

# Leadership and incentives\*

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## Abstract

We study whether compensating people who volunteer to be leaders in a public goods game creates a social crowding-out effect of moral motivation among the others in the group. We report from an experiment with four treatments, where the base treatment is a standard public goods game with simultaneous contribution decisions, while the three other treatments allowed participants to volunteer to be an “early contributor” in their group. In the three leader treatments, we manipulate the level of compensation given to the leader. Our main finding is that a moderate compensation to the leader is highly beneficial, it increases the average contribution by almost 80%. A high compensation, however, is detrimental to public good provision. We show that paying a moderate compensation to the leaders strikes the right balance between the need for recruiting leaders and avoiding a large social crowding-out effect. We argue that the main findings of the paper are important in many real life settings where we would like to use economic incentives to encourage people to lead by example.

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# 1 Introduction

The possibility to lead by example is potentially important in many public goods settings. In the household, at the workplace, in the local community, in business and politics, it is often possible for agents to take the lead and announce their contribution to the public good before others do. Since many people are conditional contributors in public goods contexts (Fischbacher and Gächter, 2010), first movers can potentially inspire others to contribute. But how can people be motivated to take the lead and when is the strategy of leading by example likely to be effective?

Evidence from economic experiments with the public goods games suggest that leading by example has the potential to increase the contributions by the followers (Moxnes and van der Heijden, 2003; Arbak and Villeval, 2007; Haigner and Wakolbinger, 2010; Rivas and Sutter, 2011).<sup>1</sup> The same studies, however, also find that leaders typically end up worse off than their followers, since followers tend to contribute less than the leader. Thus, in contexts where it is a voluntary decision to become a leader, one may face the challenge that no one steps up and makes the first move.

This problem is familiar in many real life settings. At the work place, everyone may hesitate accepting to take the leading role in organizing valuable social activities, fearing that their co-workers will not contribute to the same extent. Similarly, parents may avoid taking the lead in organizing a school activity for the children, being afraid that the other parents will not follow up. More generally, whenever there is the possibility for taking the lead in a public good setting, people may hesitate to step up and take the costs of making the first move.

The classical solution in economics to the problem of undersupply is to strengthen economic incentives. It is by now, however, well recognised that the introduction of economic incentives may undermine the intrinsic motivation of individuals, and the net effect may be a reduction of the overall motivation and a reduction of the activity itself (Frey and Oberholzer-Gee, 1997; Gneezy and Rustichini, 2000; Fehr and Falk, 2002; Bénabou and Tirole, 2003). Thus, it is not obvious that offering leader compensation would strengthen people's willingness to volunteer as leaders, the economic incentive may crowd out any intrinsic motivation to step forward. In the public goods context, however, there is a further concern regarding the introduction of economic incentives for the leader, it may crowd out the intrinsic motivation of the other members of the group. We coin this the social crowding-out effect.

To study the effect of leader compensation we designed an experiment with a sequence of one-shot public goods games with random rematching. In addition to a treatment without a leader, we had three treatments where the participants could vol-

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<sup>1</sup>Leadership has many important aspects that are not investigated in the present paper, including granting the leader the authority to reward or punish (Gürek, Irlenbusch, and Rokenbach (2009), Güth, Levati, Sutter, and van der Heijden (2007)), asymmetric payoff structures (Gächter, Herrmann, and Thoeni (2010), Glöckner, Irlenbusch, Kube, Nicklisch, and Normann (2011), Levati, Sutter, and van der Heijden (2007), van der Heijden and Moxnes (2013)) and asymmetric information (Potters, Sefton, and Vesterlund (2007)).

unteer to be the leader whose contribution was announced before the other members of the group decided on their contribution. The three treatments differed only in the compensation given to the leader (zero, moderate and high). This design allows us to study whether leader compensation represents a promising approach to public goods provision in settings where it is possible for an agent to move before others, and allows us to shed light on whether leader compensation creates a social crowding-out effect.

The paper offers three main findings. First, we show that leader compensation indeed improves public good provision. Second, we find that the optimal strategy is to pay leaders a moderate compensation. In this case, the average contribution increases by almost 80% compared to the base treatment without a leader. A further increase in the leader compensation causes a considerable drop in contributions, and turns out to be the worst arrangement if the participants themselves have to cover the costs of the leader compensation. Third, we show that a moderate compensation to the leaders strikes the right balance between the need for recruiting leaders and avoiding a large social crowding-out effect. Paying no compensation to the leaders appears to make the followers even more responsive to the leader's contribution, but fails to attract a sufficient number of leaders. Paying a high compensation to the leaders, on the other hand, appears to make it attractive to become the leader, but weakens the leader's ability to lead by example. In sum, the paper shows that leader compensation may be a viable strategy for increasing public good provision, but also that it may initiate a social crowding-out effect that makes it optimal to keep the compensation at a moderate level.

