# Endowment Effects in Proposal Right Contest*

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**Abstract**

When parties negotiate over surplus, incumbents, or agenda-setters, tend to spend more resources than challengers to keep their power in making a proposal. This is often attributed to the fact that incumbents usually have better access to resources. We experimentally investigate whether incumbents spend more resources even when they have no advantage. Specifically, we consider a two-stage game where in the first stage, players compete to be recognized as a proposer, and in the second stage, they play an ultimatum bargaining game. Our treatment concerns whether one of the subjects is endowed with proposal right (without any material advantage) in the beginning of the game. We find that subjects who were framed to be incumbents spent significantly more resources to keep the proposal right than others. This suggests that even without any resource advantage, the parties who have the power would incur higher costs to keep it, and thus, the allocation of power is likely to persist. Our finding is new in the sense that the endowment effect does not concern "property right" as in previous studies but "proposal right."

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## 1. Introduction

The power to propose legislation or to set an agenda is a key determinant of the outcomes of collective decision-making.[1] In such a process, the competition to be recognized as an "agenda-setter" is often inevitable. For example, political parties compete to put their agenda to a vote, which may make them advantageous in the legislative bargaining; divisions in an organization compete to gain a greater voice to take a larger share of resources; and individuals in a romantic relationship try to gain the upper hand, which may pay out later in the battle of sexes games. Interesting questions arise in such situations: Is the "incumbent," or the one who has the power, willing to spend more resources to secure his/her position as the agenda-setter than the "challenger" to win the power? Does the incumbent treat the challenger differently depending on the level of resources spent by the challenger? Does the incumbent obtain a higher payoff than the challenger? How does the existence of incumbent influence efficiency in bargaining?

We address these questions in an experimental setting in which two individuals negotiate over the division of surplus in two stages. First, they spend resources to increase the chance of being recognized as a proposer. In this contest stage, we adopt a lottery contest (Tullock, 1980) in which the probability of recognition strictly increases in one's spending.[2] Second, the individual selected as a proposer makes an offer of division of surplus to the other individual who then accepts or rejects the offer. If the recipient individual accepts the offer, they divide the surplus according to the proposer's offer; otherwise, both receive nothing.

The main treatment in our experiment is whether proposal power is "endowed" to one of the two subjects: (i) both subjects are treated equally and play our experimental game without such endowment of proposal power in the control group; and (ii) one of the two subjects is endowed

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[1] Kalandrakis (2006) examines a canonical model of sequential bargaining to highlight the significance of proposal rights in determining political power in collective deliberations, where political power is gauged in terms of expected outcomes. Knight (2005) documents that the representatives affiliated with the Congressional Transportation Committee used their proposal power to direct more project spending to their districts than other representatives. Loewen et al. (2013) harness a natural experiment in the Canadian House of Commons which, since 2004, has randomly granted noncabinet members the right to propose a single piece of legislation. Their analysis suggests that politicians take advantage of legislative opportunities and that voters reward them for doing so. Also see, for example, Fairholm (2009), Inderst et al. (2007), and Pfeffer (1981).

[2] Tullock contests have been widely used for modeling competition for a prize among individuals. Axiomatic justifications provided by researchers (e.g., see Skaperdas, 1996 and Clark and Riis, 1998) have contributed to the popularity of this framework. Baye and Hoppe (2003) also found conditions in which various rent-seeking, innovation, and patent-race games are strategically equivalent to the Tullock contest.

with proposal power in the treatment group. Thus, both subjects must spend resources to "gain" proposal power in the control group, whereas in the treatment group, the incumbent subject must defend his/her proposal power not to "lose" it and the challenger subject must compete against the incumbent to "gain" proposal power. Moreover, although one of the two subjects is framed to be an incumbent in the treatment group, the payoff structure is identical in both groups: all subjects have access to the same amount of resources, and the endowment of proposal power at the beginning of the game does not provide any material advantage to the incumbent subjects in the game.

Our first main finding is that the incumbent subjects in the treatment group spend significantly more resources than the subjects in the control group, roughly by 25 percent, whereas the challenger subjects in the treatment group spend a similar amount of resources to those in the control group. This is a distinct piece of evidence for endowment effect from those documented in previous studies (e.g., Kahneman et al., 1991) in the sense that the endowment effect in the extant literature concerns "property right" for some tangible object (e.g., pen or mug) or money, not "proposal right" as in our experiment. Notice that the behavior of our incumbent subjects is not well explained by either of the two most popular theories of reference-dependent preference: reference being either status quo (Kahneman and Tversky, 1979) or rational expectation (Koszegi and Rabin, 2006). More precisely, on the one hand, since no additional monetary payoff is given to any subject at the beginning of the game, the status quo does not differ between the control and the treatment, nor should the incumbent's behavior according to Kahneman and Tversky (1979). On the other hand, because the control and the treatment differ only in framing, the rational expectation and thus the incumbent's behavior should not differ in the two environments according to Koszegi and Rabin (2006).

Our second set of findings is about the subjects' ultimatum bargaining behavior in the second stage. Regarding the behavior of proposer subjects, we first find that the amount of offer from a proposer decreases with his/her own expenditure for recognition in the first stage. Thus, although the first-stage expenditure is a sunk cost, which should not influence a rational individual's subsequent decisions, our subjects are influenced by such sunk costs, appearing to recoup their losses in the past.[3] We also find that our proposer subjects' decisions are affected by their partners' expenditures for recognition, exhibiting *compensatory behavior*: they offer

[3] This finding is related to the phenomenon called "sunk cost fallacy." See, for example, Friedman et al. (2007), Sweis et al. (2018), and Thaler (1999).

more surplus to the recipients who spent more in the first stage. Moreover, our results suggest that proposers are more responsive to their partners' expenditures than to their own.

