

New hope for the voluntary contributions mechanism: The effects of context[☆]

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Received 15 August 2006; received in revised form 26 July 2007; accepted 6 August 2007

Available online 15 August 2007

Abstract

This research examines how three common contextual factors can affect contributions in the linear voluntary contributions mechanism (VCM). Using business student subjects and a low marginal per capita rate of return, the results show that contributions in the last of ten rounds range from 18% for the traditional VCM with no initial cheap talk, no voting, and a status quo of not giving to 94% in a VCM with initial cheap talk, voting, and a status quo of giving. The results demonstrate that context can make the VCM produce sustained efficiencies similar to incentive-compatible public-good mechanisms.

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Keywords: Voluntary contribution mechanism; Cheap talk; Voting; Status quo bias; Social norms; Context; Charitable contributions

1. Introduction

Despite extensive early research examining the voluntary contributions mechanism (VCM) both in theory (for a summary, see Bergstrom et al., 1986) and in the experimental literature (see Marwell and Ames, 1978, 1980, 1981; Kim and Walker, 1984; Isaac et al., 1984, 1985; Andreoni, 1998), the source of the anomalous high initial level of contributions obtained in linear public-

[☆] The authors would like to acknowledge support from the Decision, Risk, and Management Science Program at the National Science Foundation. In addition, we would like to thank James Andreoni, Ravi Kanbur, and two anonymous referees for helpful comments. All conclusions, opinions, and errors are the sole responsibility of the authors.

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good experiments that have a low marginal per capita rate of return (MPCR) remains a subject of considerable interest and debate. A number of more recent studies have examined whether positive contributions can be explained by confusion or other regarding behavior, such as altruism or “warm glow” (Andreoni, 1995a,b; Palfrey and Prisbrey, 1996, 1997; Andreoni and Miller, 2002; Ferraro et al., 2003); the effect of subject types with different levels of presumed altruism or cooperativeness (Marwell and Ames, 1981; Frank et al., 1993; Cadsby and Maynes, 1998; Peters et al., 2004); group size (Isaac et al., 1994); the effects of the threat of expulsion on contributions (Cinyabuguma et al., 2005); and prior experience with a different or same group (Andreoni, 1998; Croson, 1996; Andreoni and Croson, *in press*). Dal Bo (2005) examines finitely and infinitely repeated prisoner’s dilemma games and finds that subjects’ cooperation is higher in infinitely repeated games.

Much recent work has focused on explaining the rate of decay in contributions using the concept of reciprocity wherein kindness is repaid with kindness and spite with spite (Croson, 1999; Bolton and Ockenfels, 2000; Fischbacher et al., 2001; Fehr and Gächter, 2000a,b; Masclet et al., 2003; Fischbacher and Gächter, 2004; Ferraro and Vossler, 2004; Rege, 2004; Noussair and Tucker, 2005). Likewise, the literature includes ample evidence that cooperation and retaliation are intrinsic aspects of preferences and that reciprocity is a fundamental motivation of individual behavior (see Sobel, 2005 for a comprehensive review). The notion of reciprocity and conditional cooperation was introduced in theoretical work by Sugden (1984, 1985) and its application to the VCM has been summarized on page 164 by Fehr and Gächter (2000b) as follows:

Positive reciprocity implies that subjects are willing to contribute something to the public good if others are also willing to contribute, because a contribution to the public good represents a kind action, which induces reciprocally motivated people to contribute, too.... However, to sustain contributing to the public good as a stable behavioral regularity, a sufficiently high proportion of the agents in the game have to be reciprocally motivated... negative reciprocity can play the role that if subjects expect that others free ride, and if they interpret that as a hostile act, then they can “punish” others by free riding, too. The result is likely to be that self-interested types choose to free ride because they are self-interested, and reciprocal types free-ride because they observe others free-riding. Although the motivation to free ride is different for the reciprocal type, in the end the behavior of the selfish and the reciprocal type is indistinguishable. This public good game provides, therefore, an example where selfish types can induce reciprocal types to make “selfish” choices.

Thus, it is argued that the dynamic pattern of contributions over rounds in the VCM can be explained by reciprocity and that participants can be characterized as either selfish or reciprocal cooperators.

Given that contribution rates usually converge to zero in the simple VCM experiment—that is, the traditional context-free experimental economics setting—with a low MPCR, it is quite surprising that the VCM is used so frequently to fund public goods in the “real world.” Casual observation of real-world instances of successful VCM-use indicate that the negative reciprocity described above can be overcome in some settings. For example, in the United States in 2005, total charitable contributions exceeded \$250 billion, with 79% coming from individuals. The value of volunteer time has been estimated at a similar or greater amount, bringing the value of total contributions to an estimated \$500 billion annually, with religious organizations receiving the largest fraction of contributions, around 36% (Giving USA, 2006).