The structure of the paper is as follows: Section 2 presents the experimental design, Section 3 reports treatment effects, Section 4 investigates potential mechanisms through which leader compensation affects cooperation, and Section 5 provides some concluding remarks.

## **2 The experiment**

The experiment consisted of four treatments of a repeated public goods game with random rematching. The base treatment was a standard public goods game with simultaneous contribution decisions, while the three other treatments allowed participants to volunteer to be an "early contributor" in their group. Being an early contributor meant that one's contribution would be announced to the other group members before they made their contribution decision. We shall in the following refer to the "early contributor" as the "leader", though the word "leader" was never used in the experiment.

### **2.1 The participants and procedures**

We recruited participants among students at the NHH Norwegian School of Economics. A total of 272 subjects participated in ten sessions. Each session lasted approximately 90 minutes and the average payment was 464 NOK (about 80 USD)

including a show up fee of 100 NOK. The experiment was conducted in a computer lab using a web-based interface and was double blind.

Upon arrival the participants were informed about the rules of conduct, given an overview of how the experiment would proceed and introduced to the general public goods game. The participants were also informed that they would remain anonymous throughout the experiment.<sup>2</sup> Written copies of the instructions were available at the participants' desks. After the introduction, the participants were given a set of control questions in order to ensure that they had understood the nature of the public goods problem. All ten control questions had to be answered correctly before a participant could proceed to the actual experiment.

All payments were made in cash immediately after the experiment. Special care was taken so that the payment procedure ensured anonymity. The computer assigned a payment code to each of the participants, and a group of assistants who were not present in the lab during the experiment prepared envelopes containing the payments corresponding to each payment code. After bringing the envelopes to the lab, the assistants immediately left and the envelopes were handed out in accordance with the payment codes. This procedure was explained to all participants at the start of the experiment.

## 2.2 The treatments

All four treatments consisted of ten rounds of a public goods game with random re-matching of groups after each period. The participants were randomly assigned to groups of four and in each round they received 20 points (1 point = 1 NOK) that they either could keep to themselves or invest in a public good. Each participant's return from the public good was 0.4 times the group's total investment in the public good. After each round the participants were informed about their payoff in this round and their group's total/average contribution.

Our base treatment (B-treatment) was a standard public goods game where all group members simultaneously chose their contribution to the public good. This treatment was a replication of the experiment presented in Fischbacher and Gächter (2010). In the three leadership treatments the participants could volunteer to be the leader. If more than one group member volunteered, the leader was randomly chosen among the volunteers and asked to state his contribution. The leader contribution was announced to the three other group members before they decided on their contribution. If no one volunteered to be the leader, the round was played with simultaneous contribution decisions. The only difference between the three leadership treatments was the level of compensation given to the leader. In the "no compensation" treatment (NC-treatment) the leader received no compensation.<sup>3</sup> In the "medium compensation" treatment (M-treatment) and the "high compensation" treatment (H-treatment), the leader

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<sup>2</sup>The instructions and screenshots are provided in Appendix 2.

<sup>3</sup>The NC-treatment is related to the design in Rivas and Sutter (2011), who also study voluntary leadership without compensation. There are two important differences between their study and our NC-

received 4 and 12 points respectively to her private account as compensation for being the leader. Importantly, the compensation given to the leader in the M-treatment and the H-treatment did not change the pay off structure in the public goods game.

To summarize, a participant's payoff in each round can be represented in the following way,

$$\pi_i = 20 - c_i + 0.4 \sum_{j=1}^4 c_j + d_i \cdot f_i, \quad (1)$$

where  $c_i$  is the contribution to the public good,  $d_i$  is a binary variable indicating whether the participant was a leader and  $f_i$  indicates the compensation paid to the leader (which depended on the treatment).<sup>4</sup>

### 2.3 A conditional contribution experiment

After playing ten rounds of the public goods game, all participants took part in a second experiment similar to the the P-experiment in Fischbacher and Gächter (2010). In this P-experiment, the participants first decided on how much they wanted to contribute in a one-shot public goods game. The public goods game was the same as in the base-treatment except that 1 point = 5 NOK. After deciding on the contribution in the one-shot game, all participants were asked to fill out a conditional contribution table. For each possible average contribution level of the three other participants (rounded to whole integers), they were asked to specify how much they would want to contribute. When all participants had made their decision, three of the four participants in a group contributed according to their decision in the one-shot unconditional game, while the contribution of the fourth participant (randomly drawn) was determined by his or her conditional contribution table and the average of the three other participants. This experiment provides us with an independent measure of the social preferences. In the

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treatment; first, they consider a repeated game with partner matching, and second they let subjects go ahead as leaders if they are quicker in entering a contribution than others. These differences may explain why they find a stronger effect of voluntary leadership without compensation than what we observe in the present study.