Recipient subjects in our pooled data, as expected, reject offers of lower amounts more frequently. They also reject more often when they spent more resources in the contest for recognition. Interestingly, when an incumbent subject becomes a recipient, the tendency to reject *decreases* with his/her expenditure for recognition. Although this effect is only marginally significant, it suggests that incumbent subjects are more averse to bargaining failure than other types of subjects. Finally, we find that incumbent subjects could not obtain higher payoffs than other types of subjects in our experiment.

Our paper contributes to a small but growing literature on endogenous recognition in bargaining games.[4] Yildirim (2007) was the first who extends the model of Baron and Ferejohn (1989) to an endogenous recognition framework by allowing the agents to exert effort to be recognized as a proposer.[5] While Yildirim (2007) employs a class of lottery contests for the competition for recognition, Ali (2015) considers multilateral bargaining problems in which individuals compete for proposal power through all-pay auctions. Recently, drawing on Yildirim's (2007) model, Kim and Kim (2017) experimentally study multilateral bargaining problems in which individuals compete for recognition in a Tullock contest, and then the recognized individual makes an ultimatum offer to others. Our paper is different from these papers in that we study the endowment effects of proposal power on the intensity of competition for recognition.

Our paper also contributes to the contest theory literature.[6] In particular, we adopt a two-player Tullock contest in our experiment (Tullock, 1980). Closely related to our paper are those studying the effect of loss aversion (Kahneman and Tversky, 1979) on the bids for a prize in contests. For instance, Cornes and Hartley (2003, 2012) show that loss aversion reduces bids for a prize, whereas Chowdhury et al. (2018) show that a loss frame encourages subjects to bid

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[4] See Rubinstein (1982) and Binmore (1987) for the pioneering research on exogenous recognition in bilateral bargaining problems. For exogenous recognition in multilateral bargaining problems, see Baron and Ferejohn (1989) who study a model in which an individual is recognized with a fixed probability. See also, for example, Eraslan (2002), Jackson and Moselle (2002), and Norman (2002) for extensions. Theoretical predictions of Baron and Ferejohn (1989) have been experimentally tested by numerous researchers including Agranov and Tergiman (2014), Christiansen and Kagel (forthcoming), Christiansen et al. (2018), Diermeier and Morton (2005), Fréchette et al. (2003), Fréchette et al. (2005, 2012), Kim (2018), and Kim and Lim (2019).

[5] Also related, Yildirim (2010) studies a model in which recognition probabilities throughout the bargaining game are determined in a single lobbying stage and finds that the distribution of resources becomes more unequal.

[6] See Konrad (2009) for an excellent treatment of the contest theory literature in general.

more aggressively. Our experiment also adopts a loss frame on incumbent subjects because they might "lose" their proposal power in the contest stage. However, different from their experiments, our incumbent subjects are endowed with initial "proposal right" instead of "property right."

Despite the vast literature on ultimatum game experiments, the issue of endogenous proposer selection has not gained much attention from researchers.[7] Güth and Tietz (1985,1986) conduct an experiment in which the role of the proposer is auctioned off, and they find that it provides subjects with a strong sense of entitlement over the surplus, reducing the amount offered by the proposer. Hoffman et al. (1996) allocate the roles of the proposer to subjects who had better quiz scores and also confirm the entitlement effect in their experiment. While these papers study the entitlement effect in ultimatum bargaining, our experiment is designed to investigate the effect of pre-assignment of proposal power on subjects' behavior in the competition for recognition and bargaining.[8]

## 2. Experimental Setting and Summary Statistics

We conducted our experiment at the laboratory managed by the Center for Research in Experimental and Theoretical Economics (CREATE) at Yonsei University in Korea. Our experiment was computerized using oTree (Chen et al., 2016). We recruited 128 undergraduate students from our subject pool, and each subject participated in one treatment (between-subject design). Subjects were given 400 experimental coins at the beginning of the experiment, and they played our experimental game for 10 rounds.

In each round, two subjects were randomly matched to play the following experimental game consisting of two stages, namely, the contest stage and the bargaining stage. In the former, both subjects simultaneously choose how many coins (up to 40 coins) to invest to be recognized as a proposer.[9] The amounts of coins invested determine each subject's recognition probability

[7] See Güth and Kocher (2014) for an excellent survey of ultimatum game experiments.

[8] Researchers also have studied the effects of the money being earned as opposed to being granted in dictator game experiments. See, for instance, Erkal et al. (2011) and the references therein.

