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Social Framing Effects in Leadership: Preferences or Beliefs?

Abstract

We experimentally study the impact of framing effects in a repeated sequential social dilemma game. Our between-subjects design consists of two group level (“Wall Street” vs. “Community”) and two individual level (“First (Second) Movers” vs. “Leaders (Followers)”) frames. We find that average contributions are significantly higher when the game is called the Wall Street game than when it is called the Community game. However, the social framing effect disappears when we control for players’ first-order and second-order beliefs. Overall, our evidence indicates that social frames enter people’s beliefs rather than their preferences.

JEL-Codes: H410, C720, C920.

Keywords: framing, public good, experiment, beliefs.

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1. Introduction

It has long been argued that effective leadership can be a means to increase cooperation and efficiency in public good games (e.g. Van Vugt and De Cremer 1999). Intuitively, if a leader sets a “good example” then this should increase cooperation in the group. Consistent with this intuition, there is extensive evidence for conditional cooperation in public good games (e.g. Fischbacher et al. 2001, Kocher et al. 2008, Kosfeld, 2020). If sufficiently many followers are conditional cooperators and if the leader sets a “good example” then we should see an increase in group contributions (Cartwright and Patel 2010). It seems reasonable to conjecture, therefore, that effective leadership will enhance efficiency.

A growing experimental literature has studied leadership in public good games (e.g. Rivas and Sutter 2011, Drouvelis and Nosenzo 2013, Sahin et al. 2015, Cappelen et al. 2016, Gächter and Renner 2018). Results on the effects of leadership are mixed. In particular, there is little evidence that leadership *by itself* enhances efficiency (e.g. Rivas and Sutter 2011, Sahin et al. 2015, see also Figuières et al. 2012). Only if leaders are endogenously determined (Haigner and Wakolbinger 2010, Rivas and Sutter 2011, Cappelen et al. 2016), have status (Kumru and Vesterlund 2010, Jack and Recalde 2015), or if leadership is coupled with some power such as the right to exclude (Güth et al. 2007) does leadership appear to substantially increase efficiency.¹

There are two basic explanations for why leadership, of itself, appears relatively ineffective: either leaders do not set a good enough example (Cartwright, Gillet and van Vugt 2013, Drouvelis and Nosenzo 2013) and/or followers are less reciprocal than one might expect from estimated levels of conditional cooperation (Gächter and Renner 2018). A crucial question is whether there is anything that can increase the effectiveness of leadership, either by influencing leaders to set a “good example” or followers to reciprocate. In this paper we vary the framing of leadership of a public good game in two dimensions: (i) individual level frame comparing the term *leader* versus *first mover*, and (ii) group level frame comparing a *community* game versus *Wall Street* game.

In motivating our choice of frames we note that most economic experiments on leadership use neutral wording in the instructions such as “early contributor” (Güth et al. 2007, Rivas and Sutter 2008), “first mover” (Gächter et al. 2012, Drouvelis and Nosenzo 2013, Sahin, Eckel and Komai 2015) or “stage one” (Nosenzo and Sefton 2011). Use of the term “leader” is rare, Moxnes and van der Heijden (2003) being one exception. Although, use of “leader” is much more common in psychology experiments (e.g. Ruve and Wilke 1984, van Vugt and De Cremer 1999, Van Dijk, Wilke and Wit 2003). No study of which we are aware has directly compared the term used to identify leaders. Identifying an individual as a “leader” may potentially make her more aware of the influence her contribution will have on others or make her feel more responsibility for the group.

The comparison between a Community frame and alternatives has been explored previously. Rege and Telle (2004) and Dufwenberg, Gächter and Hennig-Schmidt (2011) compare a community frame and neutral frame – Rege and Telle (2004) find marginally

¹ A related question is whether ‘leaders’ within a group can help sustain cooperation over repeated interaction (e.g. Andreoni and Petrie 2004). The idea here is that if a group member contributes a lot in one period it may increase others contributions in subsequent periods (see also Keser and van Winden 2000).

higher contributions in the community frame while Dufwenberg et al. (2011) find marginally lower contributions in the community frame. An experiment by Ross and Samuels, reported in Ward et al. (1997), found higher cooperation in a prisoner's dilemma labelled the Community Game compared to the Wall Street Game. Similar results are reported by Liberman, Samuels and Ross (2004). All of these experiments had simultaneous choice. Particularly relevant for our purposes is the study of Ellingsen et al. (2012). They also found that cooperation was higher in a Community frame than Stock Market frame when choice was simultaneous. The framing effect vanished, however, when the game was played sequentially.

Building on the work of Dufwenberg et al. (2011) and Ellingsen et al. (2012) we hypothesize that framing effects (if they exist) are driven by changes in beliefs rather than social preferences or similar. For instance, it is not that the word "Community" makes people more or less cooperative, it is that the word influences beliefs which then influence behavior (Dufwenberg et al. 2011). This is vital when it comes to interpreting our results. Our main finding is that contributions (of leaders and followers) are *significantly higher in the Wall Street than Community group frame*, particularly with a first mover individual frame. Crucially, this effect is explained by changes in first and second order beliefs. Our findings, thus, reinforce the message of Dufwenberg et al. (2011) and Ellingsen et al. (2012) on the mediating effect of beliefs. They also support the results of Dufwenberg et al. (2011) that a Community frame may decrease contributions. We find no effect of the individual level frame on either leader or follower contributions.

Our work contributes to a general literature on framing effects in public good games (see, e.g. Bohm and Theelen 2016, Cartwright 2016, Fosgaard et al. 2017 for recent contributions). To the best of our knowledge there are surprisingly few studies that have explored framing effects on leadership (Hunter et al. 2009, Ho et al. 2012). One exception is Frackenhohl et al. (2016) who find that leadership is more effective in a give compared to a take frame. Framing effects specific to leadership can be related to social identity and evolutionary theories of leadership (e.g. Hogg 2001, van Vugt, Hogan and Kaiser 2008). The common theme in both these perspectives is that leadership, and followership, are an inherently group process. A "sterile" experimental frame that focuses on sequential decision making and abstracts away from group processes is, therefore, far removed from realistic leadership in teams. Indeed, sequential decision, by itself, may even lower efficiency compared to a simultaneous setting because it creates distance between group members (Abele and Ehrhart 2005). Hence the importance of studying in more depth framing effects in leadership.

We proceed as follows: in Section 2 we explain our experimental design, in section 3 we propose behavioral hypotheses, in section 4 we provide our results and in section 5 we conclude. The experiment instructions are contained in an appendix.

2. Experimental design and procedures

2.1 Framework

Our experiment consists of four treatments designed to test the impact of framing on leading-by-example. In all treatments the experiment consisted of a three-person voluntary

contributions game (Gächter et al., 2008), played repeatedly for ten periods. Groups were randomly formed in period 1 and remained fixed across periods (partners' matching protocol). In each period, subjects were endowed with 20 tokens that they could keep or contribute to the public account (described as a group project to subjects). Let $0 \leq c_i \leq 20$ denote the contribution of subject i . The payoff of subject i in each period was computed as:

$$\pi_i = 20 - c_i + 0.5 \cdot \sum_{j=1}^3 c_j.$$

Contributions were made sequentially with exogenous leadership (Güth et al. 2007, Drouvelis and Nosenzo 2013). At the beginning of period 1, one subject in each group was randomly assigned the role of Leader while the other two subjects took the role of Follower. Roles did not change in subsequent periods. In each period the Leaders first made a contribution decision. Followers were then informed of the contribution of the Leader in their group, and independently and simultaneously made a contribution decision. At the end of each period, subjects were informed of their individual contribution to the public account, the sum of contributions by all group members to the public account and their individual payoff in the period.