<sup>4</sup>Before making their contribution decision participants were also asked what they believed the other participants would do. Leaders were asked what they believed the average contribution of the followers would be given their own contribution. Followers were asked what they believed the average contribution of the two other followers would be given the leader's contribution. Participants in situations without a leader were asked what they believed the average contribution of the three other participants would be. The questions were incentivized and the participants received three points for a correct answer, two points if their answer deviated with one point from the correct answer, and one point if the answer deviated with two points. The beliefs data confirm almost exactly the analysis in Fischbacher and Gächter (2010), where it is shown that declining cooperation in a public goods game is driven by people being imperfect conditional cooperators. We also find that the beliefs of followers about others contribution are strongly correlated with the leader's contribution. It is, however, not possible to identify whether the underlying mechanism in this case is that the follower is inspired by the leader's contribution and is prone to a false consensus effect, or that the follower is not himself inspired but believes that others are so.

following, we classify a participant as a freerider if he did not contribute at all in the conditional contribution game, and as prosocial if he did contribute for some positive contribution levels of the others in the group.

### 3 Results

We first present treatment effects on the contributions to the public good, before we provide a brief discussion of whether it would pay off for the participants to compensate leaders, if the group itself would have to cover the costs of compensation.

#### 3.1 Treatment effects on contributions

Figure 1 presents how the contributions to the public good evolved in the experiment. We observe that in all treatments, there is a declining trend in contributions in later rounds. In the B-treatment, we replicate almost exactly the findings of Fischbacher and Gächter (2010), the average contribution is 37.3% of the endowment in the first round, but falls to 12.5% of the endowment in the last round. The introduction of the possibility of volunteering to be the leader without any compensation (NC-treatment) increases slightly average contributions in the initial rounds, but this treatment falls short of the B-treatment in almost all of the later rounds. In contrast, offering a leader compensation increases average contributions relative to the B-treatment in all rounds (with the exception of the last round for the H-compensation treatment). Finally, we observe that the average contribution in the M-treatment is above the average contribution in the H-treatment in all rounds (with the exception of the ninth round).

[ Figure 1 about here ]

Figure 2 presents the treatment effects on the average contribution to the public good across rounds.<sup>5</sup> We observe that the introduction of a moderate compensation to the leader substantially increases contributions, the average contribution in the M-treatment is almost 80% higher than in the NC-treatment ( $p < 0.001$ ).<sup>6</sup> A further increase in compensation is, however, detrimental for the public goods provision, the average contribution in the H-treatment is significantly lower than in the M-treatment ( $p = 0.048$ ), but still higher than in the NC-treatment ( $p < 0.001$ ). Finally, we observe that the average contribution in the NC-treatment is slightly below the average contribution in the B-treatment, but this difference is not statistically significant ( $p = 0.721$ ).

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<sup>5</sup>More detailed statistics are provided in Table A1 in Appendix 1. In the appendix, we also show OLS-regressions on the treatment effects in Table A2 and disaggregated treatment effects for rounds 1-5 and 6-10 in Table A3. We observe the same pattern of treatment effects in the first and second part of the experiment.

<sup>6</sup>Throughout the paper, reported  $p$ -values are from  $t$ -tests, where standard errors have been corrected for clustering on individuals where appropriate.

[ Figure 2 about here]

In sum, Figure 1 and Figure 2 provide three important insights. First, the introduction of leader compensation substantially increases contributions to the public good; second, a too high leader compensation can be counterproductive; third, the reliance on participants volunteering as leaders without receiving any compensation is not a good strategy for securing public good provision.<sup>7</sup>

### 3.2 Does it pay off?

We end this section by briefly considering whether it pays off to compensate the leaders. In the present experiment, the leaders were paid by the experimenter, but let us consider whether it would have been profitable for the participants themselves if they had to share the costs of paying the leader. Figure 3 shows the net value created for the participants in each of the four treatments, where the net value is defined as the difference between the income of the participant minus the endowment and the payment to leaders. We observe that the introduction of moderate compensation is highly beneficial, it increases the net value by 38.3% compared to NC-treatment ( $p = 0.044$ ). In contrast, the net value generated in the H-treatment is very small and much lower than in all the other treatments ( $p < 0.001$ ).

[ Figure 3 about here]

## 4 Mechanisms

In this section, we investigate potential mechanisms through which leader compensation affects cooperation. We first look at how the level of leader compensation affects the recruitment of leaders, before we discuss how it affects leader and follower behavior.

### 4.1 Recruitment of leaders

As shown in the left panel in Figure 4, the level of compensation has a significant positive effect on the participants' willingness to be leaders.<sup>8</sup> Only 22.1% of the participants volunteer to be leaders in the NC-treatment, whereas 64.6% and 93.3% would like to be the leader in the M-treatment and the H-treatment, respectively.<sup>9</sup> As shown

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<sup>7</sup>It should be noted, however, that voluntary leadership without compensation has been shown to work in other settings, see Güth et al. (2007); Rivas and Sutter (2011)

<sup>8</sup>In Figure A1 in Appendix 1, we report data disaggregated by round.