[9] Theoretically, in the basic two-player Tullock contest, the equilibrium amount of investment at the contest stage is 25. In our experimental data, almost all subjects decided to invest less than 40 coins in each round. Thus, the limit on the maximum amount of investment was rarely binding in our subjects' decisions.

following a Tullock contest success function (Tullock, 1980): that is, if subjects invested X and Y coins, respectively, the subject who invested X coins is recognized as a proposer with probability X/(X+Y) and the other subject with probability Y/(X+Y).[10]

After one of the two subjects is recognized as a proposer, the bargaining stage begins. First, the number of coins invested by his/her partner in the first stage is revealed. This feature of the game allows us to test whether the partner's investment affects bargaining behavior. For instance, a proposer may show compensatory behavior, offering more if the recipient invested a larger amount in the first stage, to compensate for the loss of his/her partner. Alternatively, a proposer may offer less when his/her partner invested a larger amount in the first stage, if he/she views this as an aggressive signal of his/her partner. After observing the investment amount of the recipient, the proposer subject must make an offer of a division of surplus, 100 coins, to his/her partner. If the partner subject accepts the offer, they divide the surplus according to the proposer's offer; otherwise, the surplus, 100 coins, disappears and both subjects obtain no coin in that round. After the round ends, subjects are randomly re-matched with each other and play our experimental game again. The experiment ends after 10 rounds. After the experiment ends, every coin of a subject is converted to KRW 15 and given to the subject in an envelope. The experiment took about an hour, and the average payment was about KRW 13,000 (including the show-up payment KRW 3,000) which is around USD 11.

The main treatment in our experiment is whether proposal power is endowed to one of the two subjects: both subjects are treated equally and play our experimental game without such endowment of proposal power in the control group, whereas one of the two subjects is endowed with proposal power in the treatment group.[11] Thus, both subjects must invest coins to "gain" proposal power in the control group, whereas in the treatment group, the incumbent subject must defend his/her proposal power not to "lose" it and the challenger subject must compete against the incumbent to "gain" proposal power.

However, as is evident from the description of our experimental game, the endowment of proposal right to incumbents does not provide any material advantage to them. All subjects have the same amount of coins (i.e., 400 coins) to begin with, and the endowment of proposal

[10] If X=Y=0, the incumbent subject retains his/her proposal right in the treatment group. In the control group, one subject is randomly chosen to be a proposer.

[11] In the treatment group, subjects are randomly matched in each round, and then their roles (either incumbent or challenger) are randomly determined at the beginning of each round.

right does not influence the probability of winning the proposal right in the contest stage.[12] The primary goal of our experiment is to study whether such endowment of proposal right influences subjects' behavior despite the fact that incumbency comes with no advantage.

Table 1 presents the summary statistics of our experimental data. The first set of variables includes experiment outcomes and payoffs (i.e., the number of coins of subjects at the end of our experiment), whereas the second set of variables is the individual characteristics of the subjects. The first row ("Invest") shows that, on average, our subjects invested 16.41 coins per round, which is about 40 percent of the maximum amount of coins (i.e., 40 coins) that can be invested per round. It is interesting to find that incumbent subjects in the treatment group invested a larger amount than other subject types, investing roughly 19 coins on average. The second row ("Offer") shows that once the subjects in the treatment group became proposers, they offered a higher amount to recipients than those in the control group.

Thus, these two outcomes suggest that the subjects in the treatment group, particularly the incumbent subjects, may obtain lower payoffs than those in the control group by spending more resources in the contest stage and ceding more surplus in the bargaining stage. The fourth row ("Payoffs") confirms this: final payoffs are lower for incumbent subjects, 60.67 coins on average, compared with 62.84 coins for challenger subjects and 63.12 coins for the control group, although these differences are not statistically significant.[13] However, final payoffs depend on several factors, such as his/her own and partner's investment, which affect individuals' recognition probability in the contest stage and the amounts of their offers once they become proposers in the bargaining stage. Thus, in Section 3, we investigate these outcomes further by examining the source of these differences across treatments in a regression framework.

[Table 1]

[12] Ball and Eckel (1996) study the effects of social status on the negotiating behavior of subjects. They report that high-status responders were offered a better proposal than those with low status. Our treatment may influence subjects' perceptions of their social status. However, unlike in Ball and Eckel's (1996) study where the participants could largely agree upon the relative status of each other, it is not clear if our subjects could do the same. If incumbents were regarded as a high-status group, they would have been offered a better proposal than challengers. However, as shown in the next section, we do not find such evidence.

[13] The p-value from the t-test with unequal variances between the final payoffs of incumbent subjects and the control group is 0.206.

Next, in the second half of Table 1, the summary statistics for individual characteristics are shown across subject types. About 44 percent of the full sample are female, and they are 24 years old on average. Incumbent subjects are more likely to be Economics/Business majors and less likely to be Engineering majors compared with challenger subjects and control subjects. Provided that there are some differential observable characteristics across treatments, we show the sensitivity of our results with and without control variables in all of our regression results in the next section.

## 3. Results

To see if a difference exists in investment amounts across subject types, column (1) in Table 2 shows uncontrolled mean differences, whereas column (2) exhibits controlled mean differences, with the control group serving as a base category.[14] Compared with the control group, incumbents invest roughly 3.7 more coins, whereas challengers invest similar amounts to those of the control group. The results are not sensitive to whether observable characteristics are controlled or not. Testing the investment difference of 2.915 between incumbents and challengers shows that the difference is statistically significant at the 5 percent level (p-value=0.014 for uncontrolled difference and p-value=0.004 for controlled difference).

