employers” and the other half of the subjects were randomly assigned as “employees”. The initial role assigned to each player was retained throughout the experiments. In order to eliminate any reputation effect, each “employer” was randomly re-matched with an “employee” for each period. As a result, subjects in this study played a one-shot game, rather than a repeated game in all treatments. Only one session was conducted each treatment. Subjects played for 6 periods in each session.

All participants received a $5 show-up fee. Their final payoff depended on their performance during the experiments. The period used to determine a subject’s payoff was randomly chosen from one of the periods (a volunteer subject rolled a six-sided dice to determine the period number in front of all subjects immediately after the experiments ended). This random period payoff rules out the possibility of strategic planning on performance in one particular period.

A total of 60 subjects participated in the experiments with 20 subjects in each treatment. The No Communication treatment lasted for about an hour and the two communication treatments lasted for about an hour and half. The average payment including the show-up fee to a subject was $25. All experiments were computerized, using z-Tree (Fischbacher 2007).

Based on the parameters in this experiment, the game strategic form of the game is provided in Appendix N. The first number in the parentheses is the principal’s payoff and the second number is the agent’s payoff. Game theory economists predict that the Nash equilibrium in all three treatments is that principals should always offer the minimum wage and agents should always exerts the minimum effort.
5.4 Results

Table 5.10 provides the results of the three treatments. Panel A shows the averages of Principals’ wage offer, requested effort, and payoff, as well as the agent’s average effort and average payoff as well as the total average payoff for the No Communication treatment. These figures are given in the third column for the entire 6 periods over which the game was played, but are also subdivided in the first and second column into the first three periods and the last three periods respectively. The purpose of this division is to highlight any change in subjects’ behavior as the game progresses. By way of example, note that principal’s wage offer is slightly higher in periods 1-3 than in periods 4-6 but principals requested effort is slightly lower in periods 1-3 than in periods 4-6. Note that the fourth column contains the results predicted by game theory which serve as a benchmark for the actual results of the experiment.

Table 5.10 Panel B is identical to Panel A except that it contains data from the One-Way Communication Treatment. Similarly, Panel C contains data for the Two-Way Communication treatment.

Figure 5.21 compares average effort across each treatment for a given wage. For all treatments, the general result is that, as wage increases, effort also increases. However, there are also results when comparing the same wage offer across different treatments that are of interest. When 40 is offered as the wage, the three treatments are a direct progression – average effort is lowest when no communication is allowed and highest when there is two-way communication. By contrast, when 20 or 30 is offered as a wage, One-Way Communication produces noticeably less effort than either No Communication or Two-Way Communication, but the latter two treatments retain a similar relationship to each other as when the wage offer is 40.

Table 5.11 presents a statistical analysis for significance of the results of the treatments. The table is divided into four sets of comparisons. The first set tests for significance between the average effort provided by each treatment overall. The following three sets subdivide these tests by wage offer, testing for significance at a wage of 20, 30 and 40. In each case significance is not found, however, some results, particularly a comparison between
One-Way and Two-Way Communication at a wage of 30, are closer to significance than others.

Figure 5.22 shows the frequency of effort choices subdivided by treatment and further subdivided by wage offer. Several points are noteworthy. First introducing one-way communication greatly increases the number of principals who choose a wage of 40. This appears to indicate that communication from agents resulted in greater confidence on the part of principals - and thus greater willingness to risk a high wage offer. It also seems to induce reciprocation on the part of agents as a greater number choose the maximum effort of 1.0. Second, these effects are not replicated when two-way communication is allowed. Principals only offer the highest wage with approximately the same frequency as when no communication is allowed. However, the results from the Wage 20 and Wage 30 categories likely provide an explanation - which leads to the third point: Two-way communication is the only treatment in which agents respond to wage offers lower than 40 with an effort of 1.0. The explanation for this and the second point may be that principals who are able to send communications to their agents believe - sometimes correctly, that they can close the social distance between themselves and the agents and induce the agents to put in the maximum effort even when principals do not offer the maximum wage. The results in the chart make it clear that this strategy does not work often, but the fact that it works at all may lead principals to make lower offers in the hopes of using it successfully.

Table 5.12 collects the various messages employers and employees exchanged. It is subdivided by treatment. For obvious reasons, there is no subdivision for the No Communication treatment. Panel A matches the message sent by the employee to the Employer’s ID number, the period in which the message was sent, the wage offered by the employer and the effort chosen by the employee. Panel B is laid out similarly for Two-Way communication, however because there are now two messages being exchanged, each interaction now sits in two rows with the employee (noted as #ee) listed with their message and effort level and the employer (#er) matched with their message and wage offer. It is worth noting that there does seem to be some correlation in the data between messages that are phrased persuasively and high wage offers.
5.4.1 Discussion of Insignificant Results

While none of the tests run on this study found significant results there are still a number of interesting features of the data. Most importantly, although not significant, the direction of the outcome is consistent with the hypothesis. As shown in Figure 5.21, the most negative outcome occurs when principals in the One-Way Communication treatment offer a wage of 20. While effort when the wage offer is 20 tends to be generally low, the fact that it is lowest when there is one-way communication tends to suggest that one-way communication allows agents to gain clarity about the intentions behind the principal’s wage offer. Since agents will tend to ask for a higher wage, a wage of 20 clearly indicates that the principals do not trust them to put in the high effort that agents often promise. Faced with this clear sign of distrust agents are more likely to respond negatively. However, this does not hold true when two-way communication is available. This is consistent with the idea that offering principals an opportunity to communicate with agents may act to soften the blow of a low wage offer.

This pattern occurs again when the wage offer is 30. This is interesting because it was initially unclear whether agents would interpret an offer of 30 as “better than 20” or “worse than 40” when deciding whether it was a positive or negative signal. This result suggests that consistent with agents tendency to ask for the highest wage offer, an offer of 30 is regarded as a negative signal.

Interestingly, and again consistent with the hypotheses, when a wage of 40 is offered, One-Way communication produces higher effort than No Communication but lower effort than Two-Way communication. This suggests that two-way communication may also offer an opportunity for Principals to encourage positive reciprocity by agents.

Since the overall pattern of the results is consistent with the hypotheses it may be that the lack of significant results is attributable to aspects of the experimental design rather than a fundamental flaw in the predictions. There are two important issues that might have contributed to this outcome. First, the issue of power. Only one session of this experiment was run meaning that the data available is limited in volume and is more vulnerable to being skewed by any of a variety of unpredictable factors. Second, the restriction of the
effort choices may have made reduced the sensitivity of this study to the point where a significant outcome was lost. Having only 3 possible effort levels greatly simplified data analysis, but may not have let employers and employees react to their counterparts choices naturally.
Table 5.10: Descriptive Statistics for All Treatments

<table>
<thead>
<tr>
<th>Panel A: No Communication Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periods 1-3</td>
</tr>
<tr>
<td>Principal's wage</td>
</tr>
<tr>
<td>Principal's requested effort</td>
</tr>
<tr>
<td>Agent's effort</td>
</tr>
<tr>
<td>Principal's payoffs</td>
</tr>
<tr>
<td>Agent's payoffs</td>
</tr>
<tr>
<td>Total payoffs</td>
</tr>
<tr>
<td>Number of Observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: One-Way Communication Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periods 1-3</td>
</tr>
<tr>
<td>Principal's wage</td>
</tr>
<tr>
<td>Principal's requested effort</td>
</tr>
<tr>
<td>Agent's effort</td>
</tr>
<tr>
<td>Principal's payoffs</td>
</tr>
<tr>
<td>Agent's payoffs</td>
</tr>
<tr>
<td>Total payoffs</td>
</tr>
<tr>
<td>Number of Observations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel C: Two-Way Communication Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periods 1-3</td>
</tr>
<tr>
<td>Principal's wage</td>
</tr>
<tr>
<td>Principal's requested effort</td>
</tr>
<tr>
<td>Agent’s effort</td>
</tr>
<tr>
<td>Principal’s payoffs</td>
</tr>
<tr>
<td>Agent’s payoffs</td>
</tr>
<tr>
<td>Total payoffs</td>
</tr>
<tr>
<td>Number of Observations</td>
</tr>
</tbody>
</table>