To gain a better understanding of subjects' motives across treatments, we elicited incentivized beliefs about others' contributions in each period. Specifically, we elicited leader's beliefs about the amount followers would contribute. We refer to these beliefs as leader's first order beliefs (FOB). We also elicited follower's beliefs about the amount the leaders would contribute. We refer to these beliefs as follower's first order beliefs (FOB). In addition to eliciting FOB, we elicited beliefs about others' beliefs. In particular, we elicited leader's beliefs about the followers' FOB, which we refer to as leaders' second order beliefs (SOB). Similarly, we elicited followers' beliefs about the leaders' FOB, which we refer to as followers' second order beliefs (SOB).

The beliefs of leaders were elicited after they had made their contribution decision (and so while followers were making their contribution decision). The beliefs of followers were elicited before they had made their contribution decision (and so while the leader was making their contribution decision). We paid subjects 10 extra tokens for each correct belief (e.g. a leader correctly estimating the amount followers would contribute). Subjects were not informed about whether their beliefs were accurate or not until the end of the experiment, where they were told the total earnings from correct estimates across all periods.

2.2 Treatments

The experimental design is a 2×2 between-subjects design, consisting of two group level and two individual level frames. The group level frame involves a change in how the experiment was referred to in the instructions and displayed on the screen during the experiment: "Wall Street" vs. "Community" frame. Specifically, there were five headings in the instructions that referred to either the "Wall Street experiment" or the "Community experiment". All screens during the experiment were, similarly, headed with either the "Wall Street experiment" or the "Community experiment". This is similar to the design of Dufwenberg et al. (2011) who compare the "experiment" with the "community experiment" and Ellingsen et al. (2012) who compare the "Community Game" with the "Stock Market Game".

The individual level frame involves a change in how the roles of the players were referred to: “First (Second) Movers” vs. “Leaders (Followers)”. There were 9 points in the instructions that referred to “First mover” or “Leader” and 11 points that referred to “Second mover” or “Follower”. The experiment screens also referred to a subject being “First mover” or “Leader” and “Second mover” or “Follower” as appropriate. As discussed in the introduction there is no study we know of that has compared the language around leadership but individual studies differ in the language they use including “first mover” (Gächter et al. 2012, Drouvelis and Nosenzo 2013, Sahin et al. 2015) and “leader” (Moxnes and van der Heijden 2003).

Our 2x2 design gives four separate experimental treatments, which we refer to as “Wall Street – First Mover”, “Wall Street – Leader”, “Community – First Mover” and “Community – Leader”. Table 1 summarizes our four treatments. We highlight that monetary incentives were fixed across the four treatments. Moreover, the instructions and screen messages were identical across treatments except for the specific framing differences discussed.

Table 1. Experimental treatments

Treatments	Individual level frame	Group level frame	Independent Observations	Total Number of Subjects
Community – First Mover	First Mover	Community	24	72
Community – Leader	Leader	Community	24	72
Wall Street – First Mover	First Mover	Wall Street	24	72
Wall Street – Leader	Leader	Wall Street	24	72

2.3 Procedures

In total, 288 subjects participated in our experiment: 72 subjects in each treatment. The experiment was programmed in z-Tree (Fischbacher 2007) and conducted in the experimental economics laboratory at the University of Birmingham. Eighteen subjects participated in each session and we conducted four sessions per treatment. Subjects were recruited from a campus-wide distribution list using the online recruitment system SONA and no subject participated in more than one session.

At the end of each session, tokens were converted to UK pounds at the pre-announced exchange rate of £0.02 per token and subjects were paid in cash. Subjects were paid according to the sum of their earnings from all periods of the experiment, in addition to their show-up fee of £2.50. Subjects were paid in private and in cash at the end of each session. Sessions lasted about 50 minutes and average earnings were £11.55.

Before subjects played the game, they received the instructions reproduced in Appendix A. As we wanted to ensure that subjects understood the decision situation and the mechanics of payoff calculations, all participants answered several test questions, concerning what the payoffs would be for various hypothetical configurations of behavior. The experiment did not proceed until every subject had answered these questions correctly.

3. Behavioral Hypotheses

If subjects' objective is to maximize own payoff then there is a unique Nash equilibrium where everybody in the group contributes zero in each period. We know, however, that contributions in public good games are typically well above zero (Chaudhuri 2011). In the following we consider, in turn, two factors that the prior literature suggests are likely to influence contributions: (1) focal points and coordination, and (2) strategic leadership.

3.1 Focal points and coordination

There is consistent evidence of conditional cooperation in public good games (Fischbacher et al. 2001, Fallucchi 2019). Specifically, around 50-70% of individuals are willing to contribute to a public good conditional on others also contributing to the public good. Such conditional cooperation can turn a public good game into a coordination game (Wolff 2017). For instance, if all three subjects in a group are conditional cooperators then it can be an equilibrium for everyone to fully contribute to the public good; each of the subjects is willing to contribute if the others contribute as well.

Framing and labelling can have an influence in coordination games by directing attention from one equilibrium to another and, thereby influencing first, second and higher order beliefs (Bardsley et al. 2010, Casajus 2012). Dufwenberg et al. (2011) find a sizable effect of framing on first-order beliefs and second-order beliefs in a one-shot simultaneous move public good game. This resulted in a smaller, but still significant, influence on contributions which the authors connect with reciprocity (first-order beliefs) and guilt aversion (second-order beliefs). Hence, the frame influences beliefs which then influence contributions, keeping social preferences constant.

The study by Ellingsen et al. (2012) is particularly relevant for our work. They compare behavior in a prisoners' dilemma game that uses a "Community" frame to one with a "Stock Market" frame. In the standard simultaneous move setting they find that cooperation is higher with the Community frame than Stock Market frame. This is consistent with other results (e.g. Liberman et al. 2004). They also find, however, that the effect disappears if one subject has no choice over their action or if choice is sequential. This result is consistent with the mediating effect of beliefs. In particular, it suggests that cooperation is higher in the Community frame than Stock Market frame in the simultaneous move setting, because the frame changes beliefs and not because it changes social preferences or similar. Ellingsen et al. (2012) refer to this as the coordination hypothesis.

In the Ellingsen et al. (2012) study there are two players and so the action of the "leader" resolves all uncertainty for the follower. In our setting there are three players and so some uncertainty remains for the two followers as to what the other will do. This means that followers' second-order beliefs still remain relevant. Although, the contribution of the leader

provides a clear and unambiguous focal point for followers and so is likely to be most relevant. Consistent with the coordination hypothesis of Ellingsen et al. (2012) we suggest that beliefs mediate any framing effect.

Hypothesis 1: The contribution of followers is increasing in the contribution of the leader and own second-order beliefs. Controlling for the leader contribution and followers' beliefs there are no treatment differences in the contributions of followers.

This hypothesis is consistent with the results of Ellingsen et al. (2012) where the framing effect disappeared in the sequential setting. Crucially, Hypothesis 1 does not rule out treatment differences. It merely says that any treatment difference must come through a change in the contribution of the leader and/or beliefs. This implies that leaders will be crucial to overall contributions and efficiency.

3.2 Strategic leadership

The idea that leader contributions can be crucial in public good games is not new (Kreps et al. 1982, Andreoni and Petrie 2004, Güth et al. 2007, Cartwright and Patel 2010, Jack and Recalde 2015). In particular, if some subjects are conditional cooperators, then it can be in the interests of the leader (even if maximizing own monetary payoff) to contribute to the public good because a positive leader contribution will elicit further contributions from followers. In a standard frame evidence of such strategic leadership is limited (Güth et al. 2007, Arbak and Villeval 2013, Cartwright and Lovett 2014), most likely because free-riders underestimate the extent of conditional cooperation of others (Fischbacher and Gächter 2010).² If leaders do not set a positive example then it is no surprise that leadership (as an institution) has a mixed record in increasing aggregate contributions in public good games.

Our experiment design allows us to explore whether the frame influences the contribution of the leader and, thus, overall contributions. There are various potential channels for such an effect. For instance, being called “leader” may make a subject more aware of how their contribution could influence others. Similarly, the “community” frame may influence internalized social preferences. We make no a-priori predictions on how framing may influence the leader's contribution. We do, though, hypothesize that any change in leader behavior is mediated by a change in beliefs.