A reasonable starting point is to ask what processes lead to such large contributions? Since the most common location of charitable giving is in religious institutions, how do such institutions manage to fund new projects? We argue that three things characterize such campaigns, each of

which is discussed in detail below. First, a specific proposal (public good) is presented to the membership for open discussion. Clearly, this corresponds to initial cheap talk, which has been shown to greatly increase contributions in laboratory settings. Second, after discussion, the proposal is brought to the membership for an up or down vote. Again, laboratory experiments suggest that voting can increase cooperation and contributions under some circumstances. Finally, various techniques are used to try to develop a social norm of giving. For example, members are often asked to make pledges for future monthly giving or are encouraged to establish automatic donation through use of a credit card or direct deposit from their employer. These techniques establish the status quo as making a donation. A social psychologist would argue that these factors would tend to lead to the establishment of a social norm of contributing, with loss aversion from a reference point of contributing, thereby increasing the incentive to contribute. The purpose of the research presented here is to fully explore the role of these three contextual factors in a full factorial design. In this article, we follow the definition of *context* as “the circumstances in which an event occurs; a setting” (*The American Heritage Dictionary of the English Language*, 2000). In this sense, the simple VCM is relatively context free while versions that add the other features add contextual factors. Both economists and psychologists have found that contextual details can matter a great deal both from a game theoretic and behavioral perspective. We summarize the literature on these factors as follows:

1.1. Cheap talk

Following promising results from prisoner’s dilemma and market experiments in which communication was shown to increase cooperative behavior among participants (see Isaac and Walker, 1988 for references), an immense literature about communication has emerged in relation to the VCM. Isaac and Walker (1988) pioneered this literature by considering noncommittal, face-to-face communication—cheap talk—between rounds of contribution. Not only did contribution rates reach 100%, but they were sustained in later rounds absent of communication.

Recent literature has questioned which aspect of communication *exactly* is responsible for this success: is it contingent upon physical contiguity, verbal communication, repetition, information, etc? While Isaac and Walker (1988) contend that cheap talk serves to expedite learning of the surplus-maximizing strategy, Brosig et al. (2003) directly address this by parsing out component features of communication. They isolate unidirectional and interactive, linguistic and non-linguistic, auditory and visual, physically present and electronic communication treatments, and the results suggest that interactive, linguistic communication with group members visible is necessary for sustained cooperation. The authors attribute the success of this particular combination to evolutionary circumstances. Their speculation is a popular one: that early human socialization occurred within small groups in a highly interactive fashion that fostered social norms of cooperation. However, it should be pointed out that they used a MPCR of 0.5 in their treatments and that their no-communication treatment showed little or no decay across rounds.

Bochet et al. (2006) compared several types of communication and punishment schemes as means to increase contributions and efficiency for the VCM. Interestingly, the authors find that anonymous communication via chat rooms was almost as effective in increasing contributions and efficiency as face-to-face communications. While punishment was found to increase contributions, it had minimal effect on efficiency due to the costs involved. Because verbal communication has such a large impact on cooperation, Bochet et al. find that the combined treatment of communication with punishment did not result in statistically significant improvement in cooperation.

1.2. Voting

Alm et al. (1999) show that, relative to control treatments that lack cheap talk and voting, tax compliance for funding a public good increases (or decreases) if subjects discuss and then vote for (or against) penalties. The authors suggest that cheap talk and voting in this situation combine to create a social norm of tax compliance or, if a negative vote occurs, to destroy such a social norm. Voting on whether or not to pursue or enforce funding (including the threat of expulsion and punishment) of a particular public good has also been shown to affect contributions (Kroll et al., 2007; Cinyabuguma et al., 2005; Walker et al., 2000; Feld and Tyran, 2002). Messer et al. (2005) show that with a provision point mechanism, contributions in treatments with voting and cheap talk are significantly higher than in treatments with cheap talk alone.

1.3. Status quo

Some voluntary public-good programs are structured to allow people to opt in, such that not allocating funds toward the public good is the default, indicating a *status quo of not giving*. Others, though, are designed to give people the choice of opting out. In such cases, the default is contribution, or, in other words, a *status quo of giving*. A number of field studies have demonstrated status-quo bias outside of the laboratory for private goods, such as insurance (Johnson et al., 1993), pension savings (Madrian and Shea, 2001), and internet privacy (Johnson et al., 2002). Two recent studies support status-quo bias for public-goods programs in field settings: organ donation (Johnson and Goldstein, 2003) and generic advertising (Messer et al., in press). Johnson and Goldstein (2003) show that countries in which organ donation has a status quo of consent with the choice to opt out have consent rates ranging from 85.9% to 99.98%, while consent rates in countries that have a status quo of no consent range from 4.3% to 27.5%.

Differences in the status quo are underlaid by variant framing. Andreoni (1995a) explores the effects of framing absent status quo differences¹ and finds that framing investments in the “private exchange” as incurring a negative externality on the other group-members yields significantly lower contributions than when the “public exchange” is framed as bearing positive externalities.

Status-quo bias as a result of the reference point in prospect theory is well known (Kahneman and Tversky, 1979; Samuelson and Zeckhauser, 1988), and a variety of laboratory experiments have demonstrated that decision-makers are reluctant to depart from the status quo even in the face of substantial incentives (see, for example, Knetsch and Sinden, 1984; Coursey et al., 1987; Kahneman et al., 1990, 1991). Thus “positive” framing and appropriate exploitation of the status quo bias may contribute to the conception of a social norm of contributing, which could be further reinforced by positive reciprocity, or the tendency to treat kindness with kindness.