* The numbers in the apprentices are the standard deviation.
Figure 5.21: Average Effort across Treatments Conditional on Wage
<table>
<thead>
<tr>
<th>Treatments</th>
<th>t-statistics</th>
<th>p-value, two-sided</th>
</tr>
</thead>
<tbody>
<tr>
<td>overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Communication (0.43) - One-Way Communication (0.5)</td>
<td>-1.12</td>
<td>0.27</td>
</tr>
<tr>
<td>No Communication (0.43) - Two-Way Communication (0.48)</td>
<td>-0.78</td>
<td>0.43</td>
</tr>
<tr>
<td>One-Way Communication (0.5) - Two-Way Communication (0.48)</td>
<td>0.3</td>
<td>0.76</td>
</tr>
<tr>
<td>wage=20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Communication (0.14) - One-Way Communication (0.1)</td>
<td>1</td>
<td>0.34</td>
</tr>
<tr>
<td>No Communication (0.14) - Two-Way Communication (0.19)</td>
<td>-0.55</td>
<td>0.59</td>
</tr>
<tr>
<td>One-Way Communication (0.1) - Two-Way Communication (0.19)</td>
<td>-1</td>
<td>0.34</td>
</tr>
<tr>
<td>wage=30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Communication (0.35) - One-Way Communication (0.32)</td>
<td>0.45</td>
<td>0.65</td>
</tr>
<tr>
<td>No Communication (0.35) - Two-Way Communication (0.42)</td>
<td>-0.81</td>
<td>0.43</td>
</tr>
<tr>
<td>One-Way Communication (0.32) - Two-Way Communication (0.42)</td>
<td>-1.18</td>
<td>0.25</td>
</tr>
<tr>
<td>wage=40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Communication (0.57) - One-Way Communication (0.6)</td>
<td>-0.31</td>
<td>0.76</td>
</tr>
<tr>
<td>No Communication (0.57) - Two-Way Communication (0.61)</td>
<td>-0.4</td>
<td>0.69</td>
</tr>
<tr>
<td>One-Way Communication (0.6) - Two-Way Communication (0.61)</td>
<td>-0.12</td>
<td>0.9</td>
</tr>
</tbody>
</table>

* The numbers in the apprentices are average effort.
* All t tests are adjusted for unequal variance.
* Significant at p<0.001: ***; significant at p<0.01: **; significant at p<0.05: *
Figure 5.22: Frequency of Effort across Treatments
Table 5.12: Messages for Communication Treatments

Panel A: Messages for One-Way Communication Treatment

<table>
<thead>
<tr>
<th>Employer #</th>
<th>Period</th>
<th>Wage</th>
<th>Effort</th>
<th>Employee’s Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>20</td>
<td>0.1</td>
<td>Hello</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>40</td>
<td>0.5</td>
<td>If you pay me a wage of 40 dollars I will give a .5 effort</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>40</td>
<td>0.5</td>
<td>To have an optimal outcome, you should select $30 and 0.5 and I will select .5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>as my effort level. That way we will both have a payoff of $25. I won’t lie over</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$4 I promise!</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>40</td>
<td>0.1</td>
<td>Hey man, if you took econ lets game theory. pick the 40 and I’ll pick 1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>the highest game outcome for both of us. Be a dawg and I will too. One love</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>40</td>
<td>1</td>
<td>If you do a wage of 40 and I do an effort of 1, you get 40 and I get 30. Sound</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>fair?</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>30</td>
<td>0.1</td>
<td>Hello. I am a hard worker with an outgoing personality. I like to be in leadership</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>roles and work hard to get all of my tasks completed. I enjoy art, sports, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>shopping.</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>40</td>
<td>1</td>
<td>let’s both get as much money as we can. that’s why we’re here right? $$? we</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>should both do our best.</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>40</td>
<td>1</td>
<td>I think the highest total payout is a wage of 40 and an effort level of 1.0.</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>40</td>
<td>0.5</td>
<td>i think $40 for full effort gives both of us the best outcome</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>40</td>
<td>0.5</td>
<td>i will put in a good amount of effort for the payoff comparative to what you</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>choose</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>30</td>
<td>0.1</td>
<td>Hello! I am a hard, determined worker. When I set my mind to something, I make</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>sure that I get it done. I am outgoing, personable, and caring. I love social</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>situations and doing my best.</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>40</td>
<td>1</td>
<td>I will give a very good amount of effort for what you pay out depending on what</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>you pay out,</td>
</tr>
</tbody>
</table>

continued
Table 5.12 continued

i will make it fair for both of us

3 2 40 0.5 If you pay me a 30 dollar wage I will put in an effort of .5 and we will both get $25

4 2 40 1 let’s both do well on this. We’re here to make the most $$ right? we can do that together

if you pay me the most and i put in the most effort. that’s the plan.

5 2 30 0.5 Hello

6 2 30 0.5 Hey man, if you took econ you should know game theory. put 30, ill put .5 and

well both walk away with 25. be a homie

7 2 40 1 The highest combined payout is 40 wage, 1.0 effort. I get 30 you get 40.

I won’t screw you over with a lower effort level

8 2 30 0.1 i think the best derision for both of us would be $40 for full effort

9 2 30 0.5 For an optimal solution for us both, you should pay me $30 for .5 effort.

When i select .5 effort, we will both have a payoff of $25. Trust me,

I will not try to trick you over $4!

10 2 40 1 If you pay $40, I will put in an effort of 1.0. You then receive $40 and I get $30,

which is the max payoff for us both. sound fair?

1 3 40 1 let’s both make the most money here. You pay me the best I put in the best effort

and we’re done. we’re both here to make the most money we can. let’s both win.

2 3 40 1 The highest combined payout is with 40 wage and 1.0 effort. I get 30 you get 40.

You have my word I’ll choose the 1.0 effort if you do this

cotinued
Table 5.12 continued

3  3  40  0.5  To have an optimal solution, you should put in $30 and 0.5 for effort.
When I then choose 0.5 for effort, we will both receive a $25 payoff!
Trust me I wouldn’t lie to you over $4.

4  3  40  0.5  I think the best bet for both of us is $40 for full effort

5  3  30  0.5  Hello!

6  3  30  0.5  if you give a wage of 30 and effort of .5 we both get paid 25. that way were even.
If you dont do that i will still put in a good amount of effort to ensure us

7  3  40  0.5  Give me a 40 dollar wage and I will give you an effort level of .5, otherwise it’s .1

8  3  40  1  If you pay $40, I will put in an effort of 1.0. You then receive $40 and I get $30,
which is the max payoff for us both. sound fair?

9  3  40  0.1  If you took econ, lets game theory this shit bro, lets both put in the highest wage,
ill put the highest effort level and well both walk away happy. be a dawg

10 3  40  0.1  Hello! I am a very outgoing, sociable person. I strive to do my best at everything I do.
My hobbies are art, sports, and shopping.

* To save space, only data in the first three periods is reported.