<sup>9</sup>Thus, in the present experiment, the economic incentive appears to be sufficiently strong to create a positive net effect on the supply of leaders. This is consistent with the crowding-out literature (Gneezy and Rustichini, 2000), which typically finds that a sufficiently strong economic incentive dominates a crowding-out effect of intrinsic motivation.

in the right panel, this implies that in the treatments with leader compensation, there is almost always a leader in the group (94.6% of the groups in M-treatment, 99.5% of the groups in the H-treatment), whereas we only have leaders in 62.1% of the groups in the NC-treatment.

[ Figure 4 about here]

The absence of a leader can clearly be detrimental for the group, since it may be seen as a signal of no one being willing to contribute much to the public good. It is, however, not straightforward to identify this effect, since followers in groups with a leader may differ from followers in groups without a leader. However, if we focus on the participants who never volunteered to be the leader, we have random assignment into groups with and without leaders in any particular round and thus a clean identification of the effect of having a leader. Regressing the follower's contribution on an indicator for the presence of a leader and controlling for round effects, we indeed find that the presence of a leader has a statistically significant positive effect: the average contribution to the public good is about 20% higher in groups with a leader ( $p = 0.055$ ). We do not know whether this leader effect applies to the other participants in the sample, but at least it provides suggestive evidence of the importance of ensuring that someone volunteers to be a leader in the group.

## 4.2 Leader behavior

We now turn to a discussion of how leader compensation affects leader behavior. As shown in Figure 5, the average leader contribution is slightly lower in the H-treatment than in the NC-treatment and, in fact, slightly higher in the M-treatment, but none of these differences are statistically significant. What can explain the absence of a treatment effect on leader contribution?

[ Figure 5 about here]

The level of the leader compensation may affect both who volunteers to be leaders and leader behavior.<sup>10</sup> Importantly, a high compensation may attract more freeriders to volunteer, as we indeed observe in Figure 6.<sup>11</sup> But it may also generate a reciprocal motive in the leader or change his beliefs about the extent to which the followers will respond to his contribution. Overall, we observe from Figure 5 that the net effect on leader behavior of manipulating the level of compensation is negligible in the present experiment, we do not observe statistically significant differences in leader behavior across treatments.

[ Figure 6 about here]

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<sup>10</sup>See also ? and Arbak and Villeval (2007).

<sup>11</sup>We observe the same pattern if we consider the relative shares of freeriders and prosocial patterns volunteering to be leaders, see Figure A3 in Appendix 1.



### 4.3 Follower behavior

How do the followers respond to the leader's contribution? Figure 7 reports the correlation between the leader contribution and the followers contribution, and we observe that it is very rare that the follower contributes with more than the leader (only in 7.2% of the cases). The leader's contribution appears to serve as an upper ceiling for the followers. We also observe a positive relationship between the leaders and followers contributions in all treatments; a higher contribution by the leader is, on average, followed by a higher contribution by the followers.

[ Figure 7 about here]

Table 1 investigates the relationship between the leaders and followers contributions in more detail. The main coefficient of interest when comparing across treatments is the linear combination of the leader contribution variable and the interaction variable between the leader contribution variable and a dummy for whether the follower has not experienced a situation without a leader.<sup>12</sup> This coefficient captures the effect of the leader's contribution on the followers in the cases where the follower has not experienced a situation without a leader. We observe that in these cases, the leader's ability to lead by example is strongest in the NC-treatment and weakest in the H-treatment; an additional unit of contribution by the leader is met with 0.45 units increase in the follower's contribution in the NC-treatment, whereas it only generates an increase in the follower's contribution of 0.33 units in the H-treatment. Thus, the follower's marginal response to the leader is 36% higher in the NC-treatment than in the H-treatment, even though the difference is not statistically significant ( $p = 0.161$ ).<sup>13</sup> The effect in the M-treatment is between that of the NC-treatment and the H-treatment, and thus we observe a pattern across treatments suggesting that increased compensation creates a social crowding-out effect among the followers.

[ Table 1 about here]

The analysis of mechanisms suggests that the success of the M-treatment in generating high contributions is that a moderate compensation of the leaders strikes the right balance between the need for recruiting leaders and avoiding a large social crowding-out effect. Paying no compensation to the leaders appears to make the followers even

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<sup>12</sup>We introduce this interaction term to allow for the possibility that having experienced no one volunteering to be a leader may affect the willingness of the followers to respond to a leader's contribution in the future. We observe that this variable is positive and statistically significant ( $p = 0.024$ ) in the NC-treatment, which means that the leader's contribution is more effective if the follower not yet has experienced a situation without a leader. The interaction effect is also positive in the two other treatments but not statistically significant (which is not surprising, given that we have very few groups without a leader in the M-treatment and H-treatment).

<sup>13</sup>A related interesting result has been shown in van der Heijden and Moxnes (2013), who find that followers follow the leaders more closely and make higher contributions when leading by example is costly.

more responsive to the leader's contribution at the margin, but fails to attract a sufficient number of leaders. Paying a high compensation to the leaders, on the other hand, makes it even more attractive to become the leader, but weakens the leader's ability to lead by example.

