Principals' Power, Decision Frames and Delegation: An Experiment

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Abstract

Principals frequently delegate decisions regarding the treatment of third parties. An important open question is whether and why delegates accommodate principals' selfishness when principals hold only imperfect power over them. We develop a theory and predict that if a principal holds any power, then delegates fully accommodate the principal's selfish preferences. Delegates are predicted to pursue equality in outcomes only when principals have zero power. We test our hypotheses using a modified dictator game where principals delegate decisions over amounts to allocate to recipients. Consistent with our theory, we find delegates' allocation decisions do not significantly differ, and favor principals' selfish preferences, whenever principals hold any power over delegates. Absent principals' power, delegates' decisions favor equity. Further, we find delegates' decision frames mediate power's effect on delegates' allocations. Our results offer new insights on the design of delegation systems, and are of particular importance in ensuring independent delegate decision making.

Keywords: Power, Delegation, Decision frame, Inequity aversion, Sanctions

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1. Introduction

Delegation is prevalent in social and business environments despite principals' inability to control delegates' actions perfectly. For example, upper level management may delegate ethically questionable decisions to lower-level managers (Hamman et al. 2010), yet be only imperfectly able to sanction violations of such requests. Similarly, companies that outsource ethically questionable (and lower cost) production may invest substantial resources in such arrangements, leaving the relationship difficult to terminate even if the delegate firm did not fully comply with the principal firm's selfish preferences. Indeed, the imperfect ability to control a delegate's decision is often an advantage for principals who wish to separate themselves from morally questionable decisions others take on their behalf. Little research has explored, however, how a delegate's willingness to support their principal's selfish preferences changes as the principal's power to sanction a non-complying delegate varies. This paper is an effort to fill that gap. We develop a novel theory of a three-party principal-delegate-recipient relationship that incorporates inequity aversion (Fehr and Schmidt 1999) as well as decision frames (Tenbrunsel and Messick 1999), and report data from a preregistered laboratory experiment[1] that tests its predictions. Our paper is the first to show how decision frames impact delegates' decision making in a tripartite delegation environment.

Building on Hamman et al. (2010), we model an environment where a principal must hire a delegate to divide an endowment between the principal and a third person denoted as the recipient. A delegate's payoff is determined by the number of principals who hire him/her. Both the principal's and the recipient's payoffs are determined by the delegate's allocation. Importantly, delegates' allocation preferences may conflict with principals' desires. The reason is that delegates might be more interested in equity of outcomes

[1] Our experiment is registered here: https://osf.io/n4w95/?view_only=f9922bb5885040ad8d4a7e3ac4638a87.

while principals may want to maximize their own earnings.

If a principal is dissatisfied with a delegate's decision, they can attempt to end the employment relationship. We identify principals' power over delegates with the objective probability that an effort to fire a delegate succeeds. Because the payoff of a delegate increases with the number of principals who employ them, principals' power over delegates can impact delegates' behavior. Our theory provides a novel perspective on the mechanism underlying that impact.

We build on Fehr and Schmidt's (1999) model of inequity aversion. Delegates care about their own monetary payoffs as well as the psychological impact they experience due to their delegation decisions. In particular, while allocating a larger share of the endowment to principals helps to avoid termination and increase their own monetary payoffs, the resulting inequity can decrease delegates' psychic payoff. The reason is that a delegate might experience guilt or envy when comparing his/her own payoff to the payoff of the recipient or principal. The delegate might also experience psychic cost if his/her decision leaves the principal and recipient earning different amounts.

We extend this model of inequity aversion by incorporating decision frames (Tenbrunsel and Messick 1999). Specifically, if principals hold zero power to sanction a delegate by terminating their employment then delegates act within a social decision frame: their decisions are guided by a preference for equitable prosocial outcomes (see, Li et al. 2009, Handgraaf et al. 2008). Consequently, our theory predicts that in the social decision frame delegates divide the endowment equally between principals and recipients. When principals have any power to fire delegates, however, delegates make decisions within a business decision frame (e.g., Li et al. 2009, Tenbrunsel and Messick 1999): they decide according to their own self-interest while giving little weight to the social consequences of their actions including equity and fairness. As a result, our theory predicts that delegates in the business decision frame accommodate principals' preferences in order to increase their own expected earnings by reducing the chance of termination.

It is worth emphasizing that incorporating decision frames into a model of inequity aversion leads to starkly different predictions than an otherwise identical model without such frames. We show that if inequity-averse delegates maximize their expected utility according to the objective termination probability, then the amount delegates allocate to principals increases monotonically in the objective probability that attempts to fire them will be successful. By contrast, our framework with decision frames predicts two distinct allocation decisions: an equal amount to principals and recipients when principals have no power (so the delegate is in the social decision frame), and inequitable allocations in favor of the principals when principals hold any power over delegates (so delegates are in the business decision frame)[2]. We show that the amounts allocated in the business frame depend on the extent to which, in relation to the social decision frame, the psychic costs of guilt, envy and unfairness diminish in the business decision frame.

We test our theory of inequity aversion with decision frames using a laboratory experiment, find it to be clearly supported. Regarding allocation decisions, we find that if principals have no power to fire then delegates allocate equally to the principals and recipients. Delegates allocate significantly more of the endowment to their principals, however, whenever principals have any power to terminate the employment relationship. Consistent with our hypothesis we find delegates to make statistically identical allocations whenever they face any positive probability of termination.

Regarding decision frames, we asked delegates to report whether they perceived their allocation to be

[2] These hypotheses are motivated in part by previous similar experiments we conducted as discussed in our preregistration document.

a social or business decision. When principals had no power, delegates reported that the allocation was more social. When there was any chance of successful termination, however, delegates reported that the allocation was more of a business decision. Consistent with our model, the self-reported decision frame does not significantly vary with the level of the principal's positive power. Further, we find decision frames to mediate the effect of principals' power on delegate allocations.

Terminating employment is a particularly severe sanction, and our findings resonate with a large literature showing sanction threats may "dominate other incentives" (Dickinson and Villeval 2008) and lead people to make decisions in a business decision frame (Gneezy and Rustichini 2000, Li et al. 2009). The implication is that principals can have confidence that delegates will work to satisfy principals' selfish preferences in order to maintain their own employment benefits, even when they can be only imperfectly monitored and sanctioned. Whether this type of delegate behavior is desirable depends on the extent to which an organization favors independence in delegates' decision making. If independence is required, then our results suggest strong controls would need to be in place to shield delegates from possible retaliation by principals.

The remainder of the paper is organized as follows. The next section introduces related literature. Section 3 presents our theory and hypotheses. Sections 4 and 5 present the experiment design and results, respectively. The last section concludes.

2. Related Literature

2.1 Impact of Power on Individual Decisions in Delegation

Selfish use of power can emerge due to feelings of entitlement, moral identity, and/or self-justification (DeCelles et al. 2012, Guinote 2017, Rode and Le Menestrel 2011). Psychological findings suggest that powerful people are less likely to care about others (Fiske and Berdahl 2007, Galinsky et al. 2006). Similarly, they enact less justice toward others (Blader and Chen 2012), are more egocentric and moral hypocritical (Handgraaf et al. 2008, Lammers et al. 2010). In addition, having higher power can lower distributive fairness and alter fairness perceptions (Mallucci et al. 2019). For instance, Rode and Le Menestrel (2011) show that those with full decision power divide less gains from productive activity to others as well as that their fairness perceptions are biased towards self-interest. However, the above studies leave open important questions regarding the role of power in a delegation context as they involve no delegated decision-making.

Existing experiments on power in delegation focus on principals' willingness to delegate their power to make decisions. Principals who possess power or decision authority are usually reluctant to delegate their decision-making rights (Bartling et al. 2014, Bobadilla-Suarez et al. 2017, Fehr et al. 2013). For example, Fehr et al. (2013) investigated principals' willingness to delegate in an authority-delegation game where delegating the decision power was optional. They showed that principals with decision power were often reluctant to delegate, even when it benefited their material interest. This indicates that power has nonpecuniary utility. With a delegation–communication game, Lai and Lim (2012) likewise found that subjects in the role of principals almost always under-delegate to retain their power and authority.

One issue that remains largely uninvestigated is how a principal's power practically impacts their delegates. Hamman et al. (2010) experimentally found that when delegates knew their principals could dismiss them at will, they would fulfill their principals' profit-maximizing preference at the expense of a passive third party. In comparison, our study differs from Hamman et al. (2010) in that we manipulate the probability with which principals are able to fire delegates. Another strand of delegation research concerns the hidden cost that results from intervening to control and restrict a delegate's actions (Falk and Kosfeld 2006, Friebel and Schnedler 2011). Our study differs from these in that we focus on the impact of principals' power to sanction (terminate) as compared to the impact of restrictions on a choice set.

2.2 Delegated Decisions Made by Delegates

Principals delegate to improve decision quality, especially when delegates have advantages in time or knowledge (Aghion and Tirole 1997, Koc et al. 2004). Delegation may also serve as a way for principals to shift responsibility for ethically questionable outcomes (Hamman et al. 2010). The reason is that delegating usually leads to outcomes that favor the principals but are less socially desirable. In scenarios that may impose negative externalities on third parties, delegates are hired to take self-interested or immoral actions on behalf of their principals when the principals are reluctant to take those actions directly.