* Each row records the employer’s wage choice and that employer’s partner’s effort level and message.
Table 5.12 continued

Panel B: Messages for Two-Way Communication Treatment

<table>
<thead>
<tr>
<th>Player #</th>
<th>Period</th>
<th>Wage</th>
<th>Effort</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ee</td>
<td>1</td>
<td>0.5</td>
<td></td>
<td>so how do you want to do this, so we both make a good amount of money</td>
</tr>
<tr>
<td>1er</td>
<td>1</td>
<td>30</td>
<td></td>
<td>if we each put in .5 effort with a $30 wage we make out at $25 each. Fair?</td>
</tr>
<tr>
<td>2ee</td>
<td>1</td>
<td>1</td>
<td></td>
<td>The best option is to collude. I will go for a 1 effort if you go for 40 wage. You get 40 and I get 30</td>
</tr>
<tr>
<td>2er</td>
<td>1</td>
<td>40</td>
<td></td>
<td>I was going to suggest the same. Let’s both try to walk out of here with some cash.</td>
</tr>
<tr>
<td>3ee</td>
<td>1</td>
<td>0.5</td>
<td></td>
<td>Hello, how are you?</td>
</tr>
<tr>
<td>3er</td>
<td>1</td>
<td>30</td>
<td></td>
<td>Good, how are you?</td>
</tr>
<tr>
<td>4ee</td>
<td>1</td>
<td>0.1</td>
<td></td>
<td>The way that this will be most profitable for the both of us is if you offer me a wage of $40 and I provide an effort of 1.0, if you offer me a low wage, I will not put forth a good effort</td>
</tr>
<tr>
<td>4er</td>
<td>1</td>
<td>30</td>
<td></td>
<td>We will both make $25 if you accept this effort level which will be best for us both.</td>
</tr>
<tr>
<td>5ee</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Ill give you 1.0 effort if you give me the $40 wage</td>
</tr>
<tr>
<td>5er</td>
<td>1</td>
<td>40</td>
<td></td>
<td>That can be done.</td>
</tr>
<tr>
<td>6ee</td>
<td>1</td>
<td>0.5</td>
<td></td>
<td>Hi, hope you day is going well! I’m willing to work well if you pay well</td>
</tr>
<tr>
<td>6er</td>
<td>1</td>
<td>40</td>
<td></td>
<td>Hello and thank you! I hope you are having a nice day as well. I pay well and expect my employees to put forth the maximum effort. Hope we can count on you!</td>
</tr>
<tr>
<td>7ee</td>
<td>1</td>
<td>1</td>
<td></td>
<td>I hope you pay a great wage! Treat me nicely :)</td>
</tr>
<tr>
<td>7er</td>
<td>1</td>
<td>40</td>
<td></td>
<td>I think this is a fair offer that will make both of us happy</td>
</tr>
<tr>
<td>8ee</td>
<td>1</td>
<td>0.5</td>
<td></td>
<td>Blank</td>
</tr>
</tbody>
</table>

continued
Table 5.12 continued

<table>
<thead>
<tr>
<th>er</th>
<th>1</th>
<th>30</th>
<th>Blank</th>
</tr>
</thead>
<tbody>
<tr>
<td>ee</td>
<td>1</td>
<td>1</td>
<td>Hello sir!</td>
</tr>
<tr>
<td>er</td>
<td>1</td>
<td>20</td>
<td>Blank</td>
</tr>
<tr>
<td>ee</td>
<td>1</td>
<td>0.1</td>
<td>If you choose the highest wage I will choose highest effort for most money for both of us.</td>
</tr>
<tr>
<td>er</td>
<td>1</td>
<td>40</td>
<td>Thanks for your effort</td>
</tr>
</tbody>
</table>

* To save space, only data in the first period is reported.

* The row with 'er' records employer’s wage choice and message and the row with ‘ee’ records that employer’s partner’s effort level and message.
5.5 Conclusion

This study did not find a significant difference between any of the three treatments irrespective of the wage offer made by the principals. As discussed above, however, the results were promising because, although they were not significant, their overall pattern was consistent with the predicted outcome. This suggests that a future, larger, study might ultimately find confirm the hypotheses presented herein. A larger data set and more flexibility for principals and agents may yield more compelling results.
Appendices
APPENDIX A
Instruments for Exogenous Treatment with No Committed Penalty

Welcome to our experiment! During the experiment you will make decisions that will affect yourself and other participants. In this experiment you can earn money.

There will be ten periods in this experiment. Your final payoff will be randomly determined from one of the ten period’s payoff by having a volunteer roll a ten-sided die after the experiment is over. In the experiment all payoffs are expressed in “Lira”, an experimental currency. At the end of the experiment, Lira will be converted into dollars at the rate of:

\[2 \text{ Lira} = 1 \text{ Dollar}\]

In addition, you will receive a $5 payment for showing up for the experiment on time.

At the end of the experiment you will be paid cash in an envelope in a private room. All decisions and payoffs are confidential. No other participants will know your decisions and payoffs. In addition, no participant will know which other participants they were matched with.

You are not allowed to talk with other participants or use your phone during the entire experiment. If you have any questions, please raise your hand, the experimenter will come to help you in private.

The Role of Players

Each participant will be randomly assigned to one of two groups: half of participants will be “employers” and the other half of participants will be “employees”. You will learn your role when the experiment begins. One employer will be randomly matched with one employee. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.

Experimental Procedure

Step 1: The employer chooses a wage to offer their matched employee. The wage can be any integer between 20 Lira and 120 Lira inclusive (20, 21, 22, ..., 118, 119, 120). At the same time, the employer also requests an effort level from the employee (see below).
Step 2: After the employee learns the matched employer's wage and the requested effort level, the employee chooses an effort level. The employee's actual effort does not need to be the same as the employer's desired effort. The effort can be any one of the following:

\{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0\}

Lower numbers represent lower effort. Higher numbers represent higher effort.

The cost of each effort level is shown below. You can see that the higher the employee's effort, the higher the employee's cost.

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
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<th>1.0</th>
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<tr>
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<td>4</td>
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<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

**Calculate Your Payoff in Each Period**

Employer's payoff = (120 – wage) * actual effort

Employee’s payoff = wage – cost of actual effort

**Examples**

**Example 1:**
If the employer chooses a wage of 50 Lira, requests an effort level of 0.7 and the employee chooses an effort level of 0.6, payoffs are as follows.

Employer’s payoff: \((120 - 50) \times 0.6 = 42 \text{ Lira} (\$21)\)

Employee’s payoff: \(50 - 8 = 42 \text{ Lira} (\$21)\)

**Example 2:**
If the employer chooses a wage of 50 Lira, requests an effort level of 0.7 and the employee chooses an effort level of 0.3, payoffs are as follows.

Employer’s payoff: \((120 - 50) \times 0.3 = 21 \text{ Lira} (\$10.5)\)

Employee’s payoff: \(50 - 2 = 48 \text{ Lira} (\$24)\)
APPENDIX B
Instruments for Exogenous Treatment with Committed Penalty

Welcome to our experiment! During the experiment you will make decisions that will affect yourself and other participants. In this experiment you can earn money.

There will be ten periods in this experiment. Your final payoff will be randomly determined from one of the ten period’s payoff by having a volunteer roll a ten-sided die after the experiment is over. In the experiment all payoffs are expressed in “Lira”, an experimental currency. At the end of the experiment, Lira will be converted into dollars at the rate of:

\[2 \text{ Lira} = 1 \text{ Dollar}\]

In addition, you will receive a $5 payment for showing up for the experiment on time.