[Table 2]

Figure 1 shows the cumulative distributions of investment in the contest stage across subject types and confirms the regression-based results. Similarly, the first panel of Figure 2 exhibits that the finding of a larger investment by incumbents observed at the contest stage is not concentrated on a particular round. Interestingly, the investment behavior shows a declining trend as players reach later rounds, and this pattern is observed among all types of subjects. However, even at the latest rounds, incumbents invest more than other subject types. Overall, the results from the contest stage display a clear treatment effect, as investment amounts are the largest among incumbents, followed by challengers, and then the subjects in the control

[14] In all our results, we allow for arbitrary correlation within individuals by clustering the standard errors at the individual level.

group.

[Figure 1]

[Figure 2]

Table 3 presents the bargaining stage outcomes among proposers. On average, incumbents (when they were selected as proposers) make more generous offers to recipients compared with those in the control group. The difference is 3 coins on average, although this difference is generally not statistically significant and only marginally significant when "own investment" at the contest stage is controlled for (column 2). The results in Table 3 indicate that challengers also appear to make more generous offers compared with the control group, although this difference is again not statistically significant. The second panel in Figure 2 mirrors the results in column (1) in that, compared with the control group, incumbents and challengers make higher offers to their recipients.

Given that the results in Table 2 show a difference in investment across subject types, in columns (2)–(4) in Table 3, we progressively control for other variables such as "own investment" and "partner investment," as well as individual characteristics, to check if the observed pattern in column (1) persists after controlling for these differences.

[Table 3]

These columns indicate that the results are unaffected, whereas the positive effects for challengers are much more muted when we control for the investment made by the partner (column 3). The results in columns (3) and (4) show that a proposer makes a more generous offer when his/her opponent invested a larger amount, indicating that individuals exhibit compensatory behavior. The compensatory effect shows that, on average, for every coin invested by a partner, a proposer increases his/her offer roughly by 0.4 coins. Our earlier results in Table 2 indicate that, on average, incumbents make higher investment than challengers. Thus, we also check whether this compensatory behavior is stronger for incumbents or challengers by adding an interaction term between partner investment and an incumbent dummy and an interaction term between partner investment and a challenger dummy. However, we do not find a differential interaction effect. The results of these interaction effects are reported in columns (1) and (2) in Table 5.

Another pattern observed in Table 3 is that a proposer's offer decreases with his/her own investment. On average, for every coin spent as his/her own investment, a proposer reduces his/her offer by 0.2 coins. It is interesting to observe that, compared with the strong compensatory behavior, the responsiveness to own investment is lower, which is only about half. We also observe that R-squared increases substantially when partner investment is added, from 0.023 in column (2) to 0.144 in column (3), which is much higher in magnitude than when own investment is added, where a change in R-squared is from 0.014 in column (1) to 0.023 in column (2).

[Table 4]

Table 4 shows regression results about recipients' behavior where the dependent variable is 1 if they reject the offer made by the proposer and 0 if they accept. The results suggest that no strong difference emerges across subject types, whether controlling for investment (own and partner's) or not. As expected, the likelihood of rejection decreases with the generosity of offers made by proposers; with additional 10 coins offered by proposers, the rejection probability decreases by roughly 0.1. The likelihood of rejection does not change much with their own investment.

However, the interaction effects reported in columns (3) and (4) in Table 5 show that the incumbents' tendency to reject decreases with their own investment, compared with the control group. Their tendency to reject also decreases with the bargaining offer made by the proposers. According to column (3), for instance, additional 10 coins offered by the proposer reduce the rejection probability by 0.13 (0.013*10) among the control group (as shown by the coefficient on "Offer amount by the proposer"), whereas among incumbents, the same number of coins reduces the rejection probability by 0.18 (0.013*10 + 0.005*10). The results suggest that incumbent subjects are more averse to bargaining failure than other types of subjects.

[Table 5]

Lastly, Table 6 shows the results for the final payoffs. Panel A shows the payoff for proposers and panel B shows that for recipients. Columns (1) and (2) show a negative effect on payoffs among the incumbents who become proposers (i.e., likely to be those who invested a larger amount at the contest stage): 3.562 lower payoffs than for the control group based on the

unconditional difference in column (1). Challengers also have lower payoffs compared with the control group, but the magnitude tends to be smaller. Columns (3) and (4) control for the contest stage outcome (own and partner investment). The results indicate that the negative effect on payoffs is mainly driven by larger investment amounts at the contest stage, as controlling for own investment narrows the gap between incumbents and the control group, from −4.461 to −1.907. The results also show that payoffs of proposers decrease with partner investment; this is because as seen in Table 3, proposers show compensatory behavior, offering more at the bargaining stage for recipients who made a larger investment at the contest stage.

The results in column (1) in panel B also indicate that incumbents who become recipients are slightly worse off, although this negative effect is not statistically significant. The lack of significant difference in the final payoffs could be because larger investment made in the contest stage is partially canceled out by the increase in the probability of accepting the given offer among incumbent recipients, as we saw in Table 5. In fact, conditioning on the offer made by the proposer, this difference becomes large and statistically significant in column (2), suggesting that holding the offer amount constant, incumbents are worse off than the control group because of the large investment made at the contest stage. As a result, in column (3), when own investment is controlled for, the negative payoff effect among incumbents disappears, as in the case of proposers.

## 4. Concluding Remarks and Discussion

We experimentally investigated whether incumbents spend more resources than challengers even when the incumbents do not have any advantage in the amount of available resources. We found that subjects who were endowed with proposal right spent significantly more resources to keep the proposal right than other types of subjects. This suggests that even without any resource advantage, the individuals who have the power are willing to spend more resources to keep it, and thus, the allocation of power is likely to persist. Our finding is new in that the endowment effect concerns “proposal right” instead of “property right” as in previous studies.