Hypothesis 2: The contribution of the leader is increasing in own first and second-order beliefs. Controlling for leaders' beliefs there are no treatment differences in the contributions of leaders.

The first part of Hypothesis 2 mirrors the two hypotheses of Dufwenberg et al. (2011). Note, however, that if the leader's contribution strongly influences follower behavior then first-order beliefs are likely to be less relevant in our setting. Hence, we should pay particular attention to second-order beliefs. The second part of Hypothesis 2 is consistent with the coordination hypothesis of Ellingsen et al. (2012). Combined with Hypothesis 1 it implies that any framing effect is mediated by changes in beliefs caused by the change in frame.

² See also Andreoni and Miller (1993) who find that subjects are good at building a reputation, but only when that reputation is ‘deserved’.

4. Results

In presenting our experimental results, we first explore whether there are differences across treatments in terms of contribution behavior. Next, we report our results on whether, and if so how, subjects' first and second order beliefs about others' behavior differ across treatments and account for any observed differences in contribution behavior.

4.1. Aggregate behavior

Figure 1 shows the timeseries of average contribution behavior across our four treatments. The top of Table 2 summarises average contributions in Periods 1-5, 6-10 and over 1-10. In period 1, average contributions range from 10.04 to 12.56 tokens, but these differences are not statistically significant (Kruskal-Wallis test: $p = 0.529$).³ Significant differences between treatments emerge as the session progresses. In short, we find:

Result 1: (i) contributions are significantly higher with a “Wall Street” frame than a “Community” frame, and (ii) there is no significant difference between contributions in the “First-mover” and “Leader” frame.

In terms of the group level frame. Contributions are significantly higher in the “Wall Street – First Mover” than “Community – First Mover” treatment (12.12 vs 7.96, $p = 0.027$, Mann-Whitney test on average contribution over all periods; 12.75 vs. 9.25, $p = 0.060$ periods 1-5; 11.49 vs. 6.67, $p = 0.010$ periods 6-10). Contributions are higher but not significantly so in “Wall Street – Leader” compared to “Community – Leader” treatment (11.82 vs. 9.20, $p = 0.164$ all periods; 12.23 vs. 10.17, $p = 0.372$ periods 1-5; 11.41 vs. 8.23, $p = 0.127$ periods 6-10). If we compare the two Wall Street treatments with the two Community treatments then we find contributions are significantly higher with the Wall Street frame than Community frame (11.97 vs. 8.58, $p = 0.013$ all periods; 12.49 vs. 9.71, $p = 0.047$ periods 1-5; 11.45 vs. 7.45, $p = 0.007$ periods 6-10).

In terms of the individual level frame. We find no significant difference in contributions between the “Community – First Mover” versus “Community-Leader” treatments (7.96 vs. 9.20, $p = 0.470$ all periods; 9.25 vs. 10.17, $p = 0.549$ period 1-5, 6.67 vs. 8.23, $p = 0.358$ period 6-10). Similarly, there is no difference between the “Wall Street – First Mover” and “Wall Street – Leader” (12.12 vs. 11.82, $p = 0.853$ all periods; 12.75 vs. 12.23, $p = 0.852$ period 1-5; 11.49 vs. 11.41 $p = 0.861$ period 6-10). We also do not find any significant difference when we compare the two “First Mover” treatments with the two “Leader” treatments (10.04 vs. 11.08, $p = 0.623$ all periods; 11 vs. 11.20, $p = 0.794$ periods 1-5; 9.08 vs. 9.82, $p = 0.543$ periods 6-10).

³ Unless otherwise stated, all statistical tests use group averages as the independent unit of observation and are based on 24 independent observations per treatment. Throughout the paper all p-values are two-sided and reported to three decimal places.

Figure 1. Timeseries of average contributions (leaders & followers)

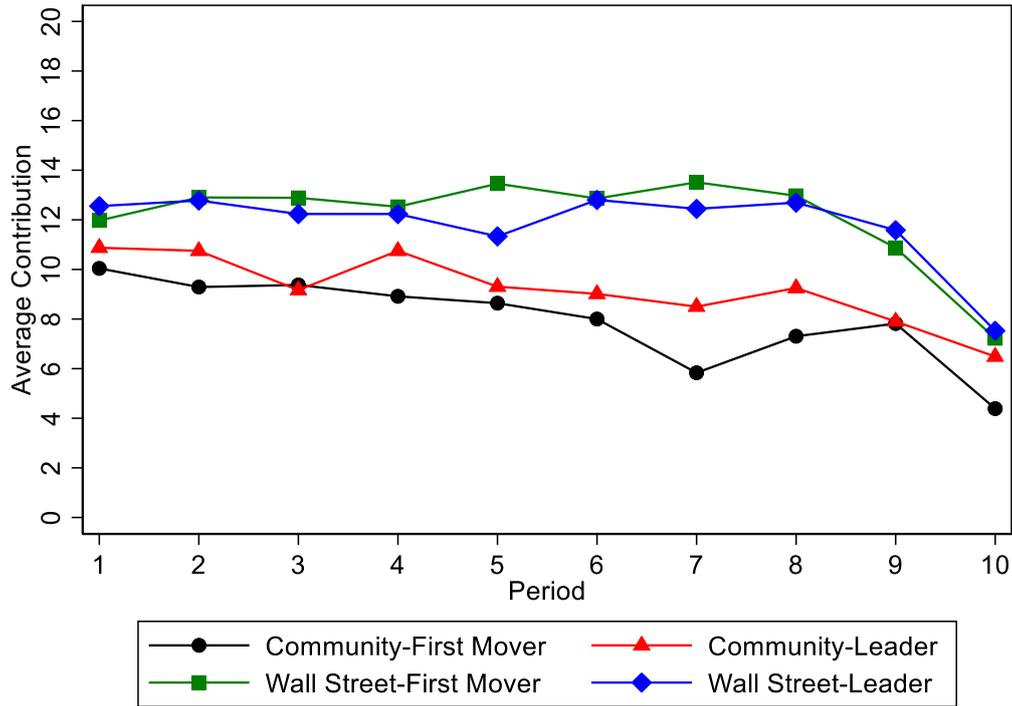


Table 2. Average contributions disaggregated by treatment

	Community – First Mover	Community – Leader	Wall Street – First Mover	Wall Street – Leader
Total contributions, periods 1-5	9.25 (6.90)	10.17 (7.12)	12.75 (6.76)	12.23 (6.58)
Total contributions, periods 6-10	6.67 (6.69)	8.23 (7.51)	11.49 (6.86)	11.41 (6.85)
Total contributions, all periods	7.96 (6.37)	9.20 (7.15)	12.12 (6.62)	11.82 (6.49)
Leaders, periods 1-5	10.28 (7.38)	10.32 (7.53)	13.50 (6.64)	12.67 (6.50)
Leaders, periods 6-10	7.75 (7.58)	9.13 (8.18)	13.36 (7.35)	12.68 (7.33)
Leaders, all periods	9.01 (6.73)	9.73 (7.57)	13.43 (6.67)	12.67 (6.51)
Followers, periods 1-5	8.74 (6.99)	10.10 (7.21)	12.38 (7.10)	12.01 (6.85)
Followers, periods 6-10	6.13 (6.47)	7.78 (7.41)	10.55 (6.78)	10.78 (6.80)
Followers, all periods	7.44 (6.40)	8.94 (7.17)	11.46 (6.76)	11.39 (6.62)

Note: Standard deviations are presented in parentheses.