At the end of the experiment you will be paid cash in an envelope in a private room. All decisions and payoffs are confidential. No other participants will know your decisions and payoffs. In addition, no participant will know which other participants they were matched with.

You are not allowed to talk with other participants or use your phone during the entire experiment. If you have any questions, please raise your hand, the experimenter will come to help you in private.

The Role of Players

Each participant will be randomly assigned to one of two groups: half of participants will be “employers” and the other half of participants will be “employees”. You will learn your role when the experiment begins. One employer will be randomly matched with one employee. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.

Experimental Procedure

Step 1: The employer chooses a wage to offer their matched employee. The wage can be any integer between 20 Lira and 120 Lira inclusive (20, 21, 22, …, 118, 119, 120). At the same time, the employer also requests an effort level from the employee (see below).

Step 2: After the employee learns the matched employer’s wage and the requested effort level, the employee chooses an effort level. The employee’s actual effort does not need to be the same as the employer’s requested effort. The effort can be any one of the following:
Lower numbers represent lower effort. Higher numbers represent higher effort.

The cost of each effort level is shown below. You can see that the higher the employee’s effort, the higher is the employee’s cost.

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<th>0.5</th>
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<th>0.7</th>
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<tbody>
<tr>
<td>Cost</td>
<td>0</td>
<td>1</td>
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<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

Please note that the experimenter sets up a payoff deduction system as follows:

1. If the employee’s effort is greater than or equal to the employer’s requested effort, the employee’s pay cannot be reduced.

2. If the employee’s effort is less than the employer’s requested effort, the employee’s payoff will be reduced by 6 Lira and the employer’s payoff will be reduced by 2 Lira.

**Calculate Your Payoff in Each Period**

1. If the employee’s effort is greater than or equal to the employer’s requested effort, payoffs are as follows:
   - Employer’s payoff = \((120 – \text{wage}) \times \text{actual effort}\)
   - Employee’s payoff = \(\text{wage} – \text{cost of actual effort}\)

2. If the employee’s effort is less than the employer’s requested effort, payoffs are as follows:
   - Employer’s payoff = \((120 – \text{wage}) \times \text{actual effort} - 2\)
   - Employee’s payoff = \(\text{wage} – \text{cost of actual effort} – 6\)

**Examples**

Example 1:
- If the employer:
  1) chooses a wage of 50 Lira
2) requests an effort level of 0.7
And the employee chooses an effort level of 0.7, payoffs are as follows.

Employer’s payoff: \((120 - 50) \times 0.7 = 49\) Lira ($24.5)
Employee’s payoff: \(50 - 10 = 40\) Lira ($20)

**Example 2:**

If the employer:
1) chooses a wage of 50 Lira
2) requests an effort level of 0.7
And the employee chooses an effort level of 0.6, payoffs are as follows.

Employer’s payoff: \((120 - 50) \times 0.6 - 2 = 40\) Lira ($20)
Employee’s payoff: \((50 - 8) - 6 = 36\) Lira ($18)
APPENDIX C
Instruments for Endogenous Treatment with Committed Penalty

Welcome to our experiment! During the experiment you will make decisions that will affect yourself and other participants. In this experiment you can earn money.

There will be ten periods in this experiment. Your final payoff will be randomly determined from one of the ten period’s payoff by having a volunteer roll a ten-sided die after the experiment is over. In the experiment all payoffs are expressed in “Lira”, an experimental currency. At the end of the experiment, Lira will be converted into dollars at the rate of:

\[ 2 \text{ Lira} = 1 \text{ Dollar} \]

In addition, you will receive a $5 payment for showing up for the experiment on time.

At the end of the experiment you will be paid cash in an envelope in a private room. All decisions and payoffs are confidential. No other participants will know your decisions and payoffs. In addition, no participant will know which other participants they were matched with.

You are not allowed to talk with other participants or use your phone during the entire experiment.

If you have any questions, please raise your hand, the experimenter will come to help you in private.

The Role of Players

Each participant will be randomly assigned to one of two groups: half of participants will be “employers” and the other half of participants will be “employees”. You will learn your role when the experiment begins. One employer will be randomly matched with one employee. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.

Experimental Procedure

Step 1: The employer chooses a wage to offer their matched employee. The wage can be any integer between 20 Lira and 120 Lira inclusive (20, 21, 22, …, 118, 119, 120). At the same time, the employer also requests an effort level from the employee (see below). In addition, the employer chooses whether to set up a payoff deduction system to reduce the employee’s pay.

(1) If the employer has decided to use the payoff deduction system,
   
   a. If the employee’s effort is less than the employer’s requested effort, the employee’s payoff will be reduced by 6 Lira and the employer’s payoff will be reduced by 2 Lira.
   
   b. If the employee’s effort is greater than or equal to the employer’s requested effort, the employee’s pay cannot be reduced.
(2) If the employer has decided NOT to use the payoff deduction system, then regardless of the employee’s actual effort, neither the employer’s payoff nor the employee’s payoff will be reduced.

**Step 2:** After the employee learns the matched employer’s wage, the requested effort level and whether the employer chooses to use a payoff deduction system to reduce the employee’s pay, the employee chooses an effort level. The employee’s actual effort does not need to be the same as the employer’s requested effort. The effort can be any one of the following:

\{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0\}

Lower numbers represent lower effort. Higher numbers represent higher effort.

The cost of each effort level is shown below. You can see that the higher the employee’s effort, the higher the employee’s cost.

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.2</th>
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<tbody>
<tr>
<td>Cost</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>
(1) If the employer chooses to use the payoff deduction system to reduce the employee’s pay,
   a. If employee’s effort is greater than or equal to the employer’s requested effort, payoffs are as follows:
      Employer’s payoff = (120 – wage) * actual effort
      Employee’s payoff = wage – cost of actual effort
   b. If the employee’s effort is less than the employer’s requested effort, payoffs are as follows:
      Employer’s payoff = (120 – wage) * actual effort - 2
      Employee’s payoff = wage – cost of actual effort - 6

(2) If the employer chooses NOT to use the payoff deduction system to reduce the employee’s pay, payoffs are as follows:
   Employer’s payoff = (120 – wage) * actual effort
   Employee’s payoff = wage – cost of actual effort
Examples

Example 1:
If the employer:
1) chooses to use a payoff deduction system to reduce the employee’s pay
2) chooses a wage of 50 Lira
3) requests an effort level of 0.7
And the employee chooses an effort level of 0.6, payoffs are as follows.

Employer’s payoff:  \[(120 - 50)\times 0.6 - 2 = 40 \text{ Lira} \ (\$20)\]
Employee’s payoff:  \[(50 - 8) - 6 = 36 \text{ Lira} \ (\$18)\]

Example 2:
If the employer:
1) chooses NOT to use a payoff deduction system to reduce the employee’s pay
2) chooses a wage of 50 Lira
3) requests an effort level of 0.7
And the employee chooses an effort level of 0.6, payoffs are as follows.

Employer’s payoff:  \[(120 - 50)\times 0.6 = 42 \text{ Lira} \ (\$21)\]
Employee’s payoff:  \[50 - 8 = 42 \text{ Lira} \ (\$21)\]
Welcome to our experiment! During the experiment you will make decisions that will affect yourself and other participants. In this experiment you can earn money.

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\[
2 \text{ Lira} = 1 \text{ Dollar}
\]

In addition, you will receive a $5 payment for showing up for the experiment on time.

At the end of the experiment you will be paid cash in an envelope in a private room. All decisions and payoffs are confidential. No other participants will know your decisions and payoffs. In addition, no participant will know which other participants they were matched with.