## **5 Concluding remarks**

We have shown that monetary compensation of leaders can be used to increase public goods provision, but also that it may create a social crowding-out effect of moral motivation. We believe that these insights may be of great importance in a wide range of real life situations.

It has been estimated that nearly a billion people are involved in voluntary work throughout the world, and the voluntary sector has increasingly been recognised to play a fundamental role in society, and particularly in the provision of public goods (Salamon, Sokolowski, and Haddock, 2011). A crucial question in the organization of voluntary work is how to motivate people to take the lead and inspire others to follow. An example from daily life is the question of how to organize a youth soccer team, which typically requires inputs from many parents. How shall we make sure that someone is willing to take the responsibility of being the first mover in getting the team established? The present paper has investigated one possibility, namely to provide a monetary compensation to the leader of the team. Our experiment suggests that such a compensation may be beneficial for the effort put into the organization of the soccer team. It may make it more likely that someone steps up, and the presence of a leader will most likely generate more effort from the other parents. But this strategy must be implemented with care. A too high compensation to the leader of the team may backfire, both by weakening the power of the example and by attracting the wrong leaders.

Similar examples abound in the public and the private sector. For example, how should we think of monetary compensation to the department head at a university? A high level of compensation will probably attract many candidates for the job (including candidates with the wrong qualities), but it may also undermine the willingness of the rest of the members in the department to contribute to the provision of public goods in the department. The fact that the head of department works very hard to create a well-functioning department may not inspire a similar effort from others, if they know that he or she is highly compensated for taking the lead.

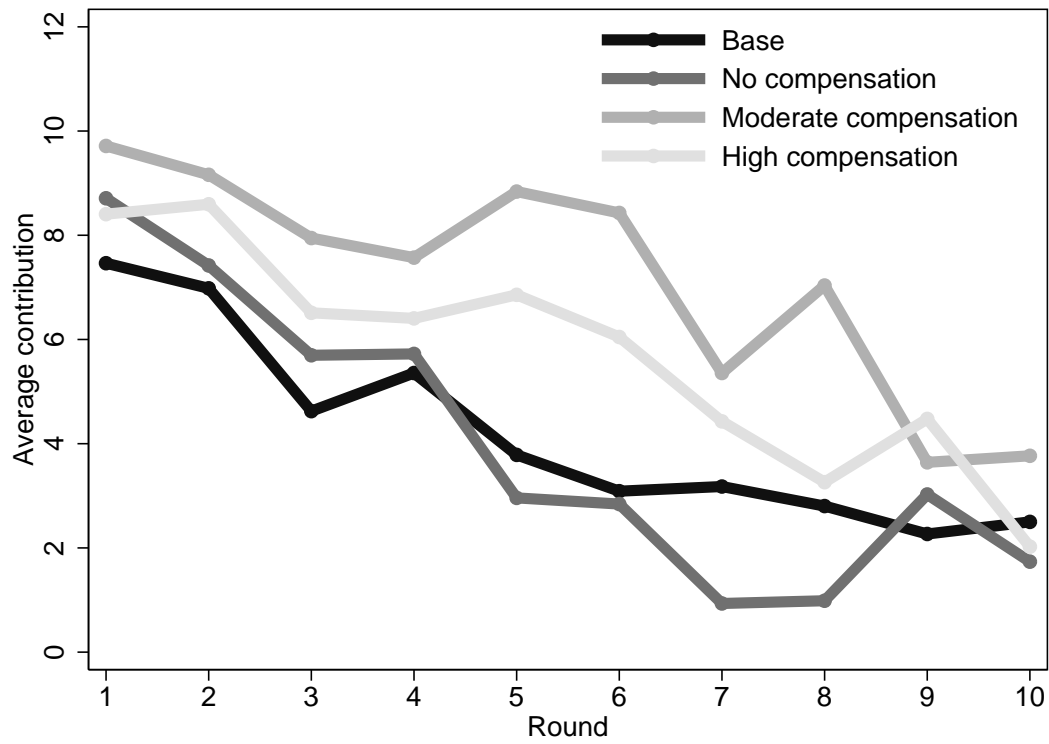
We find that compensating leaders involved in public goods provision may have both positive and negative effects, and the relative importance of these effects may depend on the level of compensation offered the leader. In particular, we have shown that a high compensation to leaders may generate a large social crowding-out effect of moral motivation that may be detrimental for public good provision. This finding may also shed light on the present debate on CEO compensation, where we have seen a surge in executive pay in the past 30 years. A main focus in this literature has been

on whether CEO compensation motivates managers to make sound business decisions (Frydman and Jenter, 2010), whereas the present paper points to the possibility that a too high CEO compensation may crowd out the intrinsic motivation of other workers in the firm. Further research, however, is needed to understand how these effects work in different types of settings, where potentially also other aspects of leadership are involved.