4.2 Leader behavior

We next look at contribution behavior, disaggregated by subjects' roles. First, we analyse leaders' contribution behavior and then followers' behavior across treatments. Figure 2 shows how many tokens leaders contributed over time in each treatment. The middle section of Table 2 details average leader contribution by treatment. Similar to what we observe in terms of total contributions, we find:

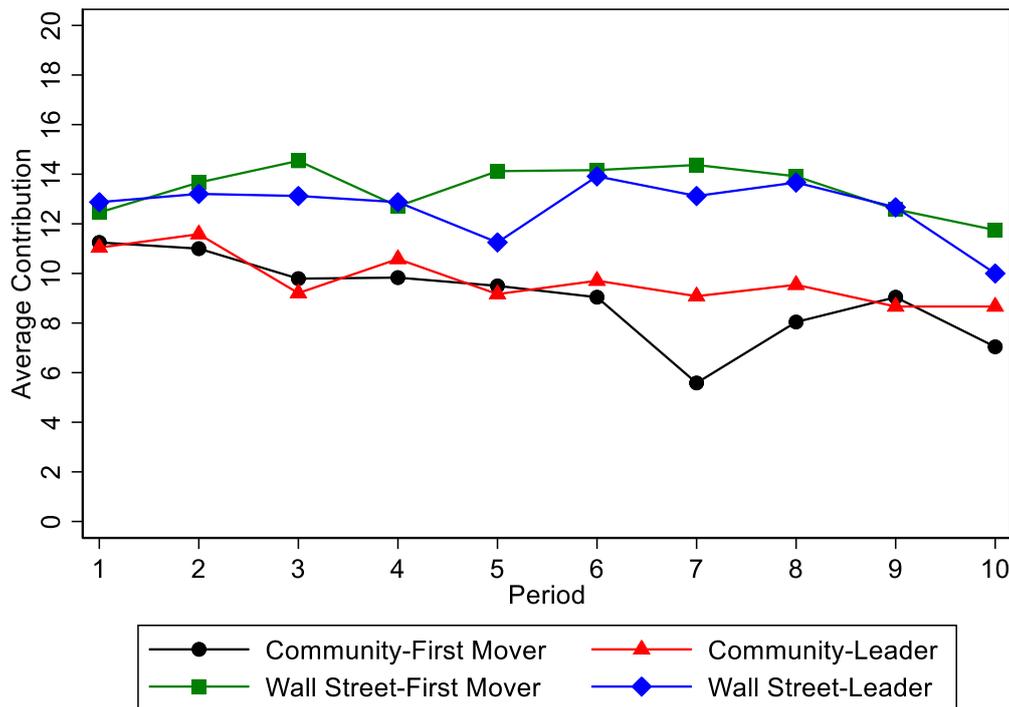
Result 2: (i) Leader contributions are significantly higher with a “Wall Street – First Mover” frame than a “Community – First Mover” frame after repetition, and (ii) there is no difference between leader contributions in the “First-mover” and “Leader” frame.

In terms of the group level frame. Average leader contributions are significantly higher in the “Wall Street – First Mover” treatment than “Community – First Mover” treatment (13.43 vs. 9.01; $p = 0.023$). This effect is larger in periods 6-10 (13.36 vs. 7.75, $p = 0.008$) than periods 1-5 (13.50 vs. 10.28; $p = 0.092$) because leader contributions decrease over time in the Community frame. Leader contributions are also higher in the “Wall Street – Leader” than “Community – Leader” treatment but not significantly so (12.67 vs. 9.73; $p=0.152$).⁴ In terms of the individual level frame. There is no sign of any difference in leader contribution between the “Community – First Mover” and “Community – Leader” treatments (9.01 vs. 9.73, $p = 0.672$) or “Wall Street – First Mover” and “Wall Street – Leader” treatments (13.43 vs. 12.67, $p = 0.779$).⁵

⁴ In periods 6-10 the difference between “Wall Street – Leader” and “Community – Leader” treatments is also larger (12.68 vs. 9.13; $p=0.107$) than in periods 1-5 (12.67 vs. 10.32; $p=0.264$).

⁵ In particular, we find that, in periods 1-5, average contributions in the “Community – First Mover” and “Community – Leader” treatments are, respectively, 7.75 vs. 9.13 tokens ($p=0.460$). For periods 6-10, the respective average contributions become 10.28 vs. 10.32 tokens ($p=0.918$). Turning to comparisons between the “Wall Street – First Mover” and “Wall Street – Leader” treatments, we again find insignificant effects, regardless of whether we focus on periods 1-5 (13.36 vs. 12.68; $p=0.899$) or periods 6-10 (13.50 vs. 12.67; $p=0.658$).

Figure 2. Time series of leaders' average contributions



We look next at the proportion of leaders who contribute their full endowment (full contribution) or contribute 0 (free-rider). The proportions are detailed in Table 3. In short, we find that:

Result 3: (i) The proportion of leaders contributing 20 is higher in the “Wall Street – First Mover” frame compared to “Community – First Mover” frame after repetition. (ii) The proportion of leaders contributing 0 is significantly lower in the “Wall Street” frame compared to “Community” frame.

You can see that proportion of leaders who contribute their full endowment is highest – i.e. 50% – in the “Wall Street – First Mover” and lowest – i.e. 28% – in the “Community – First Mover”, with this difference being marginally significant ($p = 0.076$). For the remaining treatments comparisons, we do not find any statistically significant difference (for any pairwise comparison, $p > 0.356$). The difference observed for leaders’ full contribution is more significant at the 5% level when we look at the second half of the game (0.53 vs. 0.25, $p = 0.032$)⁶. However, this difference is not significant in the first half of the session (0.48 vs. 0.31, $p = 0.174$).⁷

In terms of free-riders. As shown in Table 3 the proportion of leaders who contribute 0 is significantly lower in the “Wall Street” frames than in the “Community” frames (“Wall Street – First Mover” vs. “Community – First Mover”: $p=0.026$; “Wall Street – Leader” vs. “Community – Leader”: $p=0.040$). There is no such difference when we compare behavior in the “First Mover” vs. “Leader” frames (“Community – First Mover” vs. “Community – Leader”: $p=0.834$; “Wall Street – First Mover” vs. “Wall Street – Leader”: $p=0.740$). Our

⁶ Any other pairwise treatment comparison for periods 6-10 yields insignificant difference ($p>0.161$).

⁷ Similarly, any other pairwise treatment comparison for periods 1-5 yields insignificant differences ($p>0.598$).

observed treatment differences carry over when examine free riding behavior in periods 1-5 (“Wall Street – First Mover” vs. “Community – First Mover”: $p=0.058$; “Wall Street – Leader” vs. “Community – Leader”: $p=0.015$) and periods 6-10 (“Wall Street – First Mover” vs. “Community – First Mover”: $p=0.014$; “Wall Street – Leader” vs. “Community – Leader”: $p=0.090$).⁸

Table 3. Proportion of leader contributions of full endowment or zero

		Community – First Mover	Community – Leader	Wall Street – First Mover	Wall Street – Leader
Full contribution	Periods 1-5	0.31 (0.38)	0.38 (0.43)	0.48 (0.47)	0.43 (0.46)
	Periods 6-10	0.25 (0.37)	0.33 (0.43)	0.53 (0.44)	0.50 (0.45)
	All periods	0.28 (0.32)	0.35 (0.42)	0.50 (0.42)	0.46 (0.44)
Free-rider	Periods 1-5	0.27 (0.37)	0.27 (0.33)	0.10 (0.23)	0.10 (0.25)
	Periods 6-10	0.46 (0.42)	0.38 (0.41)	0.18 (0.29)	0.20 (0.31)
	All periods	0.36 (0.36)	0.32 (0.35)	0.14 (0.25)	0.15 (0.26)

Note: Standard deviations are presented in parentheses.

4.3 Leader beliefs

Having documented a significant difference in leader behavior according to the group level frame (“Community” versus “Wall Street”) we now evaluate Hypothesis 2 by questioning to what extent this difference in behavior can be explained by difference in beliefs. Recall that while followers were deciding on their contribution, we asked leaders to indicate how much they expect followers to contribute in total (FOB). Leaders were also asked how much they expected followers expected they would contribute (SOB).