You are not allowed to talk with other participants or use your phone during the entire experiment. If you have any questions, please raise your hand, the experimenter will come to help you in private.

The Role of Players

Each participant will be randomly assigned to one of two groups: half of participants will be “employers” and the other half of participants will be “employees”. You will learn your role when the experiment begins. One employer will be randomly matched with one employee. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.

Experimental Procedure

Step 1: The employer chooses a wage to offer their matched employee. The wage can be any integer between 20 Lira and 120 Lira inclusive (20, 21, 22, …, 118, 119, 120). At the same time, the employer also requests an effort level from the employee (see below).
**Step 2:** After the employee learns the matched employer's wage and the requested effort level, the employee chooses an effort level. The employee's actual effort does not need to be the same as the employer's requested effort. The effort can be any one of the following:

\[
\{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0\}
\]

Lower numbers represent lower effort. Higher numbers represent higher effort.

The cost of each effort level is shown below. You can see that the higher the employee’s effort, the higher is the employee's cost.

<table>
<thead>
<tr>
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<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

**Step 3:** After the employer learns the matched employee's effort,

1. If the employee’s effort is **greater than or equal to** the employer's requested effort, the employee's pay **cannot** be reduced.

2. If the employee’s effort is **less than** the employer’s requested effort, the employer chooses whether to reduce the employee’s pay.
   
a. If the employer chooses to reduce the employee’s pay, the employee’s payoff will be reduced by 6 Lira and the employer’s payoff will be reduced by 2 Lira.

   b. If the employer chooses to **not** reduce the employee’s pay, then regardless of the employee’s actual effort, neither the employer’s payoff nor the employee’s payoff will be reduced.

**Calculate Your Payoff in Each Period**

1. If the employer **chooses to reduce** the employee’s pay, payoffs are as follows:
   
   Employer’s payoff = \((120 – wage) \times \text{actual effort} – 2\)
   
   Employee’s payoff = wage – cost of actual effort – 6

2. If the employer **chooses to NOT reduce** the employee’s pay, payoffs are as follows:
   
   Employer’s payoff = \((120 – wage) \times \text{actual effort}\)
   
   Employee’s payoff = wage – cost of actual effort
Examples

Example 1:
If the employer:
1) chooses a wage of 50 Lira
2) requests an effort level of 0.7
And the employee chooses an effort level of 0.6
And, in response, the employer chooses to reduce the employer’s pay, payoffs are as follows.

Employer’s payoff: \((120 - 50)*0.6 - 2 = 40\text{ Lira}\ ($20)\)
Employee’s payoff: \((50 - 8) - 6 = 36\text{ Lira}\ ($18)\)

Example 2:
If the employer:
1) chooses a wage of 50 Lira
2) requests an effort level of 0.7
And the employee chooses an effort level of 0.6
And, in response, the employer chooses to not reduce the employee’s pay, payoffs are as follows.

Employer’s payoff: \((120 - 50)*0.6 = 42\text{ Lira}\ ($21)\)
Employee’s payoff: \(50 - 8 = 42\text{ Lira}\ ($21)\)

Example 3:
If the employer:
1) chooses a wage of 50 Lira
2) requests an effort level of 0.7
And the employee chooses an effort level of 0.7
Then the employer cannot reduce the employee’s pay, payoffs are as follows.

Employer’s payoff: \((120 - 50)*0.7 = 49\text{ Lira}\ ($24.5)\)
Employee’s payoff: \(50 - 10 = 40\text{ Lira}\ ($20)\)
APPENDIX E

Instruments for Endogenous Treatment with Discretionary Penalty (Direct Response Method)

Welcome to our experiment! During the experiment you will make decisions that will affect yourself and other participants. In this experiment you can earn money.

There will be ten periods in this experiment. Your final payoff will be randomly determined from one of the ten period's payoff by having a volunteer roll a ten-sided die after the experiment is over. In the experiment all payoffs are expressed in “Lira”, an experimental currency. At the end of the experiment, Lira will be converted into dollars at the rate of:

\[ 2 \text{ Lira} = 1 \text{ Dollar} \]

In addition, you will receive a $5 payment for showing up for the experiment on time.

At the end of the experiment you will be paid cash in an envelope in a private room. All decisions and payoffs are confidential. No other participants will know your decisions and payoffs. In addition, no participant will know which other participants they were matched with.

You are not allowed to talk with other participants or use your phone during the entire experiment.

If you have any questions, please raise your hand, the experimenter will come to help you in private.

The Role of Players

Each participant will be randomly assigned to one of two groups: half of participants will be “employers” and the other half of participants will be “employees”. You will learn your role when the experiment begins. One employer will be randomly matched with one employee. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.

Experimental Procedure

Step 1: The employer chooses a wage to offer their matched employee. The wage can be any integer between 20 Lira and 120 Lira inclusive (20, 21, 22, …, 118, 119, 120). At the same time, the employer also requests an effort level from the employee (see below). In addition, the employer chooses whether to reserve the right or give up the right to reduce the employee’s pay (as explained in Step 3).

1. reserve the right means after the employer sees the employee’s effort level the employer can decide whether to reduce the employee’s pay.
2. give up the right means the employer cannot reduce the employee’s pay regardless of the employee’s effort level.
**Step 2:** After the employee learns the matched employer’s wage, the requested effort level and whether the employer has reserved the right or given up the right to reduce the employee’s pay, the employee chooses an effort level. The employee’s actual effort does not need to be the same as the employer’s requested effort. The effort can be any one of the following:

\{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0\}

Lower numbers represent lower effort. Higher numbers represent higher effort.

The cost of each effort level is shown below. You can see that the higher the employee’s effort, the higher the employee’s cost.

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<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

**Step 3:** If the employer has decided to reserve the right to reduce the employee’s pay, after the employer learns the matched employee’s effort,

1. If the employee’s effort is greater than or equal to the employer’s requested effort, the employee’s pay cannot be reduced.

2. If the employee’s effort is less than the employer’s requested effort, the employer chooses whether to reduce the employee’s pay.
   a. If the employer chooses to reduce the employee’s pay, the employee’s payoff will be reduced by 6 Lira and the employer’s payoff will be reduced by 2 Lira.
   b. If the employer chooses to not reduce the employee’s pay, then regardless of the employee’s actual effort, neither the employer’s payoff nor the employee’s payoff will be reduced.

If the employer has decided to give up the right to reduce the employee’s pay, there is no Step 3 and the employer’s payoff and employee’s payoff will be calculated directly after Step 2.

**Calculate Your Payoff in Each Period**

1. If the employer chooses to reserve the right to reduce the employee’s pay, after the employer learns the matched employee’s effort,
   a. If the employer chooses to reduce the employee’s pay, payoffs are as follows:
Employer’s payoff = \((120 - \text{wage}) \times \text{actual effort} - 2\)
Employee’s payoff = \(\text{wage} - \text{cost of actual effort} - 6\)

b. If the employer chooses to NOT reduce the employee’s pay, payoffs are as follows:
Employer’s payoff = \((120 - \text{wage}) \times \text{actual effort}\)
Employee’s payoff = \(\text{wage} - \text{cost of actual effort}\)

(2) If the employer chooses to give up the right to reduce the employee’s pay, payoffs are as follows:
Employer’s payoff = \((120 - \text{wage}) \times \text{actual effort}\)
Employee’s payoff = \(\text{wage} - \text{cost of actual effort}\)

---

Examples

Example 1:
If the employer:
1) reserves the right to reduce the employee’s pay
2) chooses a wage of 50 Lira
3) requests an effort level of 0.7

And the employee chooses an effort level of 0.6

And, in response, the employer chooses to reduce the employee’s pay, payoffs are as follows.