A small but growing literature investigate decisions made by delegates that have negative externalities. This literature suggest that delegation might benefit the principals at the cost of others. Using an experiment where principals can delegate to the delegates by "selling" the opportunity to play the dictator game, both Coffman (2011) and Collins et al. (2018) showed that including delegates can greatly reduce the amount of money allocated to the recipients. In an experiment with options of fair or unfair allocation for the third party, Bartling and Fischbacher (2012) found that when punishment is not available, the fraction of fair choices is almost halved if the choice decision is delegated to a delegate, as compared to the case where the principal makes the choice. Our study contributes to this strand of literature by documenting delegates' willingness to fulfill principals' selfish preference even when principals have only limited power over them.

2.3 Decision Frames

A decision frame is a decision-maker's conception of the acts, outcomes, and contingencies associated with a particular choice (Tversky and Kahneman 1985). Attention often focuses on the distinction between "social" and "business" frames. For example, in their seminal paper, Tenbrunsel and Messick (1999) report that under sanction threats people perceive decisions more as being about business than ethics. They argue that sanction threats focus people on self-interest and override consideration for others. Many studies provide evidence that sanctions crowd-out pro-sociality (Houser et al. 2008, Gneezy and Rustichini 2000), providing further support for the impact of decision frames on behavior.

Previous research has also offered insights on the neural foundations of decision frames. For example, Li et al. (2009) found that, in relation to cases where people make decisions absent threats, the presence of sanction threats reduces activity in areas of the brain associated with social reward valuation, while simultaneously increasing activity in areas responsible for rational, calculative valuations. They further found activation in the brain's VMPFC to predict whether a person would behave pro-socially, and that this activation was modulated by sanction threats.

Despite substantial theoretical and empirical evidence of the importance of decision frames to decision making, no previous study has considered the impact of decision frames on environments where principals delegate ethical decisions involving third parties to subordinates over whom they have power. Indeed, to our knowledge, ours is the only study that investigates the impact of decision frame in the tripartite delegation context, a scenario that is ubiquitous within organizations. In particular, while previous studies show that decision frames impact behavioral outcomes in two-party interactions (Blount and Larrick 2000, Handgraaf et al. 2008), no existing theory of decision frames can be directly applied to behaviors in our tripartite delegation environment.[3] We contribute by developing novel decision theory applicable to this environment, and test its predictions using a pre-registered laboratory experiment.

3. Hypotheses

3.1 Environment

We predict a delegate's behavior using a framework with compulsory delegation. In our setting delegates' fairness preferences are misaligned with principals' selfish earning-maximizing preferences[4]. Following Hamman et al. (2010), we consider a delegate market in which each of six principals must each select one of three delegates to make allocation decisions on their behalf. Each delegate can be selected by multiple principals. Our setting includes multiple rounds. In the first round, each delegate is randomly selected to allocate for two principals. The selected delegate distributes a fixed endowment of ￥60 between the principal and a passive third-party recipient, thus determining the principal's and recipient's earnings for that round. After learning of delegate's chosen allocation, the principal decides whether to fire the delegate and hire a new delegate in the following round.

Delegates incur a fixed cost of ￥21.6 per round to make decisions on behalf of their principals. They also start each round with ￥30 and earn ￥10.8 for each principal they allocates for. The net expected earnings for this delegate in round t depends on the expected number of principals the delegate allocates for in round t conditional on their previous round's decision.

[3] In two-person environments, decision frame theory predicts, and evidence shows, that an agent becomes less willing to make fair allocations to their principal when their principal threatens them with weak sanctions (Houser et al, 2008; Li et al, 2009). Because a delegate trades-off among the interests of themselves and two others, one of whom has some power over them, it is not possible to apply the two-person findings to a three-person environment. Indeed, the intuition that a delegate would give less to a principal when threatened with a weak sanction turns out to be incorrect, both theoretically and empirically.

[4] We assume principals are selfish but delegates hold fairness concerns. A reason is that principals are able to justify their selfish payoff maximization behavior by shifting the responsibility to their delegates (Hamman et al. 2010). This enables selfish behavior without psychological cost. A related reason is that this tension is ecologically valid, as without it there would be much less incentive to delegate morally questionable decisions.

We capture principals' power by varying their ability to fire their delegates in round t after learning of the allocation outcomes in round t - 1. Delegates are informed before making any allocation decisions that the principal can try to fire them and choose another delegate. Delegates are aware a principal who tries to fire a delegate is successful in doing so with probability p.

3.2 Incorporating Social Preferences and Decision Frames

Our model of delegates' decision making includes both social preferences and decision frames. The possibility of being terminated by principals can shift delegates from an equity-sensitive "social" decision frame to a business decision frame that promotes selfishness (Li et al. 2009, Tenbrunsel and Messick 1999, for details, see sectionn 2.3). We assume that under a business decision frame delegates behave as if the probability of termination were unity, regardless of its actual objective value. That is, we assume:

$$f(p) = \begin{cases} 0, p = 0 & \text{(social decision frame)} \\ 1, p > 0 & \text{(business decision frame)} \end{cases} \quad (1)$$

where f(p) can be interpreted as the delegate's subjective belief about the likelihood of successful termination in the event their principal were to try to fire them[5].

We build from Fehr and Schmidt (1999) to predict delegates' allocation decisions. Two motives drive delegates' allocations. The first is a preference to maximize monetary earnings. To this end, a delegate allocates in an effort to avoid termination. The second and conflicting motive is to diminish psychological costs stemming from an unequal split between the principal and recipient.

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[5] The binary assumption here may look ad hoc at first sight. It is motivated by two discovery experiments we conducted. Delegates in the previous discovery studies displayed a binary response to whether they might be fired. Specifically, we found as long as principals can fire the delegates with a positive probability, delegates' allocation decisions did not significantly differ, and all favored principals' selfish preferences. The binary allocation pattern of delegates we observed in the discovery study suggested that delegates did not make allocation decisions based on objective firing probabilities. Instead, it resonated with a rising literature on decision frames. For a detailed discussion, see our preregistration document's *Other* section. We also spell out the alternative predictions in absence of this binary assumption at the end of this section.

3.3 Hypotheses

When the possibility of being terminated by principals is zero, the monetary earnings are fixed. Therefore, the only motive the delegate needs to consider is the psychological costs. That is, the delegate makes decisions in the social frame. It is apparent the optimal decision is to allocate equally because this will lead to zero psychological costs and no monetary loss. We thus have the following hypothesis.

Hypothesis 1: When principals have no power to fire delegates (p=0), delegates will equally allocate the endowment between their principals and the paired third parties.

When the possibility of being terminated by principals is greater than zero, the delegate faces a tradeoff between monetary earnings and psychological costs. Increasing the allocation to principals will decrease the principal's willingness to fire the delegate, and accordingly increase the delegate's monetary earnings. At the same time, this increases the inequality between the principal and recipient, which increases the psychological cost the delegate suffers. The delegate chooses an amount in the range of 30 to 60 where the marginal benefit of increased monetary earnings equals the marginal psychological cost. This balance point depends on the probability of being terminated and their aversion to inequality. However, when the probability of being terminated by principals is greater than zero, delegates switch to the business frame and behave as if the subjective probability of termination were unity. Therefore, under the business frame, the balance point should be the same for all levels of positive power. We have our second hypothesis.

Hypothesis 2: When principals have some power to fire delegates (p>0), the amount that delegates allocate to the principals are higher than half of the endowment and don't change as the objective probability that an attempt to fire is successful varies.

Our assumption is that the decision frame is a mediating variable, leading to the third hypothesis.

Hypothesis 3: When principals have some power to fire delegates (p>0), delegates are more likely to adopt a business decision frame than when principals have zero power to fire delegates (p=0).

Finally, it is important to note the key role decision frames play in forming our hypotheses. In particular, absent decision frames delegates would decide based on objective firing probabilities. More specifically, as the objective firing probabilities increase, the balance point - where the marginal increase in earnings meets the marginal increase in psychological costs – will become greater. The reason is that at the same level of allocation, a principal's intention to fire the delegate is the same, but the objective probability of success is higher, and hence the delegate perceives they are more likely to be fired, leading to a reduction in expected earnings. Consequently, they will increase the allocation to the principal in order to decrease the principal's intention to terminate them. Therefore, the marginal increase in earnings equals the marginal increase in psychological costs at a higher allocation level. Consequently, in the absence of decision frames our theory predicts a monotonically increasing allocation to principals as principals' power increases.

4. Experiment Design and Methods

Our game extends Hamman et al. (2010). In their experiment, principals have full power to fire their delegates. Our design differs in that principals have only limited firing power over delegates. Specifically, the experiment consists of four main treatments in which principals' power to fire their delegates varies. That is, principals are successful in their attempts to fire their current delegates with probabilities of 1, 0.5, 0.1, or 0, in Full-power Treatment (FPT), Half-power Treatment (HPT), Low-power Treatment (LPT) and Zero-power Treatment (ZPT), respectively. We include three additional treatments, namely Revealed Half-power Treatment (RHPT), Revealed Low-power Treatment (RLPT) and Revealed Zero-power Treatment (RZPT), which is the same as HPT, LPT and ZPT, except that now principals' failed firing attempts are revealed to the corresponding delegates[6]. We add these three treatments to avoid the possibility that our results are confounded by imperfect understanding of the objective probability that a principals attempt to fire is successful.

The experiment procedures are as follows (instructions are in Appendix B)[7]. In each session, 15 subjects were randomly assigned a fixed role during the task by computer: six as principals, three as delegates and the other six as recipients. Before role assignment, at the start of the experiment, participants received experiment instructions which were also read aloud. Then all subjects took a quiz on the instructions to make sure they understand the instruction correctly. Afterwards, the randomly assigned roles and experiment IDs were displayed privately on each computer screen: A1 to A6, B1 to B3 and C1 to C6 as the principals, the delegates, and the recipients, respectively.