Result 4: (i) Leaders’ FOB and SOB are significantly higher with a “Wall Street – First Mover” frame than a “Community – First Mover” frame after repetition, and (ii) there is no difference between leaders’ FOB and SOB in the “First-mover” and “Leader” frame.

A summary of average leaders’ FOB about the followers’ contribution is shown in Table 4 where we also split how leaders’ FOB are shaped in the first and second half of the session. The only statistically significant pairwise difference is between the “Community – First Mover” and the “Wall Street – First Mover” treatments ($p=0.024$ all periods, $p=0.128$ periods

⁸ Similarly, we do not find any difference in the percentage of free riders when we compare behavior in the “First Mover” vs. “Leader” frames for either periods 1-5 (“Community – First Mover” vs. “Community – Leader”: $p = 0.774$; “Wall Street – First Mover” vs. “Wall Street – Leader”: $p = 0.762$) or periods 6-10 (“Community – First Mover” vs. “Community – Leader”: $p=0.544$; “Wall Street – First Mover” vs. “Wall Street – Leader”: $p=0.769$).

1-5, $p=0.008$ periods 6-10). Leaders' FOB about followers' contribution behavior is in the same direction when we compare the "Community – Leader" and the "Wall Street – Leader" treatments, but this difference is not statistically significant ($p=0.337$ all periods, $p=0.213$ periods 1-5, $p=0.358$). There is no difference in leaders' FOB between the two "Community" frames ($p=0.489$ all periods) and between the two "Wall Street" frames ($p=0.687$ all periods).

Table 4. Leaders' first order beliefs disaggregated by treatment

	Community – First Mover	Community – Leader	Wall Street – First Mover	Wall Street – Leader
Leaders, periods 1-5	19.68 (13.11)	21.13 (14.12)	25.36 (12.84)	24.15 (12.33)
Leaders, periods 6-10	14.18 (14.52)	18.88 (16.01)	25.97 (14.94)	24.55 (14.71)
Leaders, all periods	16.93 (12.77)	20 (14.63)	25.66 (13.39)	24.35 (12.91)

Note: Standard deviations are presented in parentheses.

A summary of average leaders' SOB about the followers' contribution is shown in Table 5 where we also split how leaders' SOB are shaped in the first and second half of the session. Leaders' SOB in the "Wall Street – First Mover" treatment is significantly higher than in the "Community – First Mover" treatment ($p = 0.020$ all periods, $p = 0.083$ periods 1-5, $p = 0.014$ periods 6-10). While leaders' SOB are higher in the "Wall Street – Leader" treatment than in the "Community – First Mover" treatment, this difference is not statistically significant ($p = 0.358$). We do not find any significant differences between "First Mover" and "Leader" (for both pairwise comparisons, $p > 0.392$).

Table 5. Leaders' second order beliefs disaggregated by treatment

	Community – First Mover	Community – Leader	Wall Street – First Mover	Wall Street – Leader
Leaders, periods 1-5	14.98 (11.81)	17.48 (13.46)	21.74 (13.15)	19.98 (11.76)
Leaders, periods 6-10	12.34 (13.35)	17.35 (17.03)	23.59 (15.31)	21.55 (15.17)
Leaders, all periods	13.66 (11.97)	17.41 (14.50)	22.67 (13.62)	20.76 (13.19)

Note: Standard deviations are presented in parentheses.

Result 5: (i) Leader contributions are significantly increasing in FOB and SOB, (ii) treatment differences disappear once we control for leaders' FOB and SOB.

We present regression analysis showing the impact of the frames on leaders' contribution when we control or not for leaders' FOB and SOB. Specifically, in Table 6, we report Tobit regressions in which the dependent variable is "leader's contribution" and the independent variables comprise three separate dummy variables, each corresponding to "Community – First Mover", "Community – Leader" and "Wall Street – Leader" treatments along with a "Period" variable (equal to the period number) controlling for time trends. The "Wall-Street – First Mover" treatment represents the baseline category. We augment Model (1) by controlling for leaders' FOB and SOB as separate independent variables (see Model (2)).

Table 6. Leaders' contribution behavior – Regression results

	Dependent variable: Leader's contribution	
	Model (1)	Model (2)
Community-First Mover treatment	-12.507** (5.377)	-1.182 (1.202)
Community-Leader treatment	-9.804* (5.580)	-1.997 (1.402)
Wall Street-Leader treatment	-1.868 (5.304)	-0.142 (1.285)
Leader's FOB		0.709*** (0.059)
Leader's SOB		0.240*** (0.059)
Period	-0.676** (0.265)	-0.266** (0.118)
Constant	23.688*** (4.285)	-4.148** (1.412)
Obs.	960	960

*Notes: Tobit estimates. Robust standard errors (clustered at the matching group level) are presented in parentheses. *** denotes significance at the 1-percent level, ** denotes significance at the 5-percent level, and * at the 10-percent level.*

Model (1) of Table 6 shows that leaders contribute significantly less in the "Community – First Mover" treatment compared to the "Wall Street – First Mover" treatment as indicated by the negative and statistically significant coefficient on the corresponding dummy variable. This reinforces Result 2. There is a weak difference in leaders' contribution between the "Community – Leader treatment" and the "Wall Street – First Mover" treatments. We also find that contributions decline over time as the "Period" variable has a negative sign and is significant at the 1% level. Crucially, in Model (2) which controls for leaders FOB and SOB, we find that the significant treatment differences in Model (1) disappear. Instead, leaders' beliefs (both first and second order) enter the regression with a positive sign and are highly significant at the 1% level, meaning that the contribution of the leader is increasing in first and second-order beliefs. This finding is consonant with Hypothesis 2. In addition, our regression analysis provides evidence that the observed differences in leaders' contribution across frames are explained by the leaders' FOB and SOB. This observation is in line with previous findings

from the framing literature in simultaneous move public good games (e.g. Dufwenberg et al. 2011).

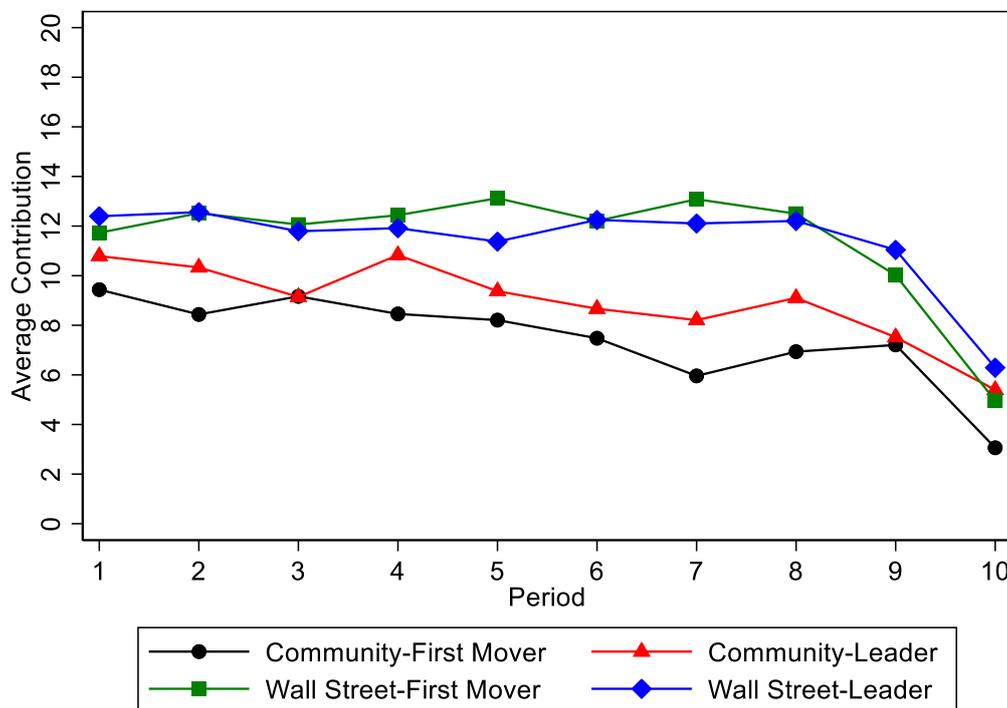
4.4 Follower behavior

Our results in terms of follower behavior mirror those of leader behavior.