It should be noted, that, from an economic, theoretical perspective, context *should not* affect the Nash equilibrium if all participants are selfish and contribute nothing to the group account when the MPCR is less than one in a linear public-good game. In the experiments conducted here, we find that simultaneous introduction of the three contextual factors discussed above results in voluntary contributions remaining at 100% over ten rounds in four of five sessions, even though the sessions had a low MPCR and used undergraduate business and economics students as subjects, who traditionally are the least likely to cooperate (Frank et al., 1993; Cadsby and Maynes, 1998). Since models that suppose that a fixed portion of participants are selfish cannot

¹ There is no default in the experiments of Andreoni (1995a). That is to say, endowments do not begin in either the private or group account, but in a third, ad interim account which must be emptied each round.

explain these results, we suggest that one possible conceptual model is that there is a continuous distribution of tastes either for contributing in the case of a status quo of not giving (warm glow), or, in the case of a status quo of giving, for complying with a social norm of complete cooperation. In terms of prospect theory, giving would register as either the gain of warm glow in the case of a status quo of not giving, or the avoidance of the loss of warm glow in the case of a status quo of giving. Studies show losses are valued at twice that of gains, predicting substantially more contributions for a status quo of giving. If this conceptual model is correct, the experimental results suggest that this distribution of tastes can be significantly shifted by context and that these tastes shift in response to the behavior of others in complying with a social norm (reciprocity). Additionally, if all participants comply with a social norm of giving all their income in the linear public goods game used here, the outcome is both efficient (consistent with social preferences for efficiency demonstrated by [Charness and Rabin \(2002\)](#) and [Engelmann and Strobel \(2004\)](#)) and fair (consistent with social preferences for fairness as demonstrated by [Fehr and Gächter \(2000b\)](#), [Bolton and Ockenfels \(2000\)](#), and [Charness and Rabin \(2002\)](#)). Note that all participants start with the same income and have the same MPCR in the experiments reported here.

The notion underlying this research is that behavioral economics can possibly guide the use of context as a tool to increase voluntary contributions. As noted above, the experiments examine the effect of context on voluntary contributions in a full factorial design with eight treatments, which reveals potential interaction effects that have not previously been formally studied. Section 2 lays out the design of the experiments, which were conducted using 322 subjects recruited from undergraduate business courses. The results, presented at length in Section 3, show that contributions as a percent of income in the last of ten rounds range from 18% (Treatment 1) for the case of no cheap talk, no voting, and status quo of not giving to 94% (Treatment 8) in the case of cheap talk, voting, and a status quo of giving. This last case demonstrates the surprising result that the VCM can be framed in a way that produces very high efficiencies, even with a low MPCR and business student participants. Additionally a stress test involving experienced business and economics subjects is conducted to see if experience in Treatment 1 affects the behavior of participants in Treatment 8. In Section 4.1, we compare results for the most efficient combination of contextual factors with incentive-compatible mechanisms. Prospective uses of context as a tool for increasing voluntary contributions in the field are discussed in Sections 4.2, and 4.3 offers concluding remarks.

2. Experiment design

All experiments were conducted in the Laboratory for Experimental Economics and Decision Research at Cornell University. The experiments were designed to test the effects on subject donations of three factors: cheap talk, voting, and the status quo of the donation. To account for all possible interactions, eight treatments were employed.

	Cheap talk	Vote	Status quo
Treatment 1	No	No	Not giving
Treatment 2	No	No	Giving
Treatment 3	Yes	No	Not giving
Treatment 4	Yes	No	Giving
Treatment 5	No	Yes	Not giving
Treatment 6	No	Yes	Giving
Treatment 7	Yes	Yes	Not giving
Treatment 8	Yes	Yes	Giving

Five sessions, each involving seven subjects, were conducted for each treatment. Each session lasted ten rounds, though the subjects were not aware of the number of rounds in advance. Subjects earned an average of \$13 for the half-hour experiment.

Subjects received written instructions and the administrator provided a verbal description of the experiment using a Microsoft PowerPoint presentation to ensure consistency. The subjects were informed that they would participate in an unidentified number of rounds and would start each round with one dollar. Since most real world contributions are made at discrete intervals by finitely lived individuals, we chose a finite rather than infinite game structure. Whatever money they put into their “private account”—equal to their one-dollar endowment minus the amount donated to the “group account”—would be theirs to keep at the end of the round. Whatever money they donated to the group account would be multiplied by 1.5 and distributed uniformly among all members of the group. So, the MPCR in the experiments was 0.21. The instructions included a table illustrating how the “group account payoff” would be calculated based on the amount donated to the group account. Subjects were randomly assigned to computers equipped with privacy shields and a Microsoft Excel spreadsheet programmed with Visual Basic for Applications. All data were stored in a Microsoft Access database. In each round, subjects submitted their confidential donations and then, before the start of the next round, received notification of their group account payoffs and the amount that the group had contributed to the group account.

To test the effect of initial cheap talk, subjects in half of the treatments (Treatments 1, 2, 5, and 6) were informed only which seven subjects were in the group and no discussion was permitted. Therefore, subjects could only make visual identification with the other members of their group. Subjects in the other half of the treatments (Treatments 3, 4, 7, and 8) were allowed to have a free and open discussion within the group for as long as five minutes prior to the beginning of the first round; thereafter, no additional discussion was allowed. Binding deals and threats were not permitted. The groups convened in separate adjacent classrooms to prevent communication between groups.

To test the effect of voting, subjects in half of the treatments (Treatments 5, 6, 7, and 8) voted on the rules for their groups. If a majority of the participants in a group selected “group account” rules, then the group participated in the VCM. If a majority of the participants in a group selected “private lottery” rules, then, in each round, each subject received one dollar and then individually decided whether to purchase a private lottery ticket costing one dollar. The payoff of the lottery ticket depended on the result of a toss of a fair coin with “heads” resulting in a payoff of two dollars and “tails” resulting in no payoff. Subjects who did not purchase a lottery ticket retained the dollar. After all votes were cast, the results were announced and the rules favored by the majority were used for all remaining rounds. In treatments with both voting and cheap talk (Treatments 7 and 8), cheap talk was conducted prior to voting. Since the Nash equilibrium prediction is zero contributions to the group account in the VCM, the expected earnings from both voting options is equal (one dollar per round). However, with any amount of contributions, the expected earnings for the group account option are higher. Additionally, subjects may view voting as an opportunity to signal their intent to give to the group account in the future. Regardless of the strategy employed by the subjects, the experiment was designed to test whether the process of voting, both alone and in combination with other context factors, affects the eventual contribution behavior in the VCM.