In each round, the principals and the recipients were randomly paired and knew each other's experiment IDs. At the beginning of each round (other than the first round), principals had to select a delegate to divide an endowment of ￥60 between them and the paired recipients, in ￥1 increments. In the first round only, each delegate was randomly matched with two principals[8]. Each selected/ matched delegate then made a decision for their principal(s) about the amount of the endowment to be allocated to the paired recipient. Once all allocations had been made, the results were revealed to the corresponding principals and recipients. Importantly, a principal was only informed of the allocation that the selected delegate split to him/her. Also, allocators of each group in the current round were revealed to all delegates at the end of a round. This mimics the real-world delegate market where delegate selection outcome is generally public

[6] In the Full-power Treatment, attempts to fire are always successful, so there are no failed firing attempts to reveal.
[7] Note that the study was pre-registered with OSF, see https://osf.io/n4w95/?view_only=f9922bb5885040ad8d4a7e3ac4638a87.
[8] In this way, all delegates would start with an equal number of allocation decisions to be made by them.

information but how a particular delegate performed for the principal is privately held information.

Then the experiment proceeded to the next round. The principals who were unsatisfied with the allocation could fire their current delegate by selecting another delegate at the beginning of this new round. However, they had varied probability of being able to do so successfully among treatments[9]. The outcomes (success or failure) of their effort to fire their delegate were displayed on their screen. If they succeeded, the selected new delegates would make allocation decisions for them. If they failed, their delegate in prior round would continue to make allocation decisions for them. Those delegates who were not currently selected saw a waiting screen. Note, the prior-round delegates knew that their principal made unsuccessful firing attempts in RHPT, RLPT and RZPT treatments. This helps delegates to internalize the objective probability that a principal's attempt to fire them will succeed.

At the end of the final round**,** delegates were asked to rate the extent to which they agreed with the statement that "My allocation decision in the decision task was a business decision", where 1 = strongly disagree and 7 = strongly agree (see Kouchaki et al. 2013, for an earlier use of this approach). Delegates were incentivized with ￥5 to do so. Following this all subjects completed a questionnaire regarding demographic information including age, gender, ethnic group and religion. At the end of the experiment, one participant was randomly chosen to throw a 12-sided die to determine the payoff-relevant round.

All subjects were told they would receive their earnings in cash at the end of the experiment. They were further told that one participant would be randomly invited to throw a 12-sided die to determine the

[9] In ZPT and RZPT, the selection of delegates by principals didn't take effect. To prevent the delegates from misunderstanding that their firing decisions were effective when a random match happened to coincide with their firing decisions, we didn't randomly match principals and delegates in each of the 2-12 rounds. At the same time, to be close to the positive power treatments, we did change the matching in two of the 11 rounds. Specifically, in rounds 1-4, 5-9, and 10-12, each principal was matched with a different delegate. Subjects were told in 2 of the 11 rounds a randomly-matched B who was different from the allocator of the group that A belonged to in prior rounds would become the new group allocator, and otherwise the allocator would not change between rounds.

paying round and subjects would be paid an amount equal to the earnings in that round, plus a ￥10 show-up fee. Principals and recipients shared the endowment as their earnings in each round. More specifically, each recipient earned the amount allocated to him/her while the rest of the endowment belonged to the paired principal. The earnings of the delegates, however, consisted of two parts in each round. One part consisted of ￥30 fixed earning, and the other part was determined by the following payoff function:

$$\pi_i = -21.6 + 10.8 * n_i$$

where n_i denotes the number of principals delegate i allocates for. This payoff function was not directly shown to delegates. Instead, they were told that they would earn ￥7.2 for each principal they allocate for, and lose ￥3.6 for each principal they do not allocate for. Following Hamman et al.(2010), we used this payoff structure to incentivize delegates in each round. When 12 rounds were finished, each subject learned of their earnings in all rounds.

We conducted the experiment at *redacted for anonymity*. All participants were recruited from a representative subject pool[10]. As a between-subject design, there were 15 subjects (3 delegates) in a session and each received a ￥10 show-up fee, plus additional earnings from the experiment, which lasted for about 1.5 hours. In total, 1050 subjects participated in 70 sessions of our experiment (10 sessions for each treatment). As a result, we obtain 30 delegate observations in each of the seven treatments: ZPT, RZPT, LPT, RLPT, HPT, RHPT and FPT[11]. The average earnings were￥41. All sessions were conducted in either the fall of the year 2022 or the spring of 2023, using z-Tree software (Fischbacher 2007).

[10] Subjects in this pool are students at *redacted for anonymity*, covering about 10% of the students. This study was reviewed and approved by *redacted for anonymity* Human Subjects Institutional Review Board.

[11] We conducted a power analysis using prior results from two of our unpublished previous experiments. We calculate required sample size using G*Power (Mayr et al. 2007), with 80% power and $\alpha = 0.05$, based on a two-tailed t-test. This results in a sample size of 27 for each treatment. Thus, our sample size is large enough to detect between-treatment differences of a 20% departure from the mean (which will result in an effect size of 0.8 based on prior data) at the 5% significance level.

5. Results

5.1 Delegates' Allocations

In this section, we present the allocation decisions made by delegates among treatments. Figure 1 shows the allocation to principals in each round by treatments. The average amount a delegate allocated to the principal(s) in a round is treated as an observation.

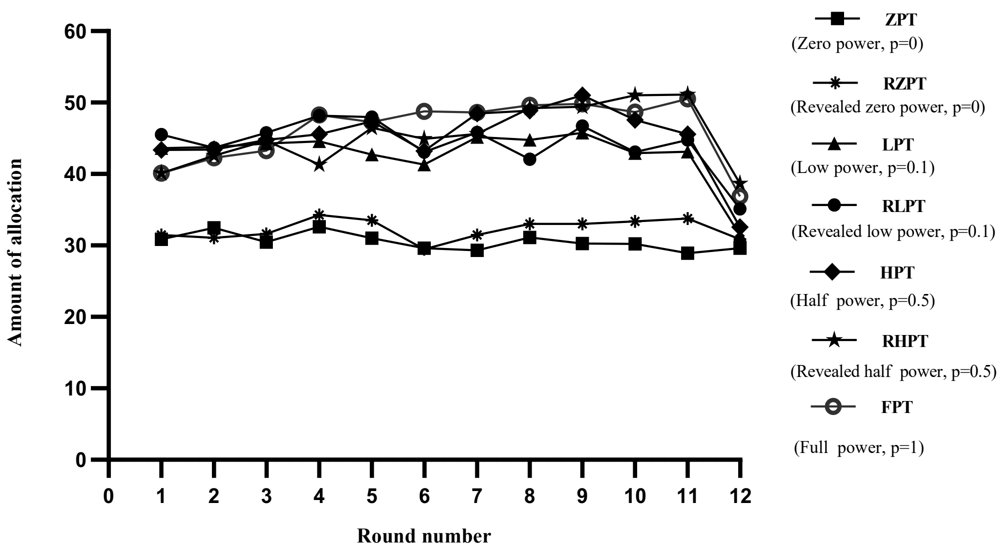

Figure 1. Average allocation to principals in each round.

Although there are some fluctuations around 30, it is straightforward to see that the allocation to the principals in the baseline ZPT treatment is generally steady. Allocation patterns of delegates in RZPT is very similar to that in ZPT. Consistent with Hypothesis 1, overall, there is no significant difference between the amount allocated to the principals in each of the first 11 rounds and half of the endowment, i.e., 30 when principals have no power[12]. In contrast, in all of the positive power treatments, allocations to principals

[12] In only three of first 11 rounds of ZPT and RZPT is there a significant difference between 30 and the amount allocated to the principals (*p*=0.084, 0.086 and 0.015 respectively, Wilcoxon one-sample signed-rank test). In the other 19 rounds, we find no difference between 30 and the amount allocated to the principals (the smallest *p* = 0.104, Wilcoxon one-sample signed-rank test).

across rounds 1 to 11 show a gradually increasing pattern over rounds. This suggests that to maintain their employment the delegates chose steadily to increase amounts allocated to principals. However, we observe an end-game effect: a sharp decline in the amount of endowment allocated to principals in the final round. Hamman et al. (2010) found the same, and suggested this could be due to guilt over previous allocation decisions that systematically disadvantaged recipients. Consequently, we do not include data from the final round in our analysis.

Analysis of the experimental data at the aggregate level also supports Hypothesis 1. In rounds 1 to 11 of ZPT and RZPT, delegates allocated an aggregated mean amount of ￥30.62 and ￥32.37 to their principals[13]. There is no significant difference between the aggregated mean amount allocated to the principals and half of the endowment, i.e., 30 ($p = 0.134$ and $p = 0.327$, respectively, Wilcoxon one-sample signed-rank test), indicating that delegates exhibit a preference for fairness. Although splitting the endowment equally is not maximizing earnings of the principals, delegates' private fairness preference seems to dominate when principals lack the power to terminate the delegate.