Result 6: (i) Follower contributions are significantly higher with a “Wall Street – First-Mover” frame than a “Community – First-Mover” frame after repetition, and (ii) there is no difference between follower contributions in the “First-mover” and “Leader” frame.

Figure 5 plots the evolution of followers’ contribution over time across frames. In Table 2 we report average contributions for followers across all periods, periods 1-5 and periods 6-10 in Table 2. We find statistically significant differences in followers’ average contributions when we compare the “Wall Street – First Mover” and “Community – First Mover” treatments ($p = 0.032$ all periods, $p = 0.067$ periods 1-5, $p = 0.024$ periods 6-10). Follower contributions are higher in the “Wall Street – Leader” than “Community – Leader” treatment but not significantly so ($p = 0.197$ all periods). We observe no difference due to the individual level frame for either the “Wall Street” frame ($p = 0.926$) or “Community” frame ($p=0.327$).

Figure 5. Time series of followers’ average contributions



Result 7: (i) There is no significant difference in the proportion of followers contributing their full endowment across frames. (ii) The proportion of followers contributing 0 is significantly lower in the “Wall Street” frame compared to “Community” frame.

In Table 7 we detail the proportion of followers contributing their full endowment or contributing 0. We find that the percentage of followers fully contributing their endowment is statistically indistinguishable across treatments regardless of whether we examine all periods (for any pairwise comparison $p > 0.136$), periods 1-6 (for any pairwise comparison $p > 0.153$) or periods 6-10 (for any pairwise comparison $p > 0.142$). The proportion of followers contributing zero is significantly lower when we compare the “Wall Street – First Mover” frame with the “Community – First Mover” frame ($p = 0.007$ all periods, $p = 0.011$ periods 1-5, $p = 0.024$ periods 6-10), and the “Wall Street – Leader” frame with the “Community – Leader” frame ($p = 0.054$ all periods, $p = 0.042$ periods 1-5, $p = 0.077$ periods 6-10). We do not find any significant differences in terms of individual level frame ($p > 0.164$).

Table 7. Proportion of followers’ contributions of full endowment or zero

		Community – First Mover	Community – Leader	Wall Street – First Mover	Wall Street – Leader
Full contribution	Periods 1-5	0.28 (0.36)	0.38 (0.43)	0.45 (0.43)	0.42 (0.44)
	Periods 6-10	0.21 (0.31)	0.30 (0.39)	0.40 (0.40)	0.39 (0.40)
	All periods	0.24 (0.32)	0.34 (0.40)	0.42 (0.40)	0.40 (0.41)
Free-rider	Periods 1-5	0.36 (0.32)	0.27 (0.29)	0.15 (0.23)	0.13 (0.25)
	Periods 6-10	0.53 (0.36)	0.40 (0.34)	0.30 (0.30)	0.23 (0.30)
	All periods	0.45 (0.31)	0.34 (0.30)	0.23 (0.26)	0.18 (0.26)

Note: Standard deviations are presented in parentheses.

4.5 Followers’ beliefs

We consider next followers’ beliefs about the contribution of the leader (FOB) and beliefs about how much the leader expects them to contribute (SOB).

Result 8: (i) Followers’ FOB are significantly higher with a “Wall Street” frame than a “Community” frame after repetition, (ii) Followers’ SOB are significantly higher with a “Wall Street – First-Mover” frame than a “Community – First-Mover” frame, and (iii) there is no difference between followers’ FOB and SOB in the “First-mover” and “Leader” frame.

In Table 8 we provide average FOB across all periods as well as in the first and second half of the session. Our analysis shows that followers’ FOB are significantly higher in the two “Wall Street” frames compared to the “Community” frames (“Community – First Mover” vs. “Wall Street – First Mover”: $p = 0.028$; “Community – Leader” vs. “Wall Street – Leader”: $p = 0.099$). There is, though, a notable difference between the first and second five periods. In the first five periods we find no statistically significant pairwise differences ($p >$

0.15). In the second five periods there is a difference (“Community – First Mover” vs. “Wall Street – First Mover”: $p=0.015$; “Community – Leader” vs. “Wall Street – Leader”: $p=0.088$). We find no significant pairwise difference in terms of individual level frame ($p > 0.508$).

Table 8. Followers’ first order beliefs disaggregated by treatment

	Community – First Mover	Community – Leader	Wall Street – First Mover	Wall Street – Leader
Followers, periods 1-5	10.30 (6.29)	10.38 (6.32)	13.08 (5.70)	12.80 (5.09)
Followers, periods 6-10	8.28 (7.60)	8.85 (8.27)	13.78 (7.32)	12.73 (6.90)
Followers, all periods	9.29 (6.55)	9.62 (7.06)	13.43 (6.31)	12.76 (5.81)

Note: Standard deviations are presented in parentheses.

In Table 9 we provide average SOB by treatment. The only statistically significant difference is observed in the treatment comparison between the “Wall Street – First Mover” treatment and the “Community – First Mover” treatment ($p = 0.030$ all periods, $p = 0.049$ periods 1-5, $p = 0.018$ periods 6-10). For the other treatment comparisons, we do not find any significant difference ($p > 0.146$).

Table 9. Followers’ second order beliefs disaggregated by treatment

	Community – First Mover	Community – Leader	Wall Street – First Mover	Wall Street – Leader
Followers, periods 1-5	17.94 (11.92)	19.74 (11.28)	24.20 (11.57)	23.64 (10.36)
Followers, periods 6-10	14.63 (14.18)	17.68 (15.77)	24.92 (13.96)	24.38 (14.13)
Followers, all periods	16.29 (12.66)	18.71 (13.20)	24.56 (12.35)	24.01 (11.89)

Note: Standard deviations are presented in parentheses.

Result 9: (i) Followers’ contributions are significantly increasing in SOB and, either, the contribution of the leader or FOB, (ii) treatment differences disappear once we control for the leader’s contribution or followers’ FOB and SOB.

We end our analysis on followers’ behavior by presenting the results of a regression analysis showing the mediating effects of beliefs and leader’s contribution on followers’ behavior. Table 10 reports four Tobit regressions in which the dependent variable is “followers’ contribution” and the independent variables comprise three treatment dummy variables, each corresponding to “Community-First Mover”, “Community-Leader” and “Wall Street-Leader” treatments along with a “Period” variable controlling for time trends. As

before, the “Wall-First Mover” treatment represents the baseline category. We augment Model (1) by controlling (i) for leaders’ contribution, and (ii) followers’ FOB and SOB as separate independent variables. Recall that when followers were deciding on their contributions, they were informed about the leaders’ contribution; however, their FOB and SOB were elicited while leaders were deciding on their contributions.