To test the effect of status-quo bias, subjects in half of the treatments (Treatments 1, 3, 5, and 7) started each round with an initial balance of one dollar and had to decide how much, if any, they wanted to *contribute* to the group account (status quo of not giving).

Any money not contributed to the group account would be put into the subject's private account. Subjects in the other half of the treatments (Treatments 2, 4, 6, and 8) started each round having made an "initial donation" of one dollar to the group account and had to decide how much, if any, they wanted to have *refunded* to their private accounts (status quo of giving).

3. Results

The results of the experiments are summarized in Table 1 and Fig. 1. Initial contributions as a fraction of income in the first round range from a low of 44.6% for Treatment 5 to a high of 97.1% in Treatments 7 and 8. Final contributions in round ten range from a low of 11.2% in Treatment 3 to a high of 94.3% in Treatment 8. All treatments show a statistically significant decrease in contributions between round one and round ten (at the 0.05 level) except Treatment 8, which shows a negligible 2.8% decline in contributions ($T=-1.00$, $p=0.324$). This difference in results clearly suggests that context can have a dramatic impact on both initial contributions and the rate of decay. Fig. 1 shows round-by-round average contributions for each treatment, which can, of course, also be interpreted here as a percentage of the socially efficient level. The figures in the four panels contrast the status quo of not giving with the status quo of giving. Panel A shows results without either cheap talk or voting, Panel B adds cheap talk, Panel C adds voting, and Panel D adds both cheap talk and voting.

First consider Treatment 1 in Panel A of Fig. 1 (no cheap talk, no voting, and status quo of not giving). Treatment 1 illustrates results typical of previous VCM experiments — contributions start at about 50% and decay to 17.8% by the tenth round. These results are very similar to results from other studies that used business and economics students (for

Table 1
Group account donations and Mann–Whitney test results

	1st round donation ^a	10th round donation ^a	1st–10th round difference ^a	Average group contributions ^b
Treatment 1	0.470 ^{d, e, f, h, i, j}	0.178 ^{e, f, i, j}	-0.292 ^{d, e, h, j}	0.274 ^{c, f, i, j}
Treatment 2	0.690 ^{c, e, f, g, i, j}	0.145 ^{f, i, j}	-0.545 ^{c, e, g, i, j}	0.326 ^{f, i, j}
Treatment 3	0.886 ^{c, d, g, h}	0.112 ^{c, f, i, j}	-0.774 ^{c, d, f, g, h, i, j}	0.445 ^{c, f, g, i, j}
Treatment 4	0.950 ^{c, d, g, h}	0.574 ^{c, d, e, g, h, j}	-0.376 ^{e, j}	0.762 ^{c, d, e, g, h, j}
Treatment 5	0.446 ^{d, e, f, h, i, j}	0.170 ^{f, i, j}	-0.276 ^{d, e, h, j}	0.286 ^{e, f, i, j}
Treatment 6	0.700 ^{c, e, f, g, i, j}	0.189 ^{f, i, j}	-0.511 ^{c, e, g, i, j}	0.324 ^{f, i, j}
Treatment 7	0.971 ^{c, d, g, h}	0.761 ^{c, d, e, g, h, j}	-0.210 ^{d, e, h, j}	0.850 ^{c, d, e, g, h}
Treatment 8	0.971 ^{c, d, g, h}	0.943 ^{c, d, e, f, g, h, i}	-0.028 ^{c, d, e, f, g, h, i}	0.954 ^{c, d, e, f, g, h}

^a $N=35$ for each treatment.

^b $N=50$ for each treatment.

^c Different than Treatment 1 (0.05 level).

^d Different than Treatment 2 (0.05 level).

^e Different than Treatment 3 (0.05 level).

^f Different than Treatment 4 (0.05 level).

^g Different than Treatment 5 (0.05 level).

^h Different than Treatment 6 (0.05 level).

ⁱ Different than Treatment 7 (0.05 level).

^j Different than Treatment 8 (0.05 level).