As shown in Figure 1, the amount allocated to the principals in the FPT, HPT, RHPT, LPT and RLPT treatment is much greater than the allocation in ZPT. In addition, we observe an increasing trend in allocations to principals across rounds 1 to 11. We investigate whether and how principals' behavior affects delegates' allocations within treatments in Appendix A. In sum, we find that principals are much more likely to attempt to fire a delegate who split less than or equal to half of the endowment to the principals, i.e., 30, in prior round, suggesting principals prefer a higher amount of allocation. The regression results further

[13] We treat the mean allocation a delegate made in 1 to 11 rounds as an observation and measure it using arithmetic mean of the average amount a delegate allocated to her principal(s) in 1-11 rounds. To derive the aggregated mean amount allocated to principals, we first sum the average amount each delegate allocated to all her principal(s) in 1 to 11 rounds, then the summation is divided by the number of delegates.

demonstrate that both seeing principal's firing attempt and being fired by at least one principal in prior round significantly increases the probability that a delegate allocates more to their principal(s) in current round.

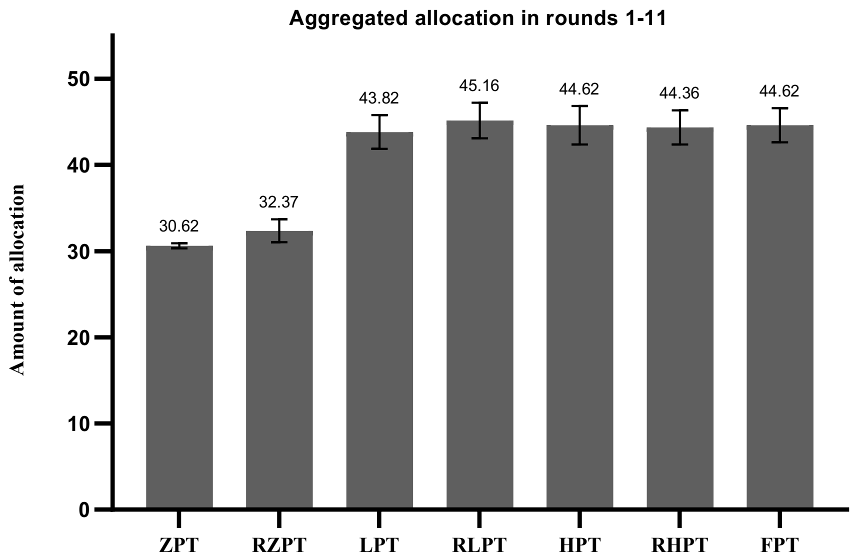

Figure 2. Mean allocation to the principals among treatments. Error bars are ±1 SE.

Statistical comparisons between treatments regarding the aggregated mean amount allocated to the principals confirm the allocation pattern suggested by Hypothesis 2. Aggregated over rounds 1 to 11, as shown in Figure 2, the amount allocated to principals in ZPT, RZPT, LPT, RLPT, HPT, RHPT and FPT is ￥30.62, ￥32.37, ￥43.82, ￥45.16, ￥44.62, ￥44.36 and ￥44.62, respectively. Compared to the allocation outcomes in ZPT (RZPT), the delegates allocated 43.11% (39.52%) more to the principals in LPT (RLPT), despite principals having only very limited power to fire them, and this increase is significant ($p < 0.001$, two-sided Mann-Whitney U test). However, while the amount distributed to principals rises slightly as the principals' firing power increases, we observe no statistically significant difference regarding the allocations between LPT, RLPT, HPT, RHPT and FPT (the smallest $p = 0.540$, two-sided Mann-Whitney

U test). These results are consistent with Hypothesis 2.

To investigate the dynamics of allocation patterns over rounds, we also use a random effect multilevel regression. Specifically, we study the impact of principals' power on delegates' allocations. In the regression, the dependent variable is the average amount a delegate allocated to the principal(s) in each round (excluding the final round). We use LPT as the baseline group. Aside from six treatment dummies capturing the effect of principals' power, we also control for round dummy variables, a round-by-treatment interaction term and demographic characteristics. In the analysis, we include random effects for subjects.

Table 1 reports the regression results. Column (3) differentiates from column (1) and column (2) in that both demographic variables, round dummy variables as well as the interaction terms between treatment dummy variables and round dummy variables are controlled. Consistent with the allocation pattern revealed by Figure 1, the regression results show that delegates in ZPT and RZPT allocated significantly less to the principals when compared to allocations in LPT. Coefficients of ZPT (RZPT) in column (3) indicate that on average delegates split about ￥12.69 (￥11.82) less to principals in ZPT (RZPT) as compared to LPT. In contrast to the case where principals have firing power or their failed firing attempts are disclosed, we observe no significant difference between the allocations in LPT and the other four treatments (RLPT, HPT, RHPT, FPT), again supporting Hypothesis 2.

Table 1. Impact of principals' power on delegates' average allocation to principals

	(1) Average allocation	(2) Average allocation	(3) Average allocation
ZPT	-13.223***	-13.064***	-12.688***
	(1.964)	(1.941)	(2.964)
RZPT	-11.454***	-11.121***	-11.815***
	(2.348)	(2.385)	(2.923)
RLPT	1.343	1.456	2.047
	(2.820)	(2.708)	(3.336)
HPT	1.122	0.667	-0.723
	(2.956)	(2.840)	(3.225)
RHPT	0.805	0.945	-3.336
	(2.744)	(2.625)	(2.976)
FPT	1.338	1.036	-3.748
	(2.737)	(2.688)	(3.172)
Age		-0.815**	-0.812**
		(0.319)	(0.321)
Male		1.628	1.609
		(1.343)	(1.353)
Han		0.305	0.323
		(1.975)	(1.991)
Religious		9.462**	9.431**
		(4.209)	(4.257)
Constant	42.148***	57.269***	58.667***
	(2.045)	(7.126)	(7.204)
N	2161	2161	2161
Round_i	Yes	Yes	Yes
Round_i_Treatments	No	No	Yes

Note: ZPT, RZPT, LPT, RLPT, HPT, RHPT and FPT are treatment dummy variables which has the value 1 if a delegate belonged to the corresponding treatment. Round dummy variables (Round_i) has the value 1 if an observation is generated from round i, where i denotes an integer from 1 to 11. Round_i_Treatments are interaction terms between treatment dummy variables (ZPT, RZPT, LPT, RLPT, HPT, RHPT and FPT) and round dummy variables (Round_i). We also control demographic characteristics, including age, gender, ethnic group and religious belief. Male, Han, Religious are dummy variables which have the value 1 if a delegate is a male, is Han ethnicity, is religious respectively. Robust standard errors clustered by each delegate are presented in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In addition, similar results are reached when comparing the fraction of dividing ￥30 or ￥60 to the principals in rounds 1 to 11 among treatments. The frequency of allocating ￥30 to the principals in ZPT (RZPT) is 41% (49%). However, this occurs much less frequently when principals have some firing power, i.e., 18%, 16%, 15%, 12% and 27% in LPT, RLPT, HPT, RHPT and FPT respectively. In terms of allocating

￥60 to the principals, this frequency displays a similar pattern. More specifically, the frequencies of allocating ￥60 to principals in ZPT, RZPT, LPT, RLPT, HPT, RHPT and FPT are 3%, 7%, 19%, 32%, 24%, 22% and 26%, respectively. Consistent with Hypothesis 1 and Hypothesis 2, we find that the delegates seem to display a binary response to whether they might be fired, as allocating ￥30 (￥60) significantly decreases (increases) once there is some probability they might be fired. However, there is no significant difference as to the fraction of ￥30 (￥60) allocations among five treatments in which principals have some power to terminate delegates (the smallest $p = 0.315$, two-sided Mann-Whitney U test). These findings further support Hypothesis 2.

In general, we find that when firing is impossible, delegates will make an equal allocation of endowment between principals and passive recipients, which confirms Hypothesis 1. Consistent with the prediction of Hypothesis 2, delegates split significant more to their principals when firing is possible and they only respond to the fact that they might be fired, but are insensitive to the objective firing probability. We further test Hypothesis 3 in next section.

5.2 Decision Frame of Delegates

In this section, we first present the ratings of statements regarding business decision frame by delegates. Figure 3 describes delegates' evaluations of their decision frame. Likert ratings range from 1 to 7 and higher ratings suggest that delegates agree more that the allocation decision is a business decision. The average ratings in the ZPT and RZPT treatments are 4.17, 4.30, respectively. In a sharp contrast, the average ratings in LPT, RLPT, HPT, RHPT and FPT are 5.67, 5.33, 5.27, 5.23 and 5.27, respectively. Each of these are significantly greater than the ratings in ZPT (RZPT) (the biggest p = 0.015 (0.091), two-sided Mann-Whitney U test) but are not significantly different from each other (the smallest $p = 0.113$, two-sided Mann-

Whitney U test). The implication is that delegates adopt a business decision frame when principals have any firing power over them.