Table 10. Followers’ contribution behavior – Regression results

	Dependent variable: Follower’s contribution			
	Model (1)	Model (2)	Model (3)	Model (4)
Community-First Mover treatment	-11.751** (5.301)	-2.809 (2.184)	-2.522 (1.712)	-1.140 (1.464)
Community-Leader treatment	-6.330 (5.378)	1.183 (2.291)	0.952 (1.781)	2.118 (1.622)
Wall Street-Leader treatment	0.231 (5.180)	1.873 (2.036)	1.048 (1.730)	1.548 (1.415)
Leader’s contribution		1.680*** (0.143)		0.944*** (0.095)
Follower’s FOB			0.437*** (0.113)	0.018 (0.113)
Follower’s SOB			0.725*** (0.073)	0.528*** (0.063)
Period	-1.333*** (0.225)	-0.801*** (0.158)	-1.039*** (0.183)	-0.845*** (0.151)
Constant	22.350*** (4.216)	-4.147** (1.975)	-3.706** (1.652)	-7.388*** (1.609)
Obs.	1,920	1,920	1,920	1,920

*Notes: Tobit estimates. Robust standard errors (clustered at the matching group level) are presented in parentheses. *** denotes significance at the 1-percent level, ** denotes significance at the 5-percent level, and * at the 10-percent level.*

Model (1) shows that followers contribute significantly less in the “Community – First Mover” treatment as indicated by the negative and statistically significant of the corresponding dummy variable. This reinforces Result 6. Additionally, we find that the “Period” variable has a negative coefficient and is significant at the 1% level, suggesting a downward trend in contributions over the session progresses. Crucially, when we add separate controls for leaders’ contribution and followers’ FOB and SOB, these treatment difference vanishes. Instead, leader’s contribution and followers’ FOB and SOB significantly predict followers’ contribution behavior. In particular, the more the leaders contribute the more followers contribute. Furthermore, we observe that the followers’ SOB are positive and significantly correlated with the followers’ contributions. This is also the case for followers’ FOB, with the exception of Model (4) where we also control for leaders’ contribution. Taken together, our findings provide strong support for Hypothesis 1 and for the notion that beliefs account for the observed differences in contribution behavior.

5. Conclusions

In this paper we varied the frame of a public good game with leadership by example. We varied the individual level frame, comparing the term *leader* versus *first mover*, and the group level frame, comparing a *Community* versus *Wall Street* frame. We find a significant effect of the group level frame with contributions being higher in the Wall Street frame. We find no significant effect of the individual level frame on either leader or follower contributions. Consistent with the results of Dufwenberg et al. (2011) and Ellingsen et al. (2012) we find that the framing effect is driven by changes in first and second order beliefs. Hence, the framing effect is caused by changes in beliefs and not social preferences or similar.

We made no a-priori assumptions on which frame would be most likely to increase contributions. The prior literature on simultaneous public good games (and prisoner dilemmas) had yielded mixed results in terms of a Community frame (Rege and Telle 2004). Our results are consistent with those of Dufwenberg et al. (2011) in that we find lower contributions in the Community frame. Dufwenberg et al. (2011) suggest that their results may be due to the German interpretation of “*gemeinschaft*”. That we observe similar results in the UK point to a more general finding that invoking “Community” may be a poor way of trying to increase contributions. In our setting, the term Wall Street potentially makes subjects think about strategic leadership in a group setting.

As already mentioned, our results strongly reinforce the findings of Dufwenberg et al. (2011) and Ellingsen et al. (2012) that framing effects are driven by changes in beliefs rather than social preferences. An additional insight in our study is the role of learning and experience.⁹ In the first period we did not observe any particularly large framing effects in contributions. Instead, differences emerged with repetition. We know that in public good games contributions typically fall with repetition (Gächter et al. 2008). This is what happened in our Community frame. In the Wall Street frame, however, contributions remained relatively stable until the final periods (see Figure 1). This was accompanied by beliefs remaining stable, or even increasing with repetition (see Tables 4, 5, 8 and 9). The interplay between frames, beliefs and learning is a topic that could be explored further in future work.

⁹ The Dufwenberg et al. (2011) and Ellingsen et al. (2012) studies focus on one-shot games.

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Appendix A. Experimental instructions (for online publication)

[Note: These are the instructions subjects facing in the “Community – First Mover” treatment. Adjustments for the remaining three treatments are indicated in square brackets.]

Welcome to the Community [Wall Street] experiment

This is an experiment in decision making. Various research foundations have provided funds for this research. Just for showing up you have already earned £2.50. You can earn additional money depending on the decisions made by you and other participants. It is therefore very important that you read these instructions with care.

It is important that you remain silent and do not look at other people’s work. If you have any questions, or need assistance of any kind, please raise your hand and an experimenter will come to you. If you talk, laugh, exclaim out loud, etc., you will be asked to leave and you will not be paid. We expect and appreciate your following of these rules.

We will first jointly go over the instructions. After we have read the instructions, you will have time to ask clarifying questions. Each of you will then need to answer a few brief questions to ensure everybody understands. We would like to stress that any choices you make in this experiment are entirely anonymous. Please do not touch the computer or its mouse until you are instructed to do so. Thank you.

In the instructions we will not speak in terms of Pounds, but in terms of experimental Tokens. Your entire earnings will, thus, be calculated in Tokens. At the end of the session the total amount of Tokens you have earned will be converted to Pounds at the following rate: **1 Token = 0.02 Pounds**. The converted amount will privately be paid to you in cash.

At the beginning of the experiment, all participants will be randomly divided into groups of three. Besides you, there will be two more members in your group. **You will neither learn before nor after the experiment, who the other persons in your group are.**

The experiment consists of **ten rounds** of the same decision making task. You will **remain in the same group throughout** the course of the ten rounds. In each round you have to decide **how many Tokens you contribute to a project of your group and how many Tokens you keep for yourself**. On the following pages we will describe the exact course of the experiment. At the end of this introductory information we ask you to do several control exercises which are designed to familiarize you with the decision situation.

The decision in the Community [Wall Street] experiment

At the beginning of the round, every participant receives an “endowment” of 20 Tokens. You then have to decide how many of these 20 Tokens you contribute to the project or how many you keep for yourself. Each participant can contribute up to 20 Tokens. The two other members of your group have to make the same decision. They can also either contribute Tokens to the project or keep Tokens for themselves. You and the other members of the group can choose any amount to contribute between 0 and 20 Tokens.

Every Token that you do not contribute to the project automatically belongs to you and will be paid to you, converted by the exchange rate given above, at the end of the experiment.

The following happens to the Tokens that are contributed to the project: The project’s value will be increased by 50% and then **divided equally among all three members of the group**. If for instance 1 Token is contributed to the project, the Token’s value increases to 1.5 Tokens. This amount is divided equally among all three members of the group. Thus every group member receives 0.5 Tokens. Your income from the project rises by 0.5 Token if you contribute one Token more to the project. At the same time, the income of the other two members of the group also rises by 0.5 Tokens. Therefore, if you contribute one Token more to the project the income from the project with regard to the whole group increases by 1.5 Tokens. It also holds that your income rises by 0.5 Tokens if another group member contributes one Token more to the project.

After you and the other two members of the group have made their decisions about their contributions to the project the total income achieved by each participant is determined.

How is your income calculated from your decision?

The income of every member of the group is calculated in the same way. The income consists of two parts:

(1) the Tokens that somebody keeps for himself/herself (“**income from Tokens kept**”)

(2) the “**income from the project**”. The income from the project is

$$0.5 \times (\text{sum of all Tokens contributed to the project}).$$

Therefore your total income will be calculated by the following formula:

$$\begin{aligned} \text{Your total income} &= \text{Income from Tokens kept} + \text{Income from project} \\ &= (20 - \text{Tokens you contributed to project}) + 0.5 \times (\text{sum of all Tokens contributed to project}) \end{aligned}$$

In order to explain the income calculation we give some examples:

- If each of the three members of the group contribute 0 Tokens to the project, all three will receive an “income from Tokens kept” of 20. Nobody receives anything from the project, because no one contributed anything. Therefore, the total income of every member of the group is 20 Tokens.
Calculation of the total income of every participant: $(20 - 0) + 0.5 \times (0) = 20$
- If each of the three members of the group contributes 20 Tokens there will a total of 60 Tokens contributed to the project. The “income from Tokens kept” is zero for everyone, but each member receives an income from the project of $0.5 \times 60 = 30$ Tokens.