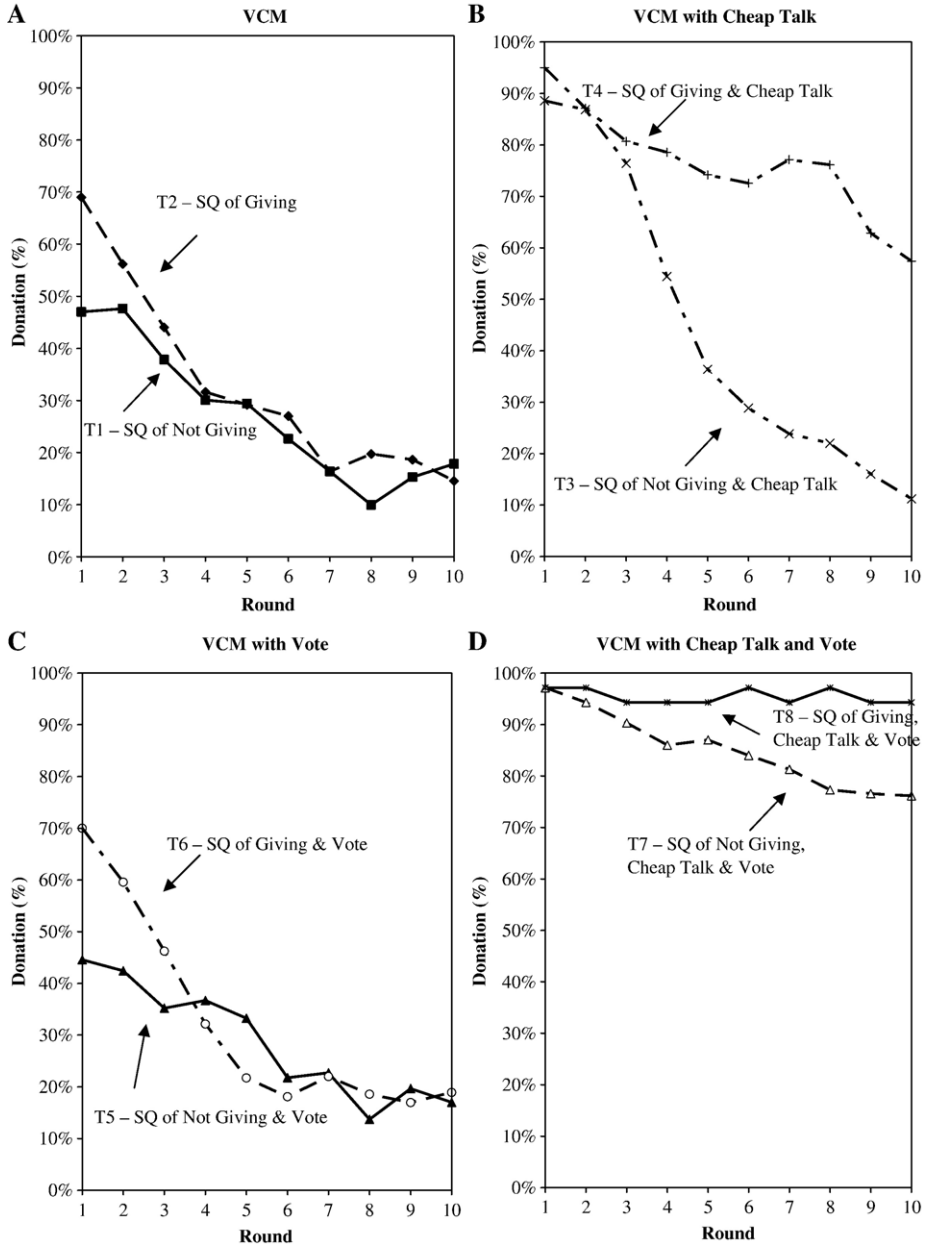


Fig. 1. Donation percentage by round for the eight treatment types.

example, see Isaac and Walker, 1988; Andreoni, 1998). Over the ten rounds, average contributions were 27.4% (Table 1).

Changing the donation status quo to giving has a substantial impact on contribution patterns in early rounds, as is apparent by comparing Treatment 1 with Treatment 2 in Panel

Table 2
Regression results for average contribution by session

Variable	First round contributions	Change in contributions from first to tenth round
INTERCEPT	0.4700** (0.0607)	-0.3192** (0.0938)
CT	0.4316** (0.0869)	-0.4820** (0.1405)
VOTE	-0.0243 (0.0858)	0.0160 (0.1405)
SQ	0.2200** (0.0858)	-0.2528 (0.1405)
CT×VOTE	0.2127 (0.1338)	0.5477** (0.1987)
CT×SQ	-0.1022 (0.1270)	0.6374** (0.1991)
VOTE×SQ	0.0373 (0.1213)	0.0177 (0.1988)
CT×SQ×VOTE	-0.1521 (0.1905)	-0.2208 (0.2813)
Log-likelihood	9.84	1.72
Left-censored	0	1
Uncensored	28	39
Right-censored	12	0

Notes: $N=40$ for each analysis. Standard errors are in parentheses.

*Significant at the 5% level or less. **Significant at the 1% level or less.

A of Fig. 1 (no cheap talk, no voting) and Treatment 5 with Treatment 6 in Panel C (no cheap talk, voting). However, note that the initial contributions shown in Panels B and D (treatments with cheap talk) are so high that the effect of status quo is limited by the contribution ceiling of 100%. Thus, to explore the statistical impact of contextual factors such as status-quo bias in a preliminary regression model that allows for interaction terms, two-limit Tobit regressions were used to explain average first-round contributions by session (ranging from 0 to 1) and the change in contributions (decay) between rounds one and ten. These regressions are presented in Table 2. Explanatory variables include a constant, three dummy variables for the main effects of the context factors, three two-way interaction effects, and one three-way interaction effect. These context factors are defined as cheap talk (0 = no, 1 = yes), voting (0 = no, 1 = yes), the status quo of the donation (0 = not giving, 1 = giving), cheap talk times vote, cheap talk times status quo, vote times status quo, and cheap talk times status quo times vote.

As shown in Table 2, the main effect of a status quo of giving when neither the upper nor lower limit has been reached is to add about 17 percentage points to the initial contribution rate in round one and the effect is significant at the 1% level. It should be noted that this marginal effect is calculated at the mean level of contributions in the no-context treatment, Treatment 1, *excluding* data points with contributions of either 0 or 1; this conditional mean is roughly equal to 0.78. Including censored observations, the change in the status quo from Treatment 1 to Treatment 2 results in average round-one contributions increasing by roughly 22 percentage points, jumping from 47% to 69%. Similarly, round-one contributions in Treatments 5 and 6 result in an increase in contributions from 44.6% to 70.0% as the status quo changes. The analogous change when restricting analysis to uncensored observations is from 76.2% to 95.4%. As shown in Table 2, the main effect of status quo is only significant at the $p=0.08$ level in explaining the change or decay in donations between rounds one and ten but seems to approximately offset the increase in initial contributions. Average contributions with the status quo change over the ten rounds are 32.6%, which is not statistically different than the average contributions in Treatment 1 (Table 1).