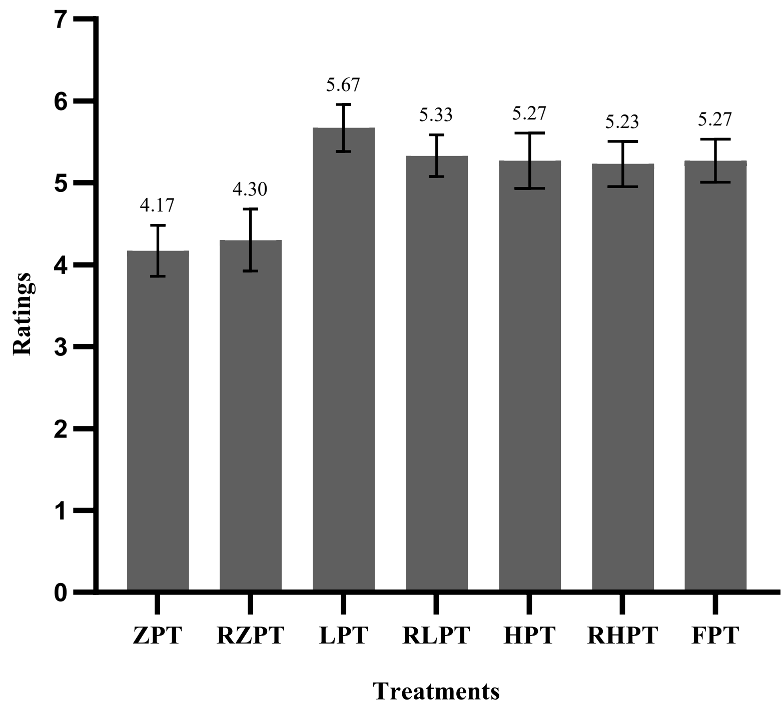

Figure 3. Ratings of business decision frame by delegates. Error bars are ±1 SE.

We test Hypothesis 3 further by investigating whether the decision frame mediates the effect of power on allocations to principals, following procedures used by Kouchaki et al.(2013) and Preacher and Hayes (2004). Specifically, we define Positive_power as a dummy variable that takes the value 1 if an observation belongs to LPT, RLPT, HPT, RHPT or FPT, and takes the value 0 if an observation belongs to ZPT or RZPT. We find that Positive_power has a significant impact on decision frame (p<0.001, b=1.090, SE=0.276) which then significantly affects the allocation to principals (p<0.001, b=2.235, SE=0.429), controlling for demographic variables. When power and decision frame are both included in the regression equation as independent variables, we find that both power ($p<0.001$, $b=11.148$, $SE=1.317$) and decision frame ($p<0.001$, $b=1.419$, $SE=0.383$) significantly impact allocation to principals. The bootstrap analysis reveals that the 95% bias-corrected confidence interval for the size of indirect effect doesn't include zero (0.618, 2.988), indicating that the decision frame mediates the effect of power on the allocation to principals. These results are consistent with Hypothesis 3[14].

6. Discussion and Conclusion

Delegation is prevalent in human social interactions, despite principals and delegates often having misaligned preferences, and principals typically retaining only limited post-delegation power over their delegates. While substantial studies seek to understand principals' delegation behaviors, ours is the first to focus on how delegates' decisions change with changes in principals' power to terminate employment relationships with delegates.

The experiment presented here, a modified dictator game where the dictator (principal) delegates the division decision to a delegate, shows that delegates act in the principal's interest if the principal has even limited power to terminate their relationship with the delegate. In sharp contrast, when principals do not have any power to terminate the relationship, delegates generally treat the principal and recipient equally. Thus, it appears that delegates hold a binary view of a principal's power to implement severe sanctions. As long as a principal has some power to impose a severe sanction, delegates will follow the principal's selfish preference. Otherwise, they will follow their private fairness preference. Findings about decision frame are consistent with the "binary" allocation pattern when principals have power or not. While delegates generally

[14] This mediation effect of the decision frame holds in both subsamples, namely in ZPT, LPT, HPT, FPT or in RZPT, RLPT, RHPT, FPT respectively. Our bootstrap analysis reveals that the 95% bias-corrected confidence interval for the size of indirect effect doesn't include zero both in ZPT, LPT, HPT, FPT (0.434, 3.750) and RZPT, RLPT, RHPT, FPT (0.271, 4.289).

adopt a social decision frame when they cannot be fired, they are more likely to adopt a business decision frame when principals have some firing power. Since business decision characterizes by a focus on personal gains, other social considerations are driven out and participants only respond to whether potential firing is present or not, regardless of the probability with which it is enforced. Our results are consistent with hypotheses suggested by the model and also resonate with those studies suggesting that delegates shifting their social decision frame to a business decision frame at the presence of a possible sanction (Li et al. 2009, Tenbrunsel and Messick 1999). Further mediation test reveals that decision frame mediates the effect between principals' power and delegates' allocation to the principals.

Our study is limited in several ways. One is that in natural environments there might be a greater number of delegates willing to work with the principals. Greater competition among delegates for positions with principals would seem to increase their incentive to do the principals' bidding. Also, in natural environments a recipient who is unfairly treated might try to punish either the principal or delegate, an important issue that is beyond the scope of our study.

This study provides important implications regarding how delegates make decisions in tripartite delegation environments (principals, delegates and an impacted third party) which is common in organizations. Top management (principals) of organizations generally delegates day-to-day decisions and the implementation of organizational strategies to middle management (delegates). Floyd and Wooldridge (1997), for instance, contend that "middle managers act as a coordinating role between the organization's strategic level and operational level" and "an implementation role to engage in interventions to implement deliberate strategy". In most cases, these delegated managerial decisions made by middle management also impact the team members led by them, especially when conflicting goals or preferences exist between top management and the team lead by middle management[15]. Our study suggests that, when threatened with potential sanctions such as firing, middle managers who have to tradeoff between their supervisors' goals and incompatible team goals will eventually accommodate supervisors' goals. The reason, our study demonstrates, is that sanctions could trigger the business decision frame. Such middle management mindset may eventually harm levels of commitment, productivity and creativity of the team lead by the middle management (Conway and Monks 2011, Van der Kam et al. 2014, Xin and Pelled 2003). This is perhaps even more true in our new era where long-term organizational value creation is more driven by knowledge and team innovations (Delarue et al. 2008, Kianto et al. 2014)[16].

Middle management catering to senior management and placing less importance on their own team's preferences can mean changes in team direction, workloads, ways of working, autonomy or status, which may result in anxiety and resistance behaviors among negatively-impacted team members (Conway and Monks 2011, Giangreco and Peccei 2005). This can increase the likelihood of vertical conflicts between middle-managers and their team (Xin and Pelled 2003). Such vertical conflicts not only lead team members to negatively perceive middle managements' leadership behaviors (Xin and Pelled 2003), but also express their frustration and anger with counteracting efforts, ultimately leading to lower team productivity (Van der Kam et al. 2014)[17].

Our paper also has important implication for organizations that value prosocial goals. Our findings suggest the importance of establishing measures to protect delegates from sanctions due to lowered

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[15] An example is that top management might prefer to increase current revenue by firing employees, but the sell department might have goals of increasing sales which require more salesmen.

[16] In recent decade, there is an increasing trend of teamwork in business. 2019 Deloitte Global Human Capital Trends report shows that 31% of survey respondents noted that they now operate mostly or almost wholly in teams, with another 65% of them noted they are mostly hierarchical but with some cross-functional team-based work.

[17] In addition, the vertical conflicts also undermine team members' cognitive abilities such as creativity as well as the perceived creativity encouragement from the middle management (Staw et al. 1981, Xin and Pelled 2003).

organization performance that may result from delegates' prosocial actions. As argued by Friedman (2007), the pursuit of prosocial goals of top management might conflict with organizations' short-term performance, potentially jeopardizing a CEOs' performance review and leading to sanctions. As a result, despite a growing literature demonstrating that heightened attention to CSR adds to firm value (Servaes and Tamayo 2013), decreases firm systematic risk (Albuquerque et al. 2019) and positively impacts financial performance (Flammer 2015), CEOs might be hesitant to pursue CSR aggressively. To this end, boards might need to form clear contractual commitments with CEOs to ensure that the short-run costs of improving CSR performance will not impact their performance reviews negatively.

In sum, our results show that delegates comply with principals' selfish requests whenever principals hold any power over them. This finding emphasizes the importance of creating strong guardrails to ensure delegates do not perceive decision-based sanction threats, particularly when delegates' independent decision-making is desired or required by organizations.

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Online Appendix

Appendix A: Impact of principals' firing decision on allocation dynamics within treatments

We address whether and how the slightly increasing pattern of allocation to principals over rounds is driven by firing attempts and realized firing of principals.

Figure A1 reports the fraction of firing attempts of principals in 2 to 12 rounds by whether their delegates split an allocation larger than ￥30 in prior round[18]. Comparing to principals who split ￥30 or less, principals who split more than ￥30 by their delegates in prior round are significantly less likely to attempt to fire their delegates in prior round (all $p < 0.001$, two-sided Mann-Whitney U test) in LPT, RLPT, HPT, RHPT and FPT. Such a result confirms that principals generally have a preference for higher allocations and are inclined to fire those delegates who enact fair divisions.

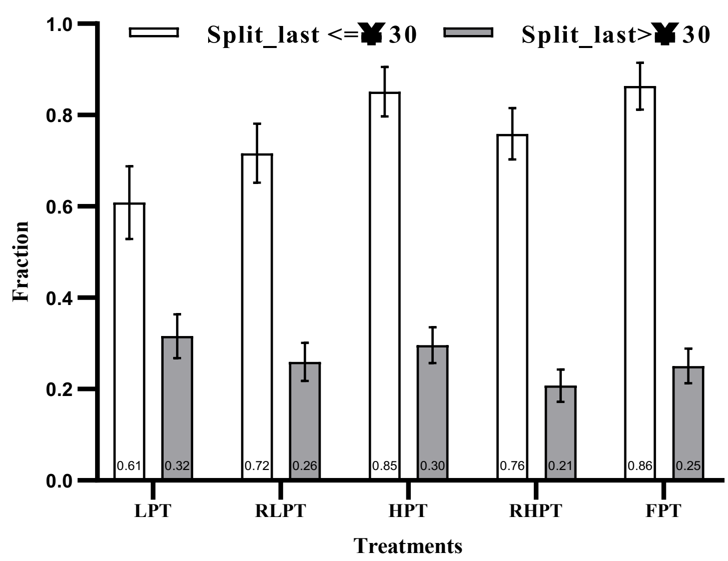

Figure A1. Aggregated fraction of intended firing of principals. Error bars are ±1 SE.