The incumbent’s behavior is not well explained by either of the two most popular theories of reference-dependent preference: reference being either status quo (Kahneman and Tversky, 1979) or rational expectation (Koszegi and Rabin, 2006). Instead, we see a potential of bounded rational expectation theories such as natural expectation (Fuster et al., 2010) and diagnostic

expectation (Bordalo et al., 2018) in providing a plausible explanation for our experimental findings. In particular, an incumbent subject might be invoked by the expressions in the instruction to form an expectation of the outcomes, according to which the incumbent takes a greater share of surplus in the bargaining. If such a belief served as the reference, they would fight more aggressively in the contest stage, because otherwise, they would have felt a greater loss later. Such an effort interestingly did not result in higher payoffs for incumbents after all.

Psychological game theory (Geanakoplos et al., 1989; Battigalli and Dufwenberg, 2009) provides an alternative framework for understanding framing effects. According to Dufwenberg et al. (2011), frames influence subjects' first- and second-order beliefs, which in turn influence motivations. In particular, they show how frames can affect the private provision of public goods through the tendencies to avoid disappointing others ("guilt aversion") and to reciprocate good and bad behaviors ("reciprocity"). Similarly, frames might alter incumbent subjects' first- and second-order beliefs and their motivations in our experiment. For instance, those who were framed to be incumbents might believe that others (e.g., the matched challenger or the experimenter) expected them to be more aggressive in the contest stage. This could influence the incumbents' behavior in two ways: (i) if some incumbents wished to live up to others' expectation, they might indeed end up investing more than others; (ii) because the Tullock contest is characterized by strategic complementarity up to some point, even the ones who did not care much about others' expectation might have to play more aggressively. Developing a full-blown theory is beyond the scope of this paper and is left for future studies.

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## Appendix: Experimental Instruction

Thank you for participating in the experiment. Please read the following instructions carefully.

All decisions of participants in the experiment are anonymously collected and used only for research. No one knows what your decisions are in the experiment.

Everyone obtains KRW 3,000 for participating in the experiment. Moreover, every participant can obtain an additional amount of money in the experiment. Therefore, every participant receives at least KRW 3,000.

The coins in your "account" are given to you at the end of the experiment. At the beginning of the experiment, 400 coins are added to your account. Coins are added to and subtracted from your account during the experiment. Each coin in your account will be converted to KRW 15 and given to you at the end of the experiment.

You will be randomly paired with someone in this room. You and your partner do not know each other during and after the experiment. You and your partner first decide who will be the proposer. Afterward, additional 100 coins are given to the proposer, and the proposer decides how many coins out of these 100 coins are to be given to his/her partner. If the partner does not accept the offer, these additional coins will disappear.

The experiment proceeds as follows.

1. You will be randomly paired with someone in this room. **[In treatment groups: You will be randomly paired with someone in this room, and you or your partner becomes the proposer.]**

2. You can invest up to 40 coins to be the proposer, and then the following situation occurs. **[In treatment groups: You can invest up to 40 coins to keep or obtain the proposer status, and then the following situation occurs.]**

– Suppose that the number of coins you invested is X and the number of coins invested by your partner is Y. The coins you invested are deducted from your account. The number of coins invested by you and your partner is also known to each other.

– You will be the proposer with probability X/(X+Y), and your partner will be the proposer with probability Y/(X+Y). That is, the more coins you invest, the more likely you are to be the proposer, and the more coins your partner invest, the less likely you are to be the proposer.

– For example, if you invested 10 coins (X = 10) and your partner invested 20 coins (Y = 20), the probability that you will be the proposer is 10/30, and the probability that your partner will be the proposer is 20/30. If both you and your partner did not invest any coins, you and your partner will be equally likely to be the proposer. **[In treatment groups: If both you and your partner did not invest any coins, the one with the proposer status at the beginning will keep the proposer status.]**

3. If you become the proposer, situation A occurs, and if your partner becomes the proposer, situation B occurs.

– [Situation A] You will receive additional 100 coins. You decide how many coins to give to your partner. Your partner decides whether or not to accept your proposal. If your partner does not accept your proposal, the additional 100 coins will disappear.

– [Situation B] Your partner will receive additional 100 coins. Your partner decides how many coins to give to you. You decide whether or not to accept your partner's proposal. If you do not accept your partner's proposal, the additional 100 coins will disappear.

4. You will be randomly paired with someone in this room again, and the process above is repeated. The process is repeated for 10 times.

Please do not talk to each other and do not use a cell phone or the Internet until the experiment ends. You do not have to hurry if others finish early. If you have any questions, please raise your hand. Please wait for further instructions from the experimenter.