Even though 69.1% and 62.8% of the subjects in Treatment 5 and Treatment 6, respectively, voted for the group account, the impact of adding voting alone does not appear to alter

the outcomes shown in Panel A (see Panel C of Fig. 1 and Table 1).² In the regression, the main effect of voting is statistically insignificant in explaining first-round contributions and changes in contributions (Table 2). Likewise, adding voting does not statistically increase contributions relative to the baseline VCM and the VCM with a status quo of giving, as groups gave an average of 28.% over the ten rounds in Treatment 5 and 32.4% in Treatment 6 (Table 1).

Our results, like those of previous VCM experiments involving cheap talk (Isaac and Walker, 1988; Brosig et al., 2003), show that adding cheap talk (see Panel B of Fig. 1) has a large impact on initial contributions—first-round contributions for both Treatment 3 (cheap talk, no vote, and status quo of not giving) and Treatment 4 (cheap talk, no vote, and status quo of giving) are greater than in any of the four treatments previously discussed (Table 1). In the first round, average contributions in Treatment 3 jump to almost 90% but then decay quickly.³ A different pattern emerges when the status quo is giving. While the long-term contribution pattern still appears to approach the Nash equilibrium, Treatment 4's erosion in contributions is not as severe. Treatment 4's initial contributions are similar to those in Treatment 3 (95.0%), but by the fourth round the contributions remain at a level that is greater than in any of the treatments so far described (Treatments 1, 2, 3, 5, and 6). By the tenth round, average contributions, 57.4%, are still higher than in the initial rounds for Treatments 1 and 5. Average contributions of 76.2% in Treatment 4 over the ten rounds are also statistically higher than the 44.5% average contributions in Treatment 3 (Table 1).

The interaction of cheap talk and changing the status quo to giving appears to dampen but not fully mitigate the increase in free-riding over time. These observations are confirmed by the information shown in Table 2: the direct effect of cheap talk is significant both in raising first-round contributions and in increasing the rate of decay in contributions from the first to the tenth round (both coefficients are significant at better than the 1% level). This increase in the rate of decay again appears to offset the initial increase in contributions. Thus, the main effects of both status quo and cheap talk appear to disappear by round ten. However, cheap talk appears to show a significant positive interaction effect with the status quo that decreases the rate of decay by reducing the change in contributions from the first to the tenth round (1% level).

While adding voting alone has no impact on the baseline VCM, voting does have an impact on contributions when coupled with cheap talk. Consider first the results of Treatment 7 (cheap talk, voting, and status quo of not giving). All five groups voted in favor of the VCM with the average support being 94.3%. Under this treatment, contributions in the final round were more than 76% and average contributions overall were 85.0%. The interaction of voting and cheap talk yields a positive impact on tenth-round contributions that is higher than all other treatments except

² All of the groups in Treatment 6 had a majority of subjects vote in favor of the group account game. In Treatment 5, one of the groups voted four to three in favor of the private lottery rules. The efficiency loss that resulted from this group's decision is included in the efficiency analysis and discussion, presented later in this paper. Specifically, the expected earnings for each of the seven subjects are one dollar per round and thus the efficiency is 66.7%. Since the vote is a type of Bernoulli trial where there are two outcomes—success (the group account) or failure (the private lottery)—the probability of a majority vote in favor of the group account is estimated using a negative binomial distribution and a maximum-likelihood estimation (Casella and Berger, 1990). The intuitive result is that the estimated probability of a majority vote for the group account is five out of six.

³ Note that some studies involving cheap talk that use MPCRs that are more than twice what was used in this research have shown little to no decay in contributions (for example, Brosig et al., 2003).

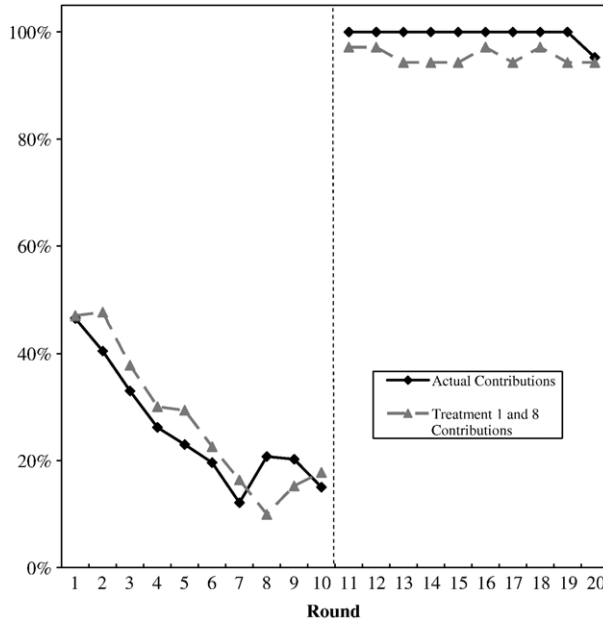


Fig. 2. Contributions in Treatment 1 and Treatment 8 compared to actual contributions when Treatment 8 follows Treatment 1 with the same participants in different groups.

Treatment 8.⁴ With regard to all observations, the interaction effect of voting and cheap talk is significant at the 0.6% level in reducing the rate of decay, and the marginal effect of this interaction—calculated at the expected mean conditional on restriction to observations strictly between 0 and 1—is significant at the same level of significance (Table 2). Therefore, the synergy of voting and cheap talk in Treatment 7 further dampens the erosion of contributions over time.