Employer’s payoff: \((120 - 50) \times 0.6 - 2\) = 40 Lira ($20)
Employee’s payoff: \((50 - 8) - 6\) = 36 Lira ($18)

Example 2:
If the employer:
1) reserves the right to reduce the employee’s pay
2) chooses a wage of 50 Lira,
3) requests an effort level of 0.7
And the employee chooses an effort level of 0.6
And, in response, the employer chooses to not reduce the employee’s pay, payoffs are as follows.

Employer’s payoff: $\ (120 - 50)*0.6 = 42 \text{ Lira ($21)}$
Employee’s payoff: $\ 50 - 8 = 42 \text{ Lira ($21)}$

**Example 3:**

If the employer:
1) **gives up the right** to reduce the employee’s pay
2) chooses a wage of 50 Lira
3) requests an effort level of 0.7
And employee chooses an effort level of 0.6, payoffs are as follows.

Employer’s payoff: $\ (120 - 50)*0.6 = 42 \text{ Lira ($21)}$
Employee’s payoff: $\ 50 - 8 = 42 \text{ Lira ($21)}$

**Example 4:**

If the employer:
1) **reserves the right** to reduce the employee’s pay
2) chooses a wage of 50 Lira
3) requests an effort level of 0.7
And employee chooses an effort level of 0.7
Then the employer **cannot** reduce the employee’s pay, payoffs are as follows.

Employer’s payoff: $\ (120 - 50)*0.7 = 49 \text{ Lira ($24.5)}$
Employee’s payoff: $\ 50 - 10 = 40 \text{ Lira ($20)}$
APPENDIX F
History for Expect High Wage Treatment

The results in a previous session of the same experiment show that:

- 5% employers offered a wage of 20 Guilders.
- 95% employers offered a wage of 60 Guilders.

In general, most employers chose to offer their employees a **HIGHER** wage.
APPENDIX G
History for Expect Low Wage Treatment

The results from one period in a previous session of the same experiment show that:

83% employers offered a wage of 20 Guilders.
17% employers offered a wage of 60 Guilders.

In general, most employers chose to offer their employees a **lower** wage.
APPENDIX H
Instruments for Expect High Wage Treatment

Welcome to our experiment! During the experiment you will make decisions that will affect yourself and other participants. In this experiment you can earn money.

There will be ten periods in this experiment. Your final payoff will be randomly determined from one of the ten period’s payoff by having a volunteer roll a 10-sided die. During the experiment your payoff will be calculated in Guilders. At the end of the experiment, Guilders will be converted into dollars at the rate of:

5 Guilders = $ 1

In addition, you will receive a $5 payment for showing up for the experiment on time.

You are not allowed to talk with other participants during the experiment. If you have any questions, please raise your hand, the experimenter will come to help you.

At the end of the experiment you will be paid in cash in an envelope in private. All decisions and payoffs are confidential. No other participants will get to know your decisions and payoffs. In addition, no participant will get to know which other participant he/she was matched with.

------------------------------------------------------------------------------------------------------------------

The Role of Participants

Each participant will be randomly assigned to one of two groups: half will be "employers" and half will be "employees". You will learn your role when the experiment begins. One employer will be randomly matched with one employee. Your role will be retained in all periods but you will be randomly re-matched with a partner at the beginning of each period.

Experimental Procedure

Stage 1: The employer offers a wage of 20 Guilders or 60 Guilders to his/her employee. At the same time, without knowing which wage the employer will offer, the employee will see the results in a previous session of the same experiment, then the employee will write down what wage he/she expects to be offered by the employer in that period (i.e. make his/her best guess of what wage he/she will get offered). The employee will get a bonus of 15 Guilders if his/her expectation (i.e. best guess) is the same as the wage that is offered by the employer. The employee’s guess will not be shown to the employer.
Stage 2: After the employee learns the wage offer, the employee determines how much effort he/she puts in to work by choosing an effort level from \{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1.0\}.

How to Calculate Your Payoff in Each Period?

For employers:

Your Payoff (in Guilders) = (120 – Wage) * Effort

For employees:

The cost of each effort level is shown in the following table: (The lower the effort is, the lower the cost is; the higher the effort is, the higher the cost is.)

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (in Guilders)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

Your Payoff (in Guilders) = Wage – Cost of Effort

Examples

Example 1:

Suppose the employer offers a wage of 20 Guilders, and the employee chooses an effort level of 0.6,

employer’s payoff (in Guilders): \((120 – 20) * 0.6 = 60\)
employee’s payoff (in Guilders): \(20 – 8 = 12\)

Example 2:

Suppose the employer offers a wage of 60 Guilders, and the employee chooses an effort level of 0.6,
employer's payoff (in Guilders): $(120 - 60) \times 0.6 = 36$
employee's payoff (in Guilders): $60 - 8 = 52$
APPENDIX I
Instruments for Expect Low Wage Treatment

Welcome to our experiment! During the experiment you will make decisions that will affect yourself and other participants. In this experiment you can earn money.

There will be ten periods in this experiment. Your final payoff will be randomly determined from one of the ten period's payoff by having a volunteer roll a 10-sided die. During the experiment your payoff will be calculated in Guilders. At the end of the experiment, Guilders will be converted into dollars at the rate of:

5 Guilders = $1

In addition, you will receive a $5 payment for showing up for the experiment on time.

You are not allowed to talk with other participants during the experiment. If you have any questions, please raise your hand, the experimenter will come to help you.

At the end of the experiment you will be paid in cash in an envelope in private. All decisions and payoffs are confidential. No other participants will get to know your decisions and payoffs. In addition, no participant will get to know which other participant he/she was matched with.

------------------------------------------------------------------------------------------------------------------

The Role of Participants

Each participant will be randomly assigned to one of two groups: half will be "employers" and half will be "employees". You will learn your role when the experiment begins. One employer will be randomly matched with one employee. Your role will be retained in all periods but you will be randomly re-matched with a partner at the beginning of each period.

Experimental Procedure

Stage 1: The employer offers a wage of 20 Guilders or 60 Guilders to his/her employee. At the same time, without knowing which wage the employer will offer, the employee will see the results in a previous session of the same experiment, then the employee will write down what wage he/she expects to be offered by the employer in that period (i.e. make his/her best guess of what wage he/she will get offered). The employee will get a bonus of 15 Guilders if his/her expectation (i.e. best guess) is the same as the wage that is offered by the employer. The employee’s guess will not be shown to the employer.
**Stage 2:** After the employee learns the wage offer, the employee determines how much effort he/she puts in to work by choosing an effort level from \{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9 and 1.0\}.

**How to Calculate Your Payoff in Each Period?**

**For employers:**

Your Payoff (in Guilders) = (120 – Wage) * Effort

**For employees:**

The cost of each effort level is shown in the following table: (The lower the effort is, the lower the cost is; the higher the effort is, the higher the cost is.)

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
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<tbody>
<tr>
<td>Cost (in Guilders)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>

Your Payoff (in Guilders) = Wage – Cost of Effort

**Examples**

**Example 1:**

Suppose the employer offers a wage of 20 Guilders, and the employee chooses an effort level of 0.6,

employer’s payoff (in Guilders): \((120 – 20) * 0.6 = 60\)

employee’s payoff (in Guilders): \(20 – 8 = 12\)

**Example 2:**

Suppose the employer offers a wage of 60 Guilders, and the employee chooses an effort level of 0.6,
employer’s payoff (in Guilders): \( (120 - 60) \times 0.6 = 36 \)
employee’s payoff (in Guilders): \( 60 - 8 = 52 \)
APPENDIX J
Instruments for Endogenous Treatment with Discretionary Penalty (Strategy Method)

Welcome to our experiment! During the experiment you will make decisions that will affect yourself and other participants. In this experiment you can earn money.