Figure 1: Cumulative distributions of investment in the contest stage across subject types

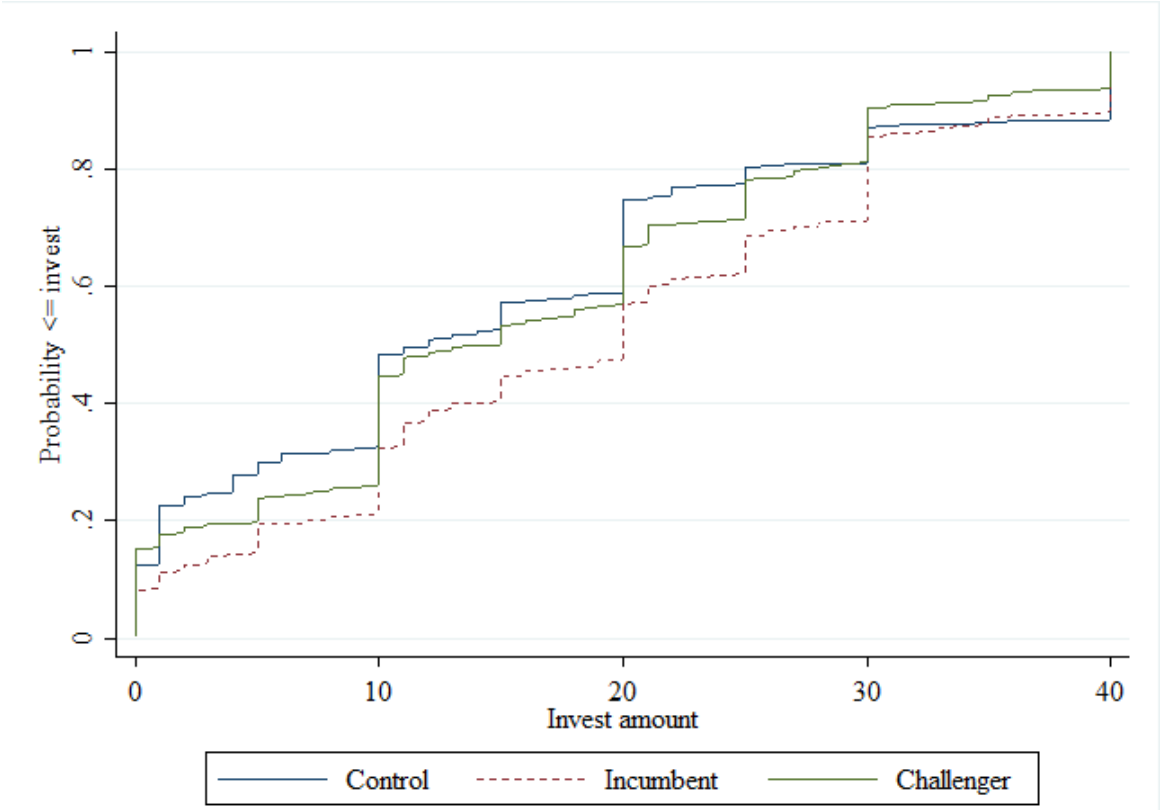


Figure 2: Investment amount and offers among proposers by round

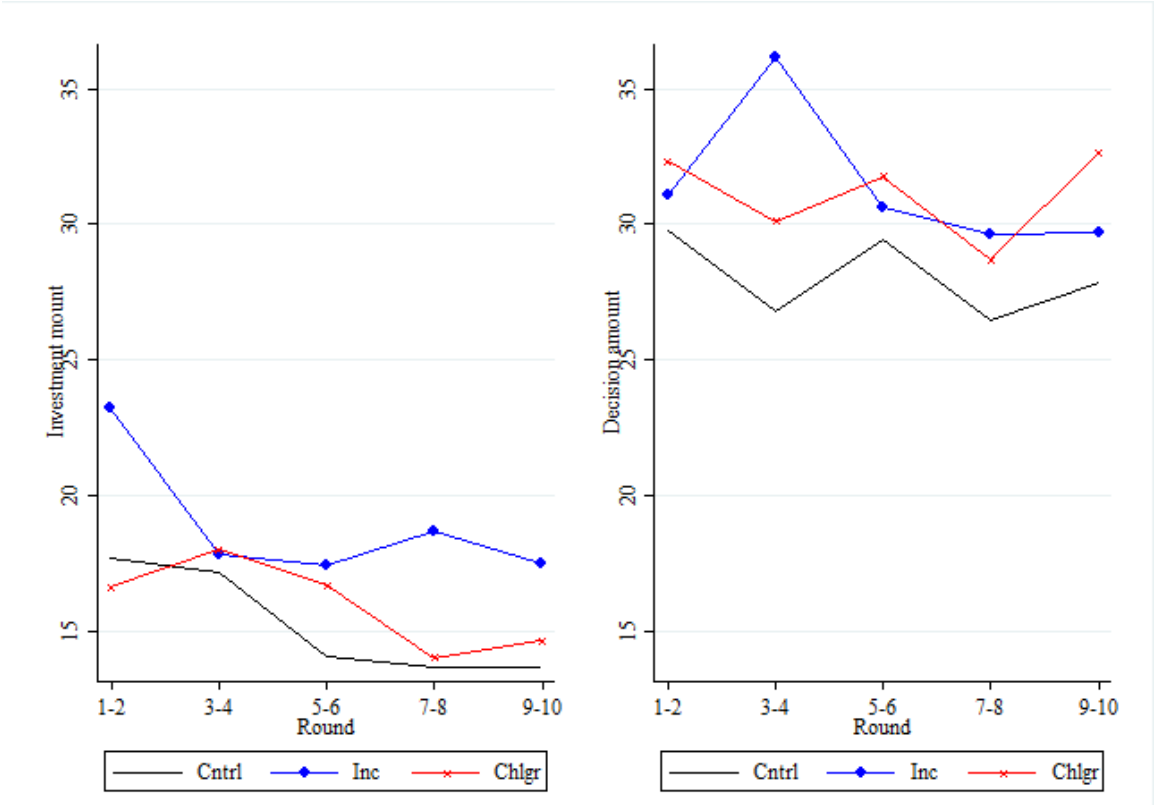

Table 1: Summary statistics

| | Incumbent (*N*=330) | | Challenger (*N*=330) | | Control (*N*=620) | | Total (*N*=1280) | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Invest | 18.94 | 12.34 | 16.03 | 11.93 | 15.27 | 12.82 | 16.41 | 12.56 |
| Offer* | 31.30 | 13.64 | 31.19 | 12.49 | 28.06 | 13.80 | 29.70 | 13.51 |
| Reject* | 0.22 | 0.41 | 0.21 | 0.41 | 0.23 | 0.42 | 0.22 | 0.42 |
| Payoffs | 60.67 | 28.01 | 62.84 | 26.65 | 63.12 | 29.13 | 62.42 | 28.22 |
| Female | 0.45 | 0.50 | 0.46 | 0.50 | 0.42 | 0.49 | 0.44 | 0.50 |
| Age | 23.82 | 2.74 | 23.91 | 2.47 | 23.57 | 2.57 | 23.72 | 2.59 |
| Econ/Business | 0.44 | 0.50 | 0.35 | 0.48 | 0.40 | 0.49 | 0.40 | 0.49 |
| Social science | 0.17 | 0.38 | 0.13 | 0.34 | 0.11 | 0.32 | 0.13 | 0.34 |
| Engineering | 0.10 | 0.30 | 0.18 | 0.38 | 0.16 | 0.37 | 0.15 | 0.36 |
| Liberal arts | 0.12 | 0.33 | 0.12 | 0.32 | 0.11 | 0.32 | 0.12 | 0.32 |
| Other majors | 0.17 | 0.38 | 0.22 | 0.42 | 0.21 | 0.41 | 0.20 | 0.40 |
| Religious | 0.34 | 0.47 | 0.36 | 0.48 | 0.42 | 0.49 | 0.38 | 0.49 |

*Note:* Summary statistics for “Offer” are calculated using the sample of proposers only. Summary statistics for “Reject” are calculated using the sample of recipients only.

Table 2: Investment across subject types (Base category: control group)

| | (1)<br>Investment | (2)<br>Investment |
|---|---|---|
| Incumbent | 3.678** | 3.876** |
| | (1.850) | (1.782) |
| Challenger | 0.763 | 0.811 |
| | (1.715) | (1.692) |
| Female | | 0.661 |
| | | (1.804) |
| Age | | −0.285 |
| | | (0.349) |
| Social science | | 0.066 |
| | | (2.476) |
| Engineering | | 0.610 |
| | | (2.555) |
| Liberal arts | | 0.535 |
| | | (3.259) |
| Other majors | | −0.017 |
| | | (2.137) |
| Religious | | 2.204 |