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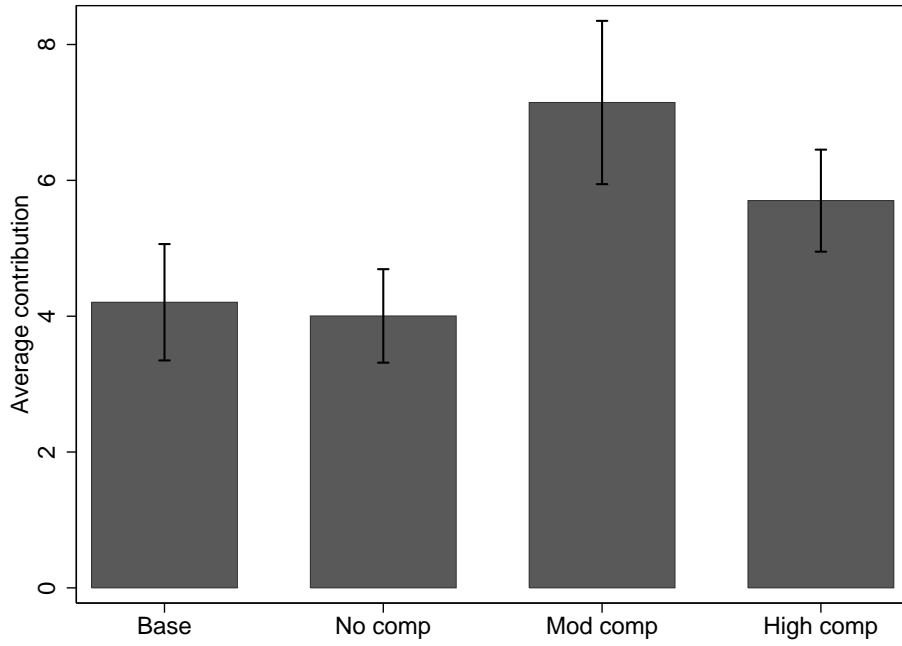
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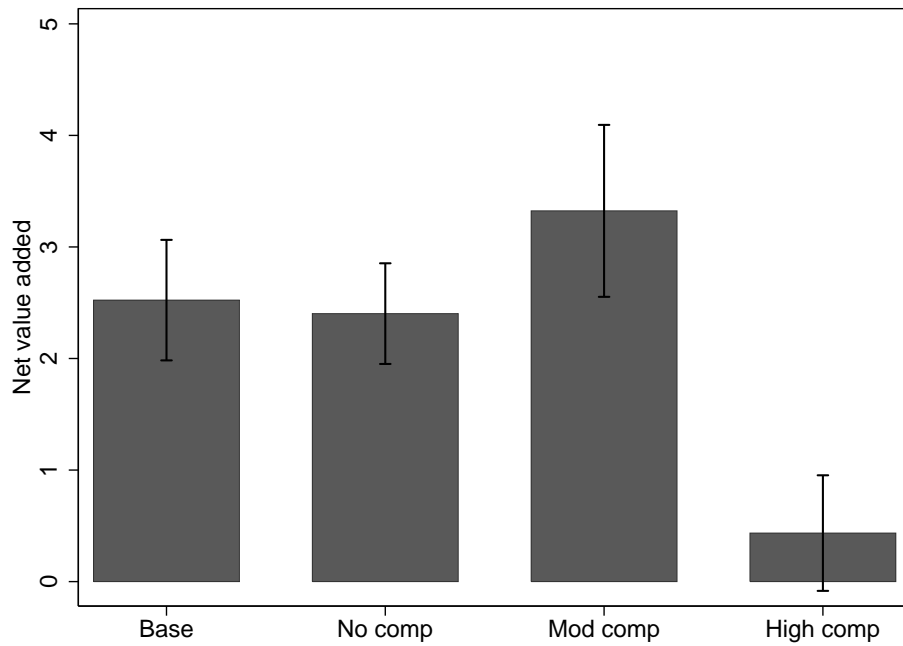
**Figure 1: Contributions**

*Note:* The figure shows contributions over the 10 rounds for all the different treatments. Both leaders and followers are included.