There will be ten periods in this experiment. Your final payoff will be randomly determined from one of the ten period's payoff by having a volunteer roll a ten-sided die after the experiment is over. During the experiment your payoff will be calculated in Lira. At the end of the experiment, Lira will be converted into dollar at the rate of:

\[ 2 \text{ Lira} = 1 \text{ Dollar} \]

In addition, you will receive a $5 payment for showing up for the experiment on time.

At the end of the experiment you will be paid cash in an envelope in a private room. All decisions and payoffs are confidential. No other participants will get to know your decisions and payoffs. In addition, no participant will get to know which other participant he/she was matched with.

You are not allowed to talk with other participants or use your phone during the entire experiment. If you have any questions, please raise your hand, the experimenter will come to help you in private.

The Role of Players

Each participant will be randomly assigned to one of two groups: half of participants will be "employers" and the other half of participants will be "employees". You will learn your role when the experiment begins. One employer will be randomly matched with one employee. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.
**Experimental Procedure**

**Step 1:** The employer offers a wage to his/her matched employee. The wage choice can be an amount between 20 Lira and 120 Lira inclusive (for example, 20, 21, 22, …, 118, 119, 120). The chosen wage must be an integer. At the same time, the employer also requests a desired effort level which the employer would like the matched employee to put in.

In addition, the employer needs to decide whether to **reserve the right** to use a conditional payoff cut plan or **give up the right** to use a conditional payoff cut plan.

"**Reserve the right**" means the employer can wait until the employer learns the employee’s effort level and then decide whether to use the conditional payoff cut plan.

"**Give up the right**" means the employer will not be able to use the conditional payoff cut plan after the employer learns the employee’s effort level regardless of the employee’s effort level.

**Conditional payoff cut plan** works as follows:

- If the employee’s effort is less than the employer’s desired effort, the employee’s payoff will be reduced by 6 Lira and the employer’s payoff will be reduced by 2 Lira.
- If the employee’s effort is equal or greater than the employer’s desired effort, neither the employer’s payoff nor the employee’s payoff will be reduced.

**Step 2:** After the employee learns the wage offer and the desired effort level from the matched employer, without knowing the matched employer’s decision on reserving the right or giving up the right, the employee chooses an effort level to put in for the employer conditional on two possibilities A and B. The effort choice can be any one of the following ten choices:

\[
\{0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0\}
\]

Lower numbers represent lower effort. Higher numbers represent higher effort.

The two possibilities for the employee’s decisions are as follows:

A) If your matched employer chose to **reserve the right** to use the conditional payoff cut plan later, your effort choice is: _______
B) If your matched employer chose to give up the right to use the conditional payoff cut plan, your effort choice is: _______

Step 3:
If the employer decides to reserve the right to use the conditional payoff cut plan in Step 1, after the employer learns the matched employee’s effort, the employer decides whether to use the conditional payoff cut plan.

- If the employer decides to use the conditional payoff cut plan, then it works as it is described under Conditional payoff cut plan in Step 1.
- If the employer decides to NOT use the conditional payoff cut plan, then regardless of the employee’s effort, neither the employer’s payoff nor the employee’s payoff will be reduced.

If the employer decides to give up the right to use the conditional payoff cut plan in Step 1, there is no Step 3 and the employer’s payoff and employee’s payoff will be calculated directly after Step 2.
Calculate Your Payoff in Each Period

Employer’s payoff = (120 – wage) * effort

Employee’s payoff = wage – cost of effort

The cost of each effort level is shown as follows (The lower the employee’s effort is, the lower the employee’s cost. The higher the employee’s effort is, the higher the employee’s cost.):

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
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<th>0.9</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
</tbody>
</table>
Examples

Example 1:
The employer chooses a wage of 50 Lira, requests an effort level of 0.7 and decides to reserve the right to use the conditional payoff cut plan after he learns the employee’s effort.

The employee decides:

A) If the matched employer chose to reserve the right to use the conditional payoff cut plan later, my effort choice is: __0.6____

B) If the matched employer chose to give up the right to use the conditional payoff cut plan, your effort choice is: __0.8____

After the employer knows that his matched employee chose an effort level of 0.6, based on the employer’s reservation of the right, the employer decides to use the conditional payoff cut plan.

Employer’s payoff: (120 - 50)*0.6 -2 = 40 Lira

Employee’s payoff: 50 - 8 - 6 = 36 Lira

Example 2:
The employer chooses a wage of 70 Lira, requests an effort level of 0.8 and decides to reserve the right to use the conditional payoff cut plan after he learns the employee’s effort.

The employee decides:

A) If the matched employer chose to reserve the right to use the conditional payoff cut plan later, my effort choice is: __0.2____

B) If the matched employer chose to give up the right to use the conditional payoff cut plan, your effort choice is: __0.5____

After the employer knows that his matched employee chose an effort level of 0.2, based on the employer’s reservation of the right, he decides to NOT use the conditional payoff cut plan.

Employer’s payoff: (120 - 70)*0.2 = 10 Lira

Employee’s payoff: 70 - 1 = 69 Lira

Example 3:
The employer chooses a wage of 30 Lira, requests an effort level of 0.5 and decides to *give up the right* to use the conditional payoff cut plan after he learns the employee’s effort.

The employee decides:

A) If the matched employer chose to *reserve the right* to use the conditional payoff cut plan later, my effort choice is: **0.5**

B) If the matched employer chose to *give up the right* to use the conditional payoff cut plan, your effort choice is: **0.4**

Employer’s payoff: 

\[(120 - 30)*0.4 = 36 \text{ Lira}\]

Employee’s payoff: 

\[30 - 4 = 26 \text{ Lira}\]
APPENDIX K
Instruments for No Communication Treatment

Thank you for participating in our experiment. During the experiment you will make decisions that will affect yourself and others.

In the experiment there are two types of players, randomly assigned by the experimenters, who we will refer to as ‘Employer’ and ‘Employee’. You will learn your role when the experiment begins. The experiment will last for six periods. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.

At the end of the experiment you will be paid in cash, in private. Your final payoff will be based on one period's payoff (in addition to the show-up fee $5). The period used to determine your payoff will be randomly chosen from one of the six periods (the experimenter will roll a dice and determine the period number in front of all subjects when the experiment is finished). Your decisions and the payment you receive will not be shared with anyone. **At this time we must ask that you not talk with any of the fellow participants until the experiment is over. If you have a question, please raise your hand and ask the experimenters privately.**

The Role of Players

**Employer:** The Employer chooses a wage from \{20, 30, 40\} and requests a desired effort level from \{0.1, 0.5, 1.0\} of the Employee.

**Employee:** After the Employer chooses a wage and requests a desired effort level, the Employee chooses an effort level. The Employee may choose an effort level different than that requested by the Employer. It costs the Employee more to put in a higher effort level than a lower effort level. The Effort-Cost table is as follows:

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.5</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$1</td>
<td>$5</td>
<td>$10</td>
</tr>
</tbody>
</table>

The Period’s Payoff Function

The Employer’s period payoff function is:
$(80 - Wage) \times Effort$

The Employee's period payoff function is:

$Wage - Cost of Effort$

**Game sequence**

Step 1: The Employer chooses a wage and requests a desired effort level.