| | | (1.824) |
| Constant | 15.265*** | 20.625** |
| | (1.221) | (8.726) |
| Observations | 1280 | 1270 |
| R-squared | 0.015 | 0.026 |
| Controlled for indiv. chars | No | Yes |

*Note:* Standard errors are clustered by individuals. * p<0.1, ** p<0.05, *** p<0.01

Table 3: Proposers' offer (Base category: control group)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Incumbent | 3.236 | 3.454* | 3.290 | 2.955 |
| | (2.060) | (2.069) | (2.005) | (1.947) |
| Challenger | 3.124 | 3.208 | 1.115 | 0.732 |
| | (1.987) | (1.974) | (1.995) | (1.932) |
| Own investment | | −0.110 | −0.226*** | −0.215*** |
| | | (0.085) | (0.086) | (0.081) |
| Partner investment | | | 0.414*** | 0.418*** |
| | | | (0.052) | (0.053) |
| Constant | 28.061*** | 30.291*** | 28.337*** | 29.286*** |
| | (1.271) | (2.106) | (2.127) | (8.816) |
| Observations | 640 | 640 | 640 | 633 |
| R-squared | 0.014 | 0.023 | 0.144 | 0.163 |
| Controlled for indiv. characteristics | No | No | No | Yes |

*Note:* Standard errors are clustered by individuals. * p<0.1, ** p<0.05, *** p<0.01

Table 4: Recipients' rejection (Base category: control group)

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Incumbent | −0.016 | 0.026 | 0.016 | 0.016 | 0.017 |
| | (0.047) | (0.047) | (0.048) | (0.048) | (0.046) |
| Challenger | −0.018 | 0.026 | 0.025 | 0.023 | 0.023 |
| | (0.051) | (0.052) | (0.052) | (0.052) | (0.050) |
| Offer made by the proposer | | −0.013*** | −0.014*** | −0.014*** | −0.014*** |
| | | (0.001) | (0.001) | (0.001) | (0.001) |
| Own investment | | | 0.002 | 0.002 | 0.002* |
| | | | (0.001) | (0.001) | (0.001) |
| Partner investment | | | | 0.001 | 0.000 |
| | | | | (0.002) | (0.002) |
| Constant | 0.232*** | 0.610*** | 0.604*** | 0.584*** | 0.343* |
| | (0.032) | (0.061) | (0.062) | (0.070) | (0.175) |
| Observations | 640 | 640 | 640 | 640 | 637 |
| R-squared | 0.000 | 0.188 | 0.192 | 0.193 | 0.193 |
| Controlled for indiv. characteristics | No | No | No | No | Yes |