While noted differences exist in all seven treatments discussed so far, all share significant erosion in contributions. Statistically, these patterns are confirmed by the change in average contribution from the first to the tenth round for each of the eight treatments, as shown in Table 1. However, when a status quo of giving is coupled with voting and cheap talk (Treatment 8), contributions start out very high and do not erode over time. In Treatment 8, all groups voted for the VCM with an average of 97.1% in favor. Public account contributions start out at 97.1% and average 95.4% over ten rounds. This level of contributions is higher than all of the other treatments (Table 1).⁵ This last case demonstrates that the VCM, even with a very low MPCR, can achieve very high efficiencies when it is framed to include cheap talk, voting, and a status quo of giving. Table 2 confirms that cheap talk and voting interact not only to increase contributions in the tenth round but also to reduce decay as measured by the change in contributions with both effects being significant at better than the 1% level.⁶

⁴ The difference in tenth round contributions between Treatment 7 (76.1%) and Treatment 4 (57.4%) is marginally significant ($p=0.071$).

⁵ The 10.4% increase in contributions in between Treatment 8 and Treatment 7 is statistically significant at the 0.06 level ($p=0.059$).

⁶ We tested to evaluate whether individual voting behavior or group vote totals influenced average contribution behavior. The results of these tests suggest no significant relationships were present.

Status-quo bias as a result of the reference point in prospect theory is well known (Kahneman and Tversky, 1979; Samuelson and Zeckhauser, 1988) and a variety of laboratory experiments have demonstrated that decision-makers are reluctant to depart from the status quo even in the face of substantial incentives (see, for example, Knetsch and Sinden, 1984; Coursey et al., 1987; Kahneman et al., 1990, 1991). In these experiments, in spite of the temptation to free-ride, if a reference point (also termed status quo or social norm) of contributing can be established, subjects are apparently reluctant to leave that status quo. Note that, when subjects remain at a status quo of giving, positive reciprocity—the tendency to treat kindness with kindness—is self-reinforcing. Apparently, cheap talk, voting, and a status quo of giving combine to allow positive reciprocity to maintain a social norm of giving in Treatment 8.

In summary, in addition to the positive constant, the round-one regression has only two significant effects, both positive. Conditional on restriction to marginal effects on uncensored observations, cheap talk increases initial contributions by 31 percentage points and status quo increases them by roughly 17 percentage points. The change (decay) regression shows that, for uncensored observations, cheap talk decreases mean uncensored contributions over rounds by 46 percentage points and status quo decreases them by 25 percentage points. Consequently, the initial increase in contributions from cheap talk alone and from status quo alone are, at least to some degree, eliminated by round ten since the percentage decays somewhat counteract the initial percentage increases. In other words, negative reciprocity partially undoes the effect of cheap talk alone and status quo alone over ten rounds. But the social norm of giving one dollar is further reinforced by the interaction of cheap talk and status quo (which reduces the marginal effect of decay by 63 percentage points) and/or cheap talk and voting (which reduces decay by 54 percentage points). Thus, it appears that it is the interaction effects that lead to sustained contributions, not the individual main effects.

Several studies have shown that experienced participants—that is, those who have participated in a VCM experiment before—tend to contribute less than their inexperienced counterparts (see Isaac et al., 1984; Palfrey and Prisbrey, 1997). To further test the robustness of the results, we conducted stress tests of Treatment 8 using experienced subjects. In these experiments, inexperienced subjects first participated in twelve rounds of Treatment 1—the standard VCM with no cheap talk, voting, or status quo of giving.⁷ After completion of this first stage of the experiment, subjects, who were now experienced with the VCM, were randomly assigned to new groups. The subjects then participated with their new groups in ten rounds of Treatment 8, the version that includes the three contextual factors of cheap talk, voting, and a status quo of giving.⁸

Six sessions were conducted with seven group members in each session ($n=42$). As expected, the results from the first ten rounds of the stress test of Treatment 1 are nearly identical to the results of the first ten rounds of the original Treatment 1. In the stress test of Treatment 1, contributions decline from an initial level of 46.5% to 15.0% by the tenth round while contributions in the original Treatment 1 decline from an initial level of 47.0% to 17.8% by the tenth round. As seen in Fig. 2, the results of the first ten rounds of the stress test of Treatment 1 are very similar to the initial results for Treatment 1. An encouraging result of the stress test is that, after the experienced members are reshuffled and undergo the contextual changes of Treatment 8, the experienced subjects' behavior closely matches the behavior seen earlier in Treatment 8 with inexperienced subjects. In this case, contributions start at 100% and remain unchanged until the tenth round, when they decrease to 95.2%.

⁷ Subjects did not know the number of rounds in advance. Treatment 1 consisted of twelve rounds to avoid subjects being able to anticipate the number rounds in for Treatment 8. Results of the first ten rounds are reported here.

⁸ We expect contributions to be even lower if we maintained group composition (Andreoni, 1998). That is, while experience alone decreases contributions, experience with the same group decreases contributions even further.

Since the change in group composition occurs simultaneously with introduction of contextual factors, we cannot parse the effect of experience alone. However, our results refute the possibility that experience with the VCM—and, more importantly, with free-riding—would render Treatment 8's results irrelevant to the real world, where people presumably engage in various VCM-type scenarios with vastly different groups of people. In other words, a negative experience while trying to fund a public good in, for example, one's church group need not affect the success of efforts to fund National Public Radio if the contexts of giving in the two organizations differ.