[18] Round 1 is excluded because principals don't have the option of firing in Round 1. To calculate this fraction, we first categories the data into 2 subsets according to the amount of allocation split to principals in prior round. Next, in each subset we calculate the fraction of firing attempts of principals over rounds by each principal. The fraction of firing attempts of each principal is treated as an observation.

Table A1 reports the logit regression results of delegates' response to principals' intentional and realized firing in RZPT, RLPT, RHPT and FPT[19]. Results show that both realized firing and knowing the firing attempt significantly increase the likelihood that a delegate split more to the principal(s) in current round. That is, the upward trend of allocation is largely driven by principals' firing actions.

Table A1. Marginal effect of intended and realized firing on Allocated_more

	(1) Logit	(2) Logit	(3) Logit
Realized_firing	0.1242**	0.1214**	0.1011*
	(0.05)	(0.05)	(0.06)
Intended_firing	0.0976***	0.0951***	0.0840***
	(0.03)	(0.03)	(0.03)
RZPT	0.0311	0.0192	0.0221
	(0.05)	(0.05)	(0.05)
RHPT	0.1184**	0.1179**	0.1177**
	(0.06)	(0.06)	(0.06)
FPT	0.0412	0.0539	0.0448
	(0.06)	(0.06)	(0.05)
Age		0.0127	0.0124
		(0.01)	(0.01)
Male		-0.0803**	-0.0800**
		(0.04)	(0.04)
Han		-0.0799	-0.0754
		(0.05)	(0.05)
Religious		-0.1471*	-0.1384**
		(0.07)	(0.07)
N	1180	1180	1180
Period_i	Yes	Yes	Yes
Period_i*Treatment	NO	NO	Yes

Note: Allocated_more is a dummy variable which has the value 1 if the average amount a delegate allocated to principals in current round is larger than the average amount in prior round. Realized_firing and Intended_firing are also dummy variables. Specifically, for each delegate, if any principal(s) successfully replaced prior-round delegate in current round in RLPT, RHPT and FPT, then Realized_firing has the value 1 and this value is always zero for RZPT. Likewise, for each delegate, if any principal(s) attempted to fire prior-round delegate in current round, then Intended_firing has the value 1. Round dummy variables (Round_i) has the value 1 if an observation is generated from round i, where i denotes an integer from 2 to 12. Round_i_Treatments are interaction terms between treatment dummy variables (RZPT, RLPT, RHPT, FPT) and round dummy variables (Round_i). We also control demographic characteristics, including age, gender, ethnic group and religious belief. Male, Han, Religious are dummy variables which have the value 1 if a delegate is male, is Han nationality, is religious respectively. Delta-method standard errors clustered by each delegate are presented in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

[19] Because we include both intentional and realized firing in the model, here we only regress in revealed failed firing attempts treatments. The pattern is the same if we have only realized firing in the same regression in non-revealed firing treatments.

Appendix B: Instructions

■ Instructions for Full Power Treatment (FPT, p=1)

General Instructions

Thank you for participating in today's experiment! You have already earned a ￥10 for showing up on time. In the experiment, you may earn more payoff. At the end of the experiment, you will be paid privately in cash.

This experiment consists of 12 rounds. When all decision making is finished, one participant will be randomly invited to select one of the 12 rounds to pay by throwing a 12-sided die. All participants will only receive the payment in this round and will not be paid for other rounds. The payoff you receive in this round plus the ￥10 show-up fee will be your total payoff in this experiment. Since you don't know which round will be chosen to pay until the end of the experiment, you should take each round seriously.

During the experiment, please do not talk or communicate with other participants. Participants who intentionally violate the rules will be disqualified from participating and will not receive any experiment payoff. To ensure that the experiment will be carried out in an orderly manner, the experimenter will temporarily keep your mobile phone. Please mute your phone (cancel the alarm if you have an alarm) and put it in the envelope on the table. After the experimenter takes away the envelope, you will receive the experiment instruction. Please read the instructions carefully to understand how to participate in today's experiment. In the experiment, if you have any question, please raise your hand and the experimenter will come to address it with you.

Instructions

Role and experiment ID

In this experiment, you will be randomly divided into one of the three roles A, B, and C. Among the 15 participants, the number of participants divided into role A will be 6 and the experiment ID will be A1 to A6 respectively. The number of participants divided into role C also will be 6 and the experiment ID will be C1 to C6 respectively; The number of participants divided into role B will be 3 and the experiment ID will be B1 to B3 respectively. Your role and experiment ID remain the same in the experiment.

Decision task and payoff

The experiment consists of 12 rounds of decision making. At the start of each round, each participant A will randomly form a group with a participant C. In each group, A will start with an initial endowment of ￥60 and can send some money from the initial endowment to the group partner C through participant B. Each A will select a B, and each B can be selected by multiple As. B will decide the amount sent to C, and the remaining amount belongs to A, which determines the payoff of A and C in this round.

In a round, B's payoff consists of two parts. At the start of each round, B will receive a fixed payoff of ￥30. In addition, each B will earn or lose an extra payoff, depending on the number of groups that a given B allocates for. For each group a given B allocates for, this B will earn ￥7.2; For each group a given B not allocate for, this B will lose ￥3.6. For example: suppose there are 2 groups a given B allocates for in a round. Since there are 6 groups in total, the extra payoff B earns in this round is 7.2×2=￥14.4, the payoff B loses in this round is 3.6 × (6-2)) = ￥14.4. Thus, this B's payoff in this round is 30 + (14.4-14.4) = 30+0 = ￥30.

Each round consists of three steps. A detailed description of each step is as follows:

- Step 1: Determining the allocators

In first round, the computer will randomly match each B as the allocator for two groups. In rounds other than the first, each A will select the group allocator by clicking the experiment ID of B on the screen.

- Step 2: B allocate for As

Firstly, each B will see the number of groups in which he/she is the group allocator on their screen. Then, each B will enter the amount sent to C (￥0-￥60, including ￥0 and ￥60) for each group sequentially to determine how to allocate ￥60 between A and C in the corresponding group.

- Step 3: Show payoffs in a given round

Once all Bs have made their allocation decision, your payoff in this round will be shown on your screen. For each B, you will also see the allocators of groups that each A belongs to.

■ Instructions for Half Power Treatment (HPT, p=0.5)

General Instructions

Thank you for participating in today's experiment! You have already earned a ￥10 for showing up on time. In the experiment, you may earn more payoff. At the end of the experiment, you will be paid privately in cash.

This experiment consists of 12 rounds. When all decision making is finished, one participant will be randomly invited to select one of the 12 rounds to pay by throwing a 12-sided die. All participants will only receive the payment in this round and will not be paid for other rounds. The payoff you receive in this round plus the ￥10 show-up fee will be your total payoff in this experiment. Since you don't know which round will be chosen to pay until the end of the experiment, you should take each round seriously.

During the experiment, please do not talk or communicate with other participants. Participants who intentionally violate the rules will be disqualified from participating and will not receive any experiment payoff. To ensure that the experiment will be carried out in an orderly manner, the experimenter will temporarily keep your mobile phone. Please mute your phone (cancel the alarm if you have an alarm) and put it in the envelope on the table. After the experimenter takes away the envelope, you will receive the experiment instruction. Please read the instructions carefully to understand how to participate in today's experiment. In the experiment, if you have any question, please raise your hand and the experimenter will come to address it with you.

Instructions

Role and experiment ID

In this experiment, you will be randomly divided into one of the three roles A, B, and C. Among the 15 participants, the number of participants divided into role A will be 6 and the experiment ID will be A1 to A6 respectively. The number of participants divided into role C also will be 6 and the experiment ID will be C1 to C6 respectively; The number of participants divided into role B will be 3 and the experiment ID will be B1 to B3 respectively. Your role and experiment ID remain the same in the experiment.

Decision task and payoff

The experiment consists of 12 rounds of decision making. At the start of each round, each participant A will randomly form a group with a participant C. In each group, A will start with an initial endowment of ￥60 and can send some money from the initial endowment to the group partner C through participant B. Each A will select a B, and each B can be selected by multiple As. B will decide the amount sent to C, and the remaining amount belongs to A, which determines the payoff of A and C in this round.

In a round, B's payoff consists of two parts. At the start of each round, B will receive a fixed payoff of ￥30. In addition, each B will earn or lose an extra payoff, depending on the number of groups that a given B allocates for. For each group a given B allocates for, this B will earn ￥7.2; For each group a given B not allocate for, this B will lose ￥3.6. For example: suppose there are 2 groups a given B allocates for in a round. Since there are 6 groups in total, the extra payoff B earns in this round is 7.2×2=￥14.4, the payoff B loses in this round is 3.6 × (6-2)) = ￥14.4. Thus, this B's payoff in this round is 30 + (14.4-14.4) = 30+0 = ￥30.

Each round consists of three steps. A detailed description of each step is as follows:

- Step 1: Determining the allocators

In first round, the computer will randomly match each B as the allocator for two groups. In rounds other than the first, each A will select the group allocator by clicking the experiment ID of B on the screen. There is a 50% chance that A's decision to select a B as the group allocator in a round will take effect. Then, whether A's allocator selection decision has taken effect or not will be shown to A. Two possible outcomes are as follows:

Outcome 1: The allocator selection decision has taken effect and the selected B will become the group allocator in this round.