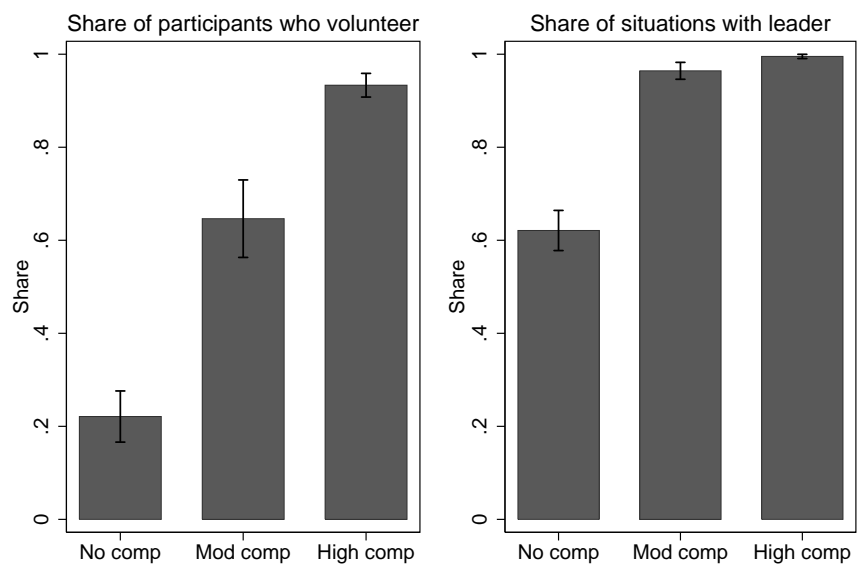
**Figure 2:** Average contributions

*Note:* The bars show average contributions for the leadership treatments. The 95 percent confidence intervals are also indicated. Note that all participants are included (also leaders). The p-value when comparing moderate and high compensation is 0.047, hence the difference is significant on a 5 percent level.



**Figure 3:** Net value added

*Note:* The bars show the return on investment for the leadership treatments. The 95 percent confidence intervals are also indicated. Note that all participants are included (also leaders). The net value added has been calculated as: Net value added = average income - endowment - average leadership payment. The p-value when comparing moderate compensation and base is 0.097. The p-value when comparing moderate compensation and no compensation is 0.044.

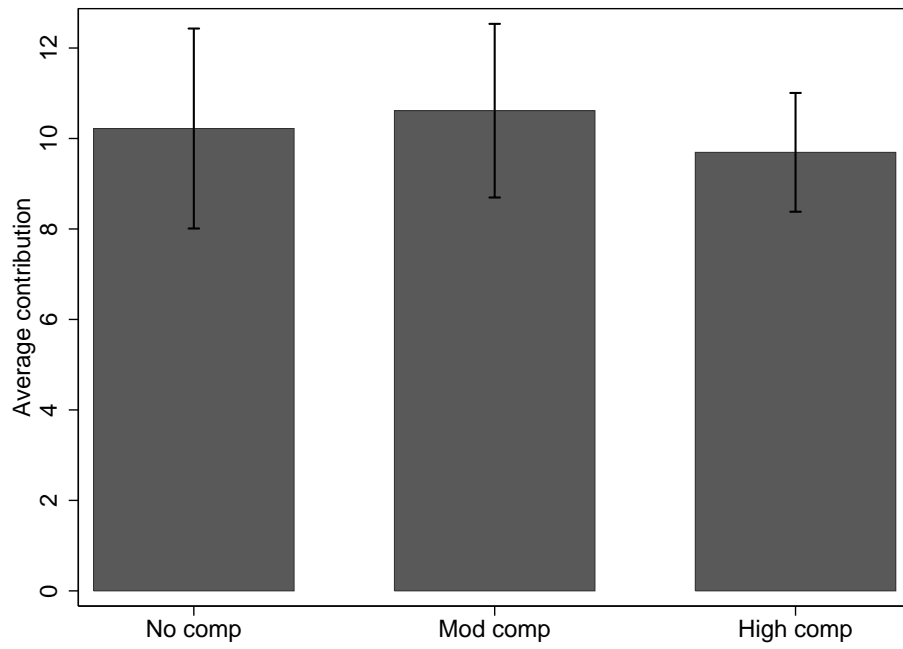


Graphs by volunteer

**Figure 4:** Recruitment

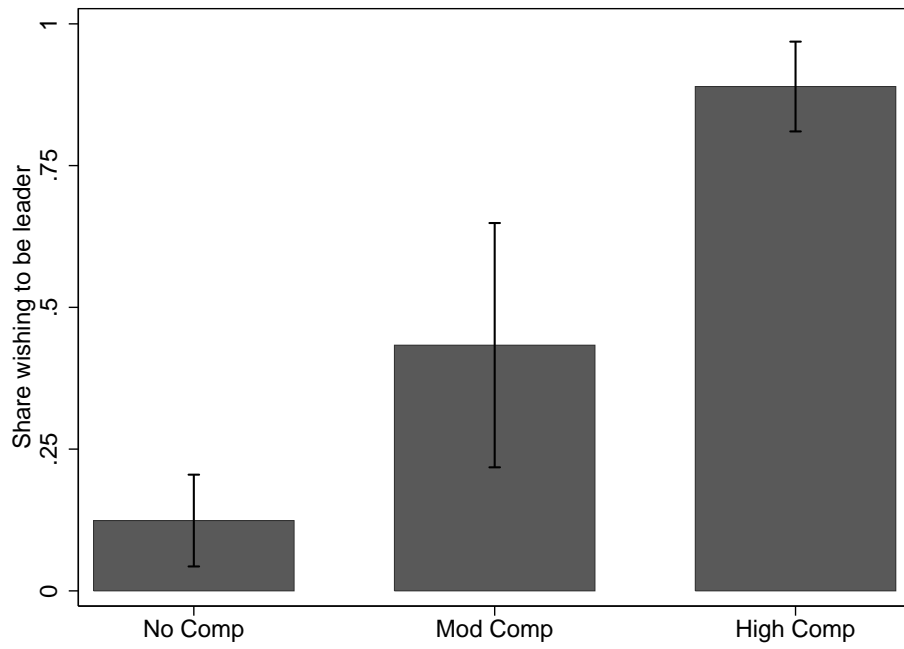
*Note:* The bars to the left show the share of participants volunteering for leadership in the different treatments. The figure to the right shows the share of groups that had a leader in the different treatments.