*Note:* Standard errors are clustered by individuals. * p<0.1, ** p<0.05, *** p<0.01

Table 5: Interaction effects of investment and subject types

| | (1) Offer | (2) Offer | (3) Reject | (4) Reject |
|---|---|---|---|---|
| Incumbent | 3.666 | 2.912 | 0.222 | 0.249 |
| | (4.656) | (4.546) | (0.160) | (0.161) |
| Challenger | 5.632 | 5.156 | 0.032 | 0.034 |
| | (4.050) | (3.947) | (0.146) | (0.146) |
| Incumbent × Own investment | −0.015 | 0.006 | −0.005* | −0.006* |
| | (0.198) | (0.186) | (0.003) | (0.003) |
| Challenger × Own investment | −0.122 | −0.119 | −0.002 | −0.002 |
| | (0.173) | (0.169) | (0.003) | (0.003) |
| Incumbent × Partner investment | −0.013 | −0.018 | 0.002 | 0.001 |
| | (0.113) | (0.115) | (0.004) | (0.004) |
| Challenger × Partner investment | −0.142 | −0.143 | 0.002 | 0.001 |
| | (0.142) | (0.142) | (0.004) | (0.003) |
| Incumbent × Offer made by the proposer | | | −0.005* | −0.006** |
| | | | (0.003) | (0.003) |
| Challenger × Offer made by the proposer | | | −0.001 | −0.001 |
| | | | (0.003) | (0.003) |
| Partner investment | 0.458*** | 0.463*** | 0.000 | −0.000 |
| | (0.057) | (0.057) | (0.002) | (0.002) |
| Own investment | −0.193* | −0.189* | 0.004* | 0.004** |
| | (0.106) | (0.104) | (0.002) | (0.002) |
| Offer amount by the proposer | | | −0.013*** | −0.013*** |
| | | | (0.002) | (0.002) |
| Constant | 27.223*** | 28.096*** | 0.544*** | 0.233 |
| | (2.385) | (8.476) | (0.093) | (0.199) |
| Observations | 640 | 633 | 640 | 637 |
| R-squared | 0.150 | 0.169 | 0.203 | 0.220 |
| Controlled for indiv. characteristics | No | Yes | No | Yes |

*Note:* Standard errors are clustered by individuals. Columns (1)–(2) use the sample of proposers, whereas columns (3)–(4) use the sample of respondents only. * p<0.1, ** p<0.05, *** p<0.01

Table 6: Final payoffs

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | | Panel A: Payoffs among proposers | | |
| Incumbent | −3.562 | −4.461 | −1.907 | −2.014 | −2.130 |
| | (3.797) | (3.983) | (3.081) | (3.124) | (3.122) |
| Challenger | −2.742 | −3.609 | −2.457 | −1.775 | −1.668 |
| | (3.752) | (3.879) | (3.451) | (3.428) | (3.532) |
| Own offer | | 0.278* | 0.186 | 0.236* | 0.217* |
| | | (0.142) | (0.118) | (0.123) | (0.122) |
| Own investment | | | −1.145*** | −1.093*** | −1.090*** |
| | | | (0.119) | (0.125) | (0.124) |
| Partner investment | | | | −0.167* | −0.167* |
| | | | | (0.092) | (0.092) |
| Constant | 72.884*** | 65.091*** | 90.768*** | 90.037*** | 89.576*** |
| | (2.158) | (4.925) | (5.216) | (5.259) | (14.405) |
| Observations | 640 | 640 | 640 | 640 | 633 |
| R-squared | 0.002 | 0.015 | 0.170 | 0.173 | 0.181 |
| | | | Panel B: Payoffs among recipients | | |
| Incumbent | −1.658 | −4.385** | 0.147 | 0.146 | 0.090 |
| | (2.124) | (2.074) | (1.216) | (1.214) | (1.172) |
| Challenger | 2.442 | −0.383 | −0.330 | −0.322 | −0.330 |
| | (2.303) | (2.353) | (1.213) | (1.215) | (1.173) |
| Offer made by the proposer | | 0.873*** | 1.157*** | 1.156*** | 1.161*** |
| | | (0.051) | (0.023) | (0.023) | (0.023) |
| Own investment | | | −1.029*** | −1.028*** | −1.041*** |
| | | | (0.034) | (0.033) | (0.033) |
| Partner investment | | | | −0.003 | 0.011 |
| | | | | (0.033) | (0.033) |
| Constant | 53.361*** | 28.861*** | 31.538*** | 31.608*** | 38.218*** |
| | (1.477) | (1.802) | (1.173) | (1.384) | (4.045) |
| Observations | 640 | 640 | 640 | 640 | 637 |
| R-squared | 0.006 | 0.399 | 0.782 | 0.782 | 0.782 |
| Controlled for indiv. characteristics | No | No | No | No | Yes |

*Note:* Standard errors are clustered by individuals. Payoffs for proposers are (40 − investment) + (100 − offer) if the respondent accepts. If the respondent does not accept, it is 40 − investment. Payoffs for respondents are (40 − investment) + offer if they accept the offer made by the proposer, and 40 − investment if they do not accept the offer. *p<0.1, ** p<0.05, *** p<0.01