Outcome 2: The allocator selection decision has not taken effect and the allocator from the group that A belongs to in prior round will continue to be the allocator for the group that A belongs to in this round.

- Step 2: B allocate for As

Firstly, each B will see the number of groups in which he/she is the group allocator on their screen. Then, each B will enter the amount sent to C (￥0-￥60, including ￥0 and ￥60) for each group sequentially to determine how to allocate ￥60 between A and C in the corresponding group.

- Step 3: Show payoffs in a given round

Once all Bs have made their allocation decision, your payoff in this round will be shown on your screen. For each B, you will also see the allocators of groups that each A belongs to.

- Instructions for Revealed Half Power Treatment (RHPT, p=0.5)

General Instructions

Thank you for participating in today's experiment! You have already earned a ￥10 for showing up on time. In the experiment, you may earn more payoff. At the end of the experiment, you will be paid privately in cash.

This experiment consists of 12 rounds. When all decision making is finished, one participant will be randomly invited to select one of the 12 rounds to pay by throwing a 12-sided die. All participants will only receive the payment in this round and will not be paid for other rounds. The payoff you receive in this round plus the ￥10 show-up fee will be your total payoff in this experiment. Since you don't know which round will be chosen to pay until the end of the experiment, you should take each round seriously.

During the experiment, please do not talk or communicate with other participants. Participants who intentionally violate the rules will be disqualified from participating and will not receive any experiment payoff. To ensure that the experiment will be carried out in an orderly manner, the experimenter will temporarily keep your mobile phone. Please mute your phone (cancel the alarm if you have an alarm) and put it in the envelope on the table. After the experimenter takes away the envelope, you will receive the experiment instruction. Please read the instructions carefully to understand how to participate in today's experiment. In the experiment, if you have any question, please raise your hand and the experimenter will come to address it with you.

Instructions

Role and experiment ID

In this experiment, you will be randomly divided into one of the three roles A, B, and C. Among the 15 participants, the number of participants divided into role A will be 6 and the experiment ID will be A1 to A6 respectively. The number of participants divided into role C also will be 6 and the experiment ID will be C1 to C6 respectively; The number of participants divided into role B will be 3 and the experiment ID will be B1 to B3 respectively. Your role and experiment ID remain the same in the experiment.

Decision task and payoff

The experiment consists of 12 rounds of decision making. At the start of each round, each participant A will randomly form a group with a participant C. In each group, A will start with an initial endowment of ￥60 and can send some money from the initial endowment to the group partner C through participant B. Each A will select a B, and each B can be selected by multiple As. B will decide the amount sent to C, and the remaining amount belongs to A, which determines the payoff of A and C in this round.

In a round, B's payoff consists of two parts. At the start of each round, B will receive a fixed payoff of ￥30. In addition, each B will earn or lose an extra payoff, depending on the number of groups that a given B allocates for. For each group a given B allocates for, this B will earn ￥7.2; For each group a given B not allocate for, this B will lose ￥3.6. For example: suppose there are 2 groups a given B allocates for in a round. Since there are 6 groups in total, the extra payoff B earns in this round is 7.2×2=￥14.4, the payoff B loses in this round is 3.6 × (6-2)) = ￥14.4. Thus, this B's payoff in this round is 30 + (14.4-14.4) = 30+0 = ￥30.

Each round consists of three steps. A detailed description of each step is as follows:

- Step 1: Determining the allocators

In first round, the computer will randomly match each B as the allocator for two groups. In rounds other than the first, each A will select the group allocator by clicking the experiment ID of B on the screen. There is a 50% chance that A's decision to select a B as the group allocator in a round will take effect. Then, whether A's allocator selection decision has taken effect or not will be shown to A. Two possible outcomes are as follows:

Outcome 1: The allocator selection decision has taken effect and the selected B will become the group allocator in this round.

Outcome 2: The allocator selection decision has not taken effect and the allocator from the group that A belongs to in prior round will continue to be the allocator for the group that A belongs to in this round.

- Step 2: B allocate for As

Firstly, each B will see the number of groups in which he/she is the group allocator on their screen. Meanwhile, if A has failed to replace the B being selected in prior round, this B will also see A's failed attempt on the screen. Then, each B will enter the amount sent to C (￥0-￥60, including ￥0 and ￥60) for each group sequentially to determine how to allocate ￥60 between A and C in the corresponding group.

- Step 3: Show payoffs in a given round

Once all Bs have made their allocation decision, your payoff in this round will be shown on your screen. For each B, you will also see the allocators of groups that each A belongs to.

■ Instructions for Low Power Treatment (LPT, p=0.1)

General Instructions

Thank you for participating in today's experiment! You have already earned a ￥10 for showing up on time. In the experiment, you may earn more payoff. At the end of the experiment, you will be paid privately in cash.

This experiment consists of 12 rounds. When all decision making is finished, one participant will be randomly invited to select one of the 12 rounds to pay by throwing a 12-sided die. All participants will only receive the payment in this round and will not be paid for other rounds. The payoff you receive in this round plus the ￥10 show-up fee will be your total payoff in this experiment. Since you don't know which round will be chosen to pay until the end of the experiment, you should take each round seriously.

During the experiment, please do not talk or communicate with other participants. Participants who intentionally violate the rules will be disqualified from participating and will not receive any experiment payoff. To ensure that the experiment will be carried out in an orderly manner, the experimenter will temporarily keep your mobile phone. Please mute your phone (cancel the alarm if you have an alarm) and put it in the envelope on the table. After the experimenter takes away the envelope, you will receive the experiment instruction. Please read the instructions carefully to understand how to participate in today's experiment. In the experiment, if you have any question, please raise your hand and the experimenter will come to address it with you.

Instructions

Role and experiment ID

In this experiment, you will be randomly divided into one of the three roles A, B, and C. Among the 15 participants, the number of participants divided into role A will be 6 and the experiment ID will be A1 to A6 respectively. The number of participants divided into role C also will be 6 and the experiment ID will be C1 to C6 respectively; The number of participants divided into role B will be 3 and the experiment ID will be B1 to B3 respectively. Your role and experiment ID remain the same in the experiment.

Decision task and payoff

The experiment consists of 12 rounds of decision making. At the start of each round, each participant A will randomly form a group with a participant C. In each group, A will start with an initial endowment of ￥60 and can send some money from the initial endowment to the group partner C through participant B. Each A will select a B, and each B can be selected by multiple As. B will decide the amount sent to C, and the remaining amount belongs to A, which determines the payoff of A and C in this round.

In a round, B's payoff consists of two parts. At the start of each round, B will receive a fixed payoff of ￥30. In addition, each B will earn or lose an extra payoff, depending on the number of groups that a given B allocates for. For each group a given B allocates for, this B will earn ￥7.2; For each group a given B not allocate for, this B will lose ￥3.6. For example: suppose there are 2 groups a given B allocates for in a round. Since there are 6 groups in total, the extra payoff B earns in this round is 7.2×2=￥14.4, the payoff B loses in this round is 3.6 × (6-2)) = ￥14.4. Thus, this B's payoff in this round is 30 + (14.4-14.4) = 30+0 = ￥30.

Each round consists of three steps. A detailed description of each step is as follows:

- Step 1: Determining the allocators

In first round, the computer will randomly match each B as the allocator for two groups. In rounds other than the first, each A will select the group allocator by clicking the experiment ID of B on the screen. There is a 10% chance that A's decision to select a B as the group allocator in a round will take effect. Then, whether A's allocator selection decision has taken effect or not will be shown to A. Two possible outcomes are as follows:

Outcome 1: The allocator selection decision has taken effect and the selected B will become the group allocator in this round.

Outcome 2: The allocator selection decision has not taken effect and the allocator from the group that A belongs to in prior round will continue to be the allocator for the group that A belongs to in this round.

- Step 2: B allocate for As

Firstly, each B will see the number of groups in which he/she is the group allocator on their screen. Then, each B will enter the amount sent to C (￥0-￥60, including ￥0 and ￥60) for each group sequentially to determine how to allocate ￥60 between A and C in the corresponding group.

- Step 3: Show payoffs in a given round

Once all Bs have made their allocation decision, your payoff in this round will be shown on your screen. For each B, you will also see the allocators of groups that each A belongs to.

■ Instructions for Revealed Low Power Treatment (RLPT, p=0.1)

General Instructions

Thank you for participating in today's experiment! You have already earned a ￥10 for showing up on time. In the experiment, you may earn more payoff. At the end of the experiment, you will be paid privately in cash.

This experiment consists of 12 rounds. When all decision making is finished, one participant will be randomly invited to select one of the 12 rounds to pay by throwing a 12-sided die. All participants will only receive the payment in this round and will not be paid for other rounds. The payoff you receive in this round plus the ￥10 show-up fee will be your total payoff in this experiment. Since you don't know which round will be chosen to pay until the end of the experiment, you should take each round seriously.

During the experiment, please do not talk or communicate with other participants. Participants who intentionally violate the rules will be disqualified from participating and will not receive any experiment payoff. To ensure that the experiment will be carried out in an orderly manner, the experimenter will temporarily keep your mobile phone. Please mute your phone (cancel the alarm if you have an alarm) and put it in the envelope on the table. After the experimenter takes away the envelope, you will receive the experiment instruction. Please read the instructions carefully to understand how to participate in today's experiment. In the experiment, if you have any question, please raise your hand and the experimenter will come to address it with you.