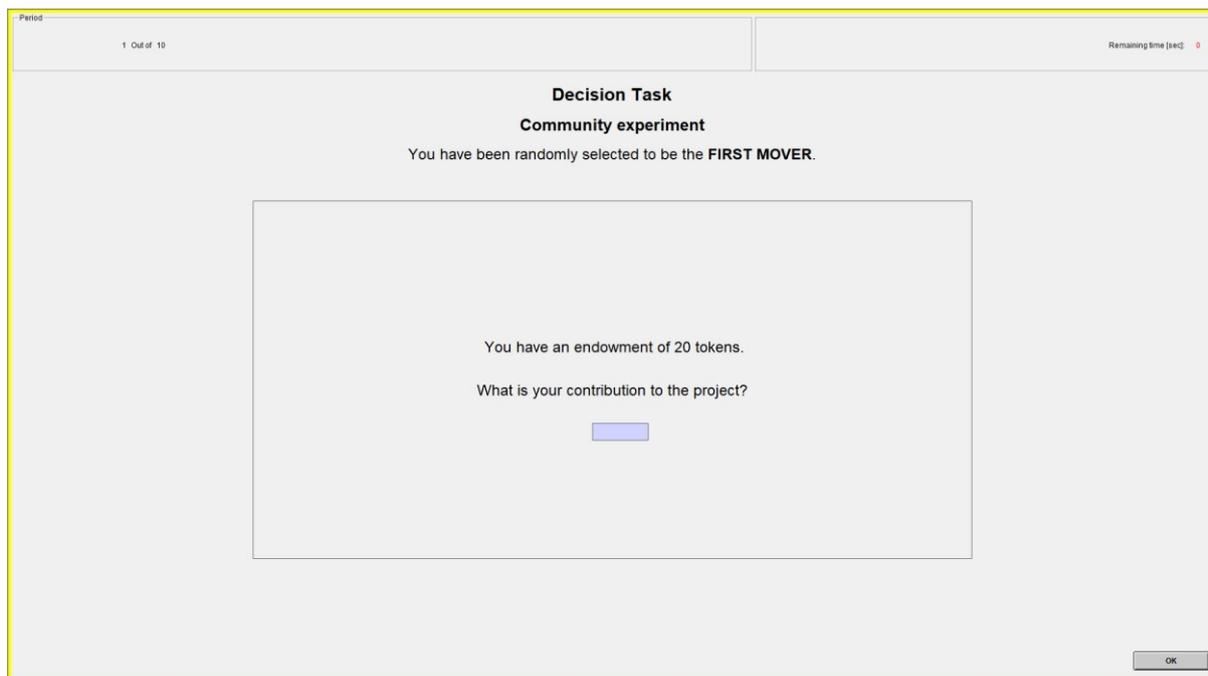
Calculation of the total income of every participant: $(20 - 20) + 0.5 \times (60) = 30$

- If you contribute 20 Tokens, the second member 10 and the third member 0 Tokens. Because you and the second member have together contributed 30 Tokens, everyone will receive $0.5 \times 30 = 15$ Tokens from the project. You contributed all your 20 Tokens to the project. You will therefore receive 15 Tokens in total at the end of the experiment. Calculation of your total income: $(20 - 20) + 0.5 \times (30) = 15$
- Two other members of your group contribute 20 Tokens each to the project. You do not contribute anything. In this case the income will be calculated as follows: Calculation of your total income (contribution 0): $(20 - 0) + 0.5 \times (40) = 40$

Making your contribution decision

One member of the group will randomly be chosen to be the "FIRST MOVER" ["LEADER"]. This person makes their decision before the others in the group, who are referred to as "SECOND MOVERS" ["FOLLOWERS"]. Note that the FIRST MOVER [LEADER] in your group will be the same in each of the 10 rounds.

If you are chosen to be the FIRST MOVER [LEADER] you will see a screen like the one below:



The screenshot shows a web-based interface for a decision task. At the top left, it says "Period" and "1 Out of 10". At the top right, it says "Remaining time [sec: 0]". The main heading is "Decision Task" followed by "Community experiment". Below that, it states "You have been randomly selected to be the FIRST MOVER." In the center, there is a text box containing the text: "You have an endowment of 20 tokens. What is your contribution to the project?" Below this text is a blue rectangular input field. At the bottom right of the interface, there is an "OK" button.

You will make your decision by entering into the blue box how many Tokens you contribute to the project. After you have made your decision please press the OK-button. As long as you did not press the OK-button you can change your decision anytime.

Once the FIRST MOVER [LEADER] has made his/her decision the other two group members make their decision. If you are a SECOND MOVER [FOLLOWER] you will see a screen like the one below. Note that you are told the decision of the FIRST MOVER [LEADER]. Also the two SECOND MOVERS [FOLLOWERS] independently make their decision at the same time.

Period

1 Out of 10

Remaining time [sec]: 30

Decision Task

Community experiment

You have been randomly selected to be the **SECOND MOVER**.

The FIRST MOVER has contributed 1 tokens.

You have an endowment of 20 tokens.

What is your contribution to the project?

OK

You will make your decision by entering into the blue box how many Tokens you contribute to the project. After you have made your decision please press the OK-button.

Estimates of other contributions in the Community [Wall Street] experiment

While you are waiting for others to make their contribution decision we will ask you to estimate their contributions.

If you are chosen to be a SECOND MOVER [FOLLOWER] you will be asked **how many Tokens you think the FIRST MOVER [LEADER] will contribute** in this round. Note that your estimate must be a number between 0 and 20. If you estimate the correct amount you will be paid 10 extra Tokens. If you do not estimate the correct amount you will receive no Tokens.

If you are chosen to be a FIRST MOVER [LEADER] you will be asked **how many Tokens you think the SECOND MOVERS [FOLLOWERS] will contribute in total** in this round. Note that there are two SECOND MOVERS and so your estimate must be a number between 0 and 40. If you estimate the correct amount you will be paid 10 extra Tokens. If you do not estimate the correct amount you will receive no Tokens.

For example: You estimate that the other two members of the group contributed 17 Tokens to the project. In fact, they contributed 7 and 10 Tokens. Your estimation was correct and you will be paid 10 extra Tokens.

Estimates of others estimates in the Community [Wall Street] experiment

We will also ask you to think about the estimates of others.

If you are chosen to be a FIRST MOVER [LEADER] we will ask **how many Tokens you think the SECOND MOVERS [FOLLOWERS] expected you to contribute**. You should add together your estimate from each of the two SECOND MOVERS [FOLLOWERS]. If you estimate the correct amount

you will be paid 10 extra Tokens. If you do not estimate the correct amount you will receive no Tokens.

For example: You estimate the other two members of the group will collectively predict you contribute 30 Tokens. In fact, one member of your group expects you to contribute 10 Tokens and another 20. Your estimate was correct and you will be paid 10 Tokens.

If you are chosen to be a SECOND MOVER [FOLLOWER] we will ask **how many Tokens you think the FIRST MOVER [LEADER] expects SECOND MOVERS [FOLLOWERS] to contribute in total**. Note that there are two SECOND MOVERS [FOLLOWERS] and so your estimate must be a number between 0 and 40. If you estimate the correct amount you will be paid 10 extra Tokens. If you do not estimate the correct amount your will receive no Tokens.

End of the round

At the end of the round you will see how much each group member contributed to the public project. You will also be told how many Tokens you earned in that round. You then continue to the next round until all 10 rounds are completed. You will be told at the end of the 10 rounds whether your estimates of others contributions and estimates were correct.

Control questions for the Community [Wall Street] experiment

Please complete the questions below. In a couple of minutes someone will come to your desk to check your answers. Once everybody answers the following questions correctly, the experiment will start. The questions are hypothetical and serve for your understanding the income calculation only.

Question 1: Each member of the group – including yourself – does not contribute anything to the project.

What is, in Tokens, your total income from the experiment?

Question 2: Each member of the group – including yourself – contributed all 20 Tokens to the project.

What is, in Tokens, your total income from the experiment?

Question 3: You contribute 3 Tokens. The other two members of the group contribute 10 and 4 respectively.

What is, in Tokens, your total income from the experiment?

Question 4: You and one other member of the group contribute 20 Tokens each. The other group member contributes 0 Tokens.

What is, in Tokens, your total income from the experiment?