Step 2: The Employee chooses an effort level.

---

**Examples (all payments exclude show-up payment of $5)**

**Example 1:**
If the Employer chooses a wage of $20 and requests an effort level of 0.5, and the Employee puts in an effort level of 0.5,

Employer’s payoff: \((80 - 20) \times 0.5 = 30\)

Employee’s payoff: \(20 - 5 = 15\)

**Example 2:**

If the Employer chooses a wage of $30 and requests an effort level of 1.0, and the Employee puts in an effort level of 0.1,

Employer’s payoff: \((80 - 30) \times 0.1 = 5\)

Employee’s payoff: \(30 - 1 = 29\)

**Example 3:**

If the Employer chooses a wage of $40 and requests an effort level of 1.0, and the Employee puts in an effort level of 0.5,

Employer’s payoff: \((80 - 40) \times 0.5 = 20\)

Employee’s payoff: \(40 - 5 = 35\)
APPENDIX L
Instruments for One-Way Communication Treatment

Thank you for participating in our experiment. During the experiment you will make decisions that will affect yourself and others.

In the experiment there are two types of players, randomly assigned by the experimenters, who we will refer to as ‘Employer’ and ‘Employee’. You will learn your role when the experiment begins. The experiment will last for six periods. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.

At the end of the experiment you will be paid in cash, in private. Your final payoff will be based on one period’s payoff (in addition to the show-up fee $5). The period used to determine your payoff will be randomly chosen from one of the six periods (the experimenter will roll a dice and determine the period number in front of all subjects when the experiment is finished). Your decisions and the payment you receive will not be shared with anyone. **At this time we must ask that you not talk with any of the fellow participants until the experiment is over. If you have a question, please raise your hand and ask the experimenters privately.**

**The Role of Players**

**Employer:** The Employer chooses a wage from \{20, 30, 40\} and requests a desired effort level from \{0.1, 0.5, 1.0\} of the Employee.

**Employee:** Before the Employer chooses a wage and requests a desired effort level, the Employee may send a free-form message to the Employer. The message must be between 0 and 200 characters in length. The message may not contain any threatening or offensive language, nor may it contain any self-identifying information. After the Employer chooses a wage and requests a desired effort level, the Employee chooses an effort level. **The Employee may choose an effort level different than that requested by the Employer.** It costs the Employee more to put in a higher effort level than a lower effort level. The Effort-Cost table is as follows:

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.5</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$1</td>
<td>$5</td>
<td>$10</td>
</tr>
</tbody>
</table>

**The Period’s Payoff Function**

The Employer’s period payoff function is:
The Employee’s period payoff function is:

\[(80 - Wage) \times Effort\]

\[Wage - Cost of Effort\]

**Game sequence**

Step 1: The Employee may send a message to the Employer.

Step 2: The Employer chooses a wage and requests a desired effort level.

Step 3: The Employee chooses an effort level.

**Examples (all payments exclude show-up payment of $5)**

**Example 1:**
If the Employer pays a wage of $20 and requests an effort level of 0.5, and the
Employee puts in an effort level of 0.5,

Employer’s payoff: \( (80 - 20) \times 0.5 = 30 \)  
Employee’s payoff: \( 20 - 5 = 15 \)

Example 2:
If the Employer pays a wage of $30 and requests an effort level of 1.0, and the
Employee puts in an effort level of 0.1,

Employer’s payoff: \( (80 - 30) \times 0.1 = 5 \)  
Employee’s payoff: \( 30 - 1 = 29 \)

Example 3:
If the Employer pays a wage of $40 and requests an effort level of 1.0, and the
Employee puts in an effort level of 0.5,

Employer’s payoff: \( (80 - 40) \times 0.5 = 20 \)  
Employee’s payoff: \( 40 - 5 = 35 \)
APPENDIX M
Instruments for Two-Way Communication Treatment

Thank you for participating in our experiment. During the experiment you will make decisions that will affect yourself and others.

In the experiment there are two types of players, randomly assigned by the experimenters, who we will refer to as 'Employer' and 'Employee'. You will learn your role when the experiment begins. The experiment will last for six periods. Your role will be retained in all periods but you will be randomly re-matched with a partner in each period.

At the end of the experiment you will be paid in cash, in private. Your final payoff will be based on one period’s payoff (in addition to the show-up fee $5). The period used to determine your payoff will be randomly chosen from one of the six periods (the experimenter will roll a dice and determine the period number in front of all subjects when the experiment is finished). Your decisions and the payment you receive will not be shared with anyone. At this time we must ask that you not talk with any of the fellow participants until the experiment is over. If you have a question, please raise your hand and ask the experimenters privately.

The Role of Players

Employer: The Employer chooses a wage from \{\$20, \$30, \$40\} and requests a desired effort level from \{0.1, 0.5, 1.0\} of the Employee. In addition, the Employer may send a free-form message to the Employee. The message will be limited from 0 to 200 characters. The message may not contain any threatening or offensive language, nor may it contain any self-identifying information.

Employee: Before the Employer chooses a wage and requests a desired effort level, the Employee may send a free-form message to the Employer. The message must be between 0 and 200 characters in length. The message may not contain any threatening or offensive language, nor may it contain any self-identifying information. After the Employer chooses a wage and requests a desired effort level, the Employee chooses an effort level. The Employee may choose an effort level different than that requested by the Employer. It costs the Employee more to put in a higher effort level than a lower effort level. The Effort-Cost table is as follows:

<table>
<thead>
<tr>
<th>Effort</th>
<th>0.1</th>
<th>0.5</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$1</td>
<td>$5</td>
<td>$10</td>
</tr>
</tbody>
</table>
The Period’s Payoff Function

The Employer’s period payoff function is:

\[(80 - Wage) \times Effort\]

The Employee’s period payoff function is:

\[Wage - Cost of Effort\]

Game sequence

Step 1: The Employee may send a message to the Employer.

Step 2: The Employer chooses a wage and requests a desired effort level.

Step 3: The Employer may send a message to the Employee.

Step 3: The Employee decides an effort level.

Examples (all payments exclude show-up payment of $5)

Example 1:

If the Employer pays a wage of $20 and requests an effort level of 0.5, and the Employee puts in an effort level of 0.5,
Employer’s payoff: \((80 - 20) \times 0.5 = $ 30\)

Employee’s payoff: \(20 - 5 = $ 15\)

**Example 2:**

If the Employer pays a wage of $30 and requests an effort level of 1.0, and the Employee puts in an effort level of 0.1,

Employer’s payoff: \((80 - 30) \times 0.1 = $ 5\)

Employee’s payoff: \(30 - 1 = $ 29\)

**Example 3:**

If the Employer pays a wage of $40 and requests an effort level of 1.0, and the Employee puts in an effort level of 0.5,

Employer’s payoff: \((80 - 40) \times 0.5 = $ 20\)

Employee’s payoff: \(40 - 5 = $ 35\)
### APPENDIX N

**Strategic Form Game for All Treatments**

<table>
<thead>
<tr>
<th>Player 1: Principal</th>
<th>Player 2: Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>effort</td>
<td>0.1</td>
</tr>
<tr>
<td>wage</td>
<td></td>
</tr>
<tr>
<td>$20</td>
<td>(6, 19)*</td>
</tr>
<tr>
<td>$30</td>
<td>(5, 29)</td>
</tr>
<tr>
<td>$40</td>
<td>(4, 39)</td>
</tr>
</tbody>
</table>
Bibliography