Instructions

Role and experiment ID

In this experiment, you will be randomly divided into one of the three roles A, B, and C. Among the 15 participants, the number of participants divided into role A will be 6 and the experiment ID will be A1 to A6 respectively. The number of participants divided into role C also will be 6 and the experiment ID will be C1 to C6 respectively; The number of participants divided into role B will be 3 and the experiment ID will be B1 to B3 respectively. Your role and experiment ID remain the same in the experiment.

Decision task and payoff

The experiment consists of 12 rounds of decision making. At the start of each round, each participant A will randomly form a group with a participant C. In each group, A will start with an initial endowment of ￥60 and can send some money from the initial endowment to the group partner C through participant B. Each A will select a B, and each B can be selected by multiple As. B will decide the amount sent to C, and the remaining amount belongs to A, which determines the payoff of A and C in this round.

In a round, B's payoff consists of two parts. At the start of each round, B will receive a fixed payoff of ￥30. In addition, each B will earn or lose an extra payoff, depending on the number of groups that a given B allocates for. For each group a given B allocates for, this B will earn ￥7.2; For each group a given B not allocate for, this B will lose ￥3.6. For example: suppose there are 2 groups a given B allocates for in a round. Since there are 6 groups in total, the extra payoff B earns in this round is 7.2×2=￥14.4, the payoff B loses in this round is 3.6 × (6-2)) = ￥14.4. Thus, this B's payoff in this round is 30 + (14.4-14.4) = 30+0 = ￥30.

Each round consists of three steps. A detailed description of each step is as follows:

- Step 1: Determining the allocators

In first round, the computer will randomly match each B as the allocator for two groups. In rounds other than the first, each A will select the group allocator by clicking the experiment ID of B on the screen. There is a 10% chance that A's decision to select a B as the group allocator in a round will take effect. Then, whether A's allocator selection decision has taken effect or not will be shown to A. Two possible outcomes are as follows:

Outcome 1: The allocator selection decision has taken effect and the selected B will become the group allocator in this round.

Outcome 2: The allocator selection decision has not taken effect and the allocator from the group that A belongs to in prior round will continue to be the allocator for the group that A belongs to in this round.

- Step 2: B allocate for As

Firstly, each B will see the number of groups in which he/she is the group allocator on their screen. Meanwhile, if A has failed to replace the B being selected in prior round, this B will also see A's failed attempt on the screen. Then, each B will enter the amount sent to C (￥0-￥60, including ￥0 and ￥60) for each group sequentially to determine how to allocate ￥60 between A and C in the corresponding group.

- Step 3: Show payoffs in a given round

Once all Bs have made their allocation decision, your payoff in this round will be shown on your screen. For each B, you will also see the allocators of groups that each A belongs to.

■ Instructions for No Power Treatment (ZPT, p=0)

General Instructions

Thank you for participating in today's experiment! You have already earned a ￥10 for showing up on time. In the experiment, you may earn more payoff. At the end of the experiment, you will be paid privately in cash.

This experiment consists of 12 rounds. When all decision making is finished, one participant will be randomly invited to select one of the 12 rounds to pay by throwing a 12-sided die. All participants will only receive the payment in this round and will not be paid for other rounds. The payoff you receive in this round plus the ￥10 show-up fee will be your total payoff in this experiment. Since you don't know which round will be chosen to pay until the end of the experiment, you should take each round seriously.

During the experiment, please do not talk or communicate with other participants. Participants who intentionally violate the rules will be disqualified from participating and will not receive any experiment payoff. To ensure that the experiment will be carried out in an orderly manner, the experimenter will temporarily keep your mobile phone. Please mute your phone (cancel the alarm if you have an alarm) and put it in the envelope on the table. After the experimenter takes away the envelope, you will receive the experiment instruction. Please read the instructions carefully to understand how to participate in today's experiment. In the experiment, if you have any question, please raise your hand and the experimenter will come to address it with you.

Instructions

<u>Role and experiment ID</u>

In this experiment, you will be randomly divided into one of the three roles A, B, and C. Among the 15 participants, the number of participants divided into role A will be 6 and the experiment ID will be A1 to A6 respectively. The number of participants divided into role C also will be 6 and the experiment ID will be C1 to C6 respectively; The number of participants divided into role B will be 3 and the experiment ID will be B1 to B3 respectively. Your role and experiment ID remain the same in the experiment.

<u>Decision task and payoff</u>

The experiment consists of 12 rounds of decision making. At the start of each round, each participant A will randomly form a group with a participant C. In each group, A will start with an initial endowment of ￥60 and can send some money from the initial endowment to the group partner C through participant B. Each A will be matched with a B by the computer, and each B will be matched with two As. B will decide the amount sent to C, and the remaining amount belongs to A, which determines the payoff of A and C in this round.

In a round, each B will receive a fixed payoff of ￥30.

Each round consists of three steps. A detailed description of each step is as follows:

- Step 1: Determining the allocators

In first round, the computer will randomly match each B as the allocator for two groups. In rounds other than the first, each A will select the group allocator by clicking the experiment ID of B on the screen. <u>There is a Zero chance that A's decision to select a B as the group allocator in a round will take effect and the selection will not impact the random matching of allocators made by the computer.</u> Two possible outcomes are as follows:

Outcome 1: In 2 rounds that are randomly determined by the computer in rounds 2-12, a randomly-matched B who is different from the allocator of the group that A belonged to in prior round will become the group allocator in this round.

Outcome 2: In the rest of the 9 rounds, the allocator of the group that A belonged to in prior round will continue to be the allocator for the group that A belongs to in this round.

- Step 2: B allocate for As

Firstly, each B will see he/she is the group allocator for two groups on their screen. Then, each B will enter the amount sent to C (￥0-￥60, including ￥0 and ￥60) for each group sequentially to determine how to allocate ￥60 between A and C in the corresponding group.

- Step 3: Show payoffs in a given round

Once all Bs have made their allocation decision, your payoff in this round will be shown on your screen. For each B, you will also see the allocators of groups that each A belongs to.

■ Instructions for Revealed No Power Treatment (RZPT, p=0)

General Instructions

Thank you for participating in today's experiment! You have already earned a ￥10 for showing up on time. In the experiment, you may earn more payoff. At the end of the experiment, you will be paid privately in cash.

This experiment consists of 12 rounds. When all decision making is finished, one participant will be randomly invited to select one of the 12 rounds to pay by throwing a 12-sided die. All participants will only receive the payment in this round and will not be paid for other rounds. The payoff you receive in this round plus the ￥10 show-up fee will be your total payoff in this experiment. Since you don't know which round will be chosen to pay until the end of the experiment, you should take each round seriously.

During the experiment, please do not talk or communicate with other participants. Participants who intentionally violate the rules will be disqualified from participating and will not receive any experiment payoff. To ensure that the experiment will be carried out in an orderly manner, the experimenter will temporarily keep your mobile phone. Please mute your phone (cancel the alarm if you have an alarm) and put it in the envelope on the table. After the experimenter takes away the envelope, you will receive the experiment instruction. Please read the instructions carefully to understand how to participate in today's experiment. In the experiment, if you have any question, please raise your hand and the experimenter will come to address it with you.

Instructions

<u>Role and experiment ID</u>

In this experiment, you will be randomly divided into one of the three roles A, B, and C. Among the 15 participants, the number of participants divided into role A will be 6 and the experiment ID will be A1 to A6 respectively. The number of participants divided into role C also will be 6 and the experiment ID will be C1 to C6 respectively; The number of participants divided into role B will be 3 and the experiment ID will be B1 to B3 respectively. Your role and experiment ID remain the same in the experiment.

<u>Decision task and payoff</u>

The experiment consists of 12 rounds of decision making. At the start of each round, each participant A will randomly form a group with a participant C. In each group, A will start with an initial endowment of ￥60 and can send some money from the initial endowment to the group partner C through participant B. Each A will be matched with a B by the computer, and each B will be matched with two As. B will decide the amount sent to C, and the remaining amount belongs to A, which determines the payoff of A and C in this round.

In a round, each B will receive a fixed payoff of ￥30.

Each round consists of three steps. A detailed description of each step is as follows:

- Step 1: Determining the allocators

In first round, the computer will randomly match each B as the allocator for two groups. In rounds other than the first, each A will select the group allocator by clicking the experiment ID of B on the screen. <u>There is a Zero chance that A's decision to select a B as the group allocator in a round will take effect and the selection will not impact the random matching of allocators made by the computer.</u> Two possible outcomes are as follows:

Outcome 1: In 2 rounds that are randomly determined by the computer in rounds 2-12, a randomly-matched B who is different from the allocator of the group that A belonged to in prior round will become the group allocator in this round.

Outcome 2: In the rest of the 9 rounds, the allocator of the group that A belonged to in prior round will continue to be the allocator for the group that A belongs to in this round.

- Step 2: B allocate for As

Firstly, each B will see he/she is the group allocator for two groups on their screen. Meanwhile, if A has failed to replace the B being selected in prior round, this B will also see A's failed attempt on the screen. Then, each B will enter the amount sent to C (￥0-￥60, including ￥0 and ￥60) for each group sequentially to determine how to allocate ￥60 between A and C in the corresponding group.

- Step 3: Show payoffs in a given round

Once all Bs have made their allocation decision, your payoff in this round will be shown on your screen. For each B, you will also see the allocators of groups that each A belongs to.