4. Conclusion

4.1. Efficiency

Given that there are real-world examples where a status quo of giving for public goods is feasible, such as generic advertising, organ donations, and public contributions by unions, how does Treatment 8, which includes cheap talk and voting, compare in efficiency to other public-good mechanisms? Note that, since the group account in this research is multiplied by a factor of 1.5, if all subjects contribute nothing, the efficiency of the theoretical Nash equilibrium is 66.7% since the subjects still retain their initial endowments of one dollar. If all group members contribute their entire endowments, the efficiency is 100% as everyone receives \$1.50 from the group account. For instance, the efficiency of Treatment 1, which has no added context, is 82.3% in the first round and declines to 72.6% in the final round, which is a typical result for economics and business students facing a low MPCR. In contrast, Treatment 8, which incorporates cheap talk, voting, and the status quo of giving, has an initial efficiency of 99.0% and a final efficiency of 98.1%, showing no significant decline in efficiency in successive rounds in spite of a Nash equilibrium of zero contributions and a predicted efficiency of 66.7%.

For comparison, the Groves–Ledyard mechanism (Groves and Ledyard, 1977) shows efficiencies in different treatments ranging from a low of 84.5% to a high of 98.9% in which improved efficiencies are obtained with higher levels of the “punishment” parameter (Chen and Plott, 1996). Thus, Treatment 8 compares well with the Groves–Ledyard mechanism, which is quite complex and difficult to implement in real-world settings. Note that although the experimental details differ, both our Treatment 8 and the Groves–Ledyard mechanism can achieve near 100% efficiency. However, the Groves–Ledyard mechanism determines optimal quantities for an interior solution, something that is not tested here where the optimum is a corner solution.

The one-round Provision Point Mechanism examined in Rondeau et al. (2005) is shown to be between 86.2% and 100% efficient when taking into account the possibility that contributions can fail to reach the threshold according to the benefit–cost ratio varied in the study. In the results reported here for round one, all treatments with a status quo of giving (2, 4, 6, and 8) and Treatments 3 and 7, which include cheap talk, exceed 86% efficiency. Only Treatment 1 (without context) and Treatment 5 (with voting alone) fall below this level in the first round.

Modifications of the VCM that punish or reward contributions depending on whether contributions fall below or exceed the average contribution (Falkinger et al., 2000) should theoretically achieve very high efficiencies. The experiments reported here, which have seven members in each group (allowing a majority vote) and an MPCR of 0.21, closely match Falkinger et al.'s design for their case with eight subjects and an MPCR of 0.20. Average efficiency in the Falkinger et al. study, based on contributions of about 90% of the endowment over ten rounds, was on the order of 96%, slightly less than the efficiencies obtained in Treatment 8 in this study

with full context. It is remarkable that context alone can produce efficiencies comparable to those of incentive-compatible mechanisms.

Finally, the efficiencies observed in this research, which involves business majors in Treatment 8, are superior to those obtained in treatments like our Treatment 1 with highly altruistic subjects such as nurses, the subjects in a study by Cadsby and Maynes (1998). Similarly, free-riding occurs much less often in many of these treatments than it does in studies involving prisoner dilemmas and students from Cornell who are not business or economics majors (Frank et al., 1993).

4.2. Policy implications

Treatment 8 raises some interesting possibilities as well as some problems for efforts to fund public goods. To allow a status quo of giving, an institution must be in a position to make automatic withdrawals from individuals' private accounts or tax the transactions and still be able to return the funds upon request. Generic advertising programs in agriculture were facilitated by federal legislation passed in 1937 that allows marketing orders to authorize local governments or industry associations to regulate and even tax products. Another example can be found in green-choice programs for electric power in which public service commissions have encouraged utilities to let people sign up voluntarily for higher "green rates" using either a type of VCM or a provision-point mechanism to fund renewable energy sources (Rose et al., 2002). Alternatively, using the approach suggested in this research, power companies could conduct public hearings and a majority vote by customers would determine whether customers would have automatic billing for green power unless they opt out. Refunds could be made upon request, thereby allowing those who either do not support the notion of green power or who wish to free-ride to withdraw. Another approach that has become popular with charitable organizations is use of automatic credit card payments. Thus, if an individual can be convinced to sign up initially, a status quo of giving is created that requires action to stop the contributions. Again, experimental tests of such a mechanism are appropriate, and we note that this approach may be very promising since first-round contributions in Treatment 7 (cheap talk, voting, and a status quo of not giving) are the same as those in Treatment 8 (the same parameters except with a status quo of giving). Thus, people showing sufficient cooperation in round one would likely sign up for automatic giving, which could allow contributions to be sustained by status-quo bias.

Another possible application arises with school tax initiatives. Such initiatives are often defeated because voters who are retired or who do not have school-age children feel that property taxes are too high and will not vote to increase them. Proposing a voluntary tax increase to fund additional programs, such as music or sports, that offers taxpayers the right to request a refund—thereby creating a status quo of giving—could result in a more efficient provision of these public goods. In other words, voters who value such programs less than others would not be forced to block passage of such a tax to avoid having to pay it. Rather, they could vote for others to pay and then individually request their refund. Such votes are naturally preceded by discussion—cheap talk—which is consistent with Treatment 8.

Finally, the approach we have developed suggests a number of possible mechanisms that could increase the efficiency of contributions. For example, land trusts could rely on a VCM funding system much like Treatment 7, with discussion among members who could have the right to vote whether to purchase several natural areas over a series of funding cycles (much like the rounds in our experiments). However, even if leaders of the land trust recognize that small contributors will not provide sufficient funds to purchase the natural area in this funding cycle, fund-raising will continue with a hope that "quite" large donors may make up any shortfall. Thus, small donors

perceive, over successive land purchases, that the purchase program is