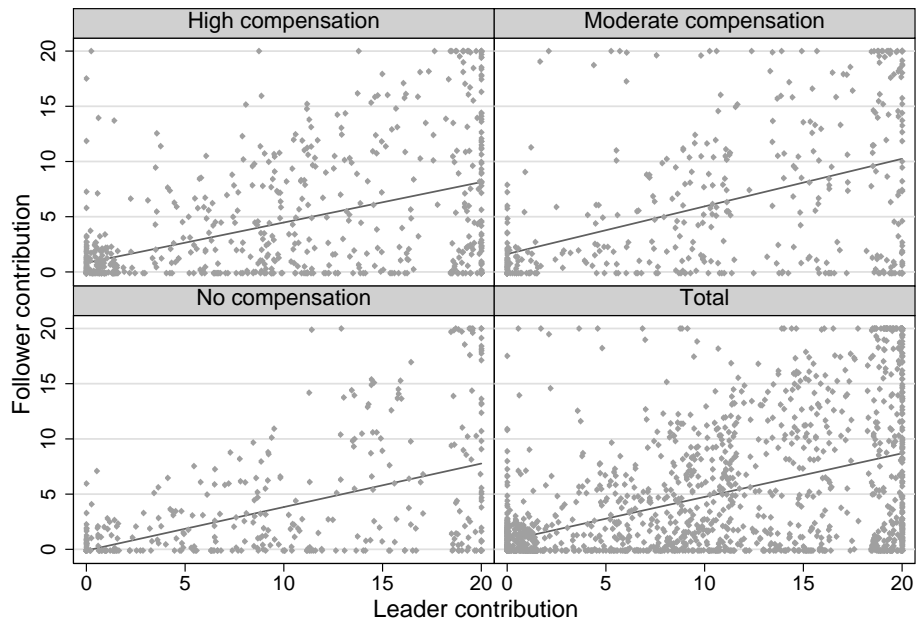
**Figure 5:** Leader contributions

*Note:* The figure shows the contributions of leaders in the different treatments. The 95 percent confidence intervals are also indicated.



**Figure 6:** Leader composition across treatments

*Note:* The figure shows the share of freeriders (classified by the P-experiment) that volunteered for leadership in the different treatments.



**Figure 7:** Follower contribution as a function of leader contribution

*Note:* The figure shows a scatter of follower contribution plotted against the leader's contribution for all leadership treatments separately and pooled. The line shows the linear fit.

**Table 1:** Follower motivation

	<b>Followers' contribution</b>		
	No comp	Mod comp	High comp
Leader contribution	0.253*** (0.0603)	0.296*** (0.110)	0.298* (0.163)
Always_leader	-1.485** (0.666)	-0.579 (1.047)	0.431 (0.904)
Leader_always_int	0.200** (0.0868)	0.104 (0.122)	0.0356 (0.168)
Freerider	-3.312*** (0.755)	-5.050*** (1.168)	-2.446*** (0.907)
Period	-0.269*** (0.0984)	-0.452*** (0.0990)	-0.415*** (0.0726)
Constant	3.412*** (0.869)	5.931*** (1.180)	3.629*** (1.055)
Leader_lincom	0.453*** (0.073)	0.399*** (0.060)	0.333*** (0.043)
<i>N</i>	354	405	627
<i>R</i> <sup>2</sup>	0.347	0.322	0.297

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

*Note:* Standard errors in parentheses (robust and clustered on participant level). The model shows a regression of follower contribution on several explanatory variables across the leadership treatments. “Leader contribution” is the contribution of the leader in the participant’s group in this round. “Always\_leader” is a dummy taking the value one if the participant in all previous rounds has been in a group with a leader. “Leader\_always\_int” is an interaction between “Always\_leader” and “Leader contribution.” “Freerider” = 1 if the participant gave all zeros in the conditional table. “Leader\_lincom” is the linear combination of leader contribution and the interaction term. Hence, “Leader\_lincom” should be read as the average marginal effect on a follower’s contribution from an increase in leader contribution in situations where the followers always had encountered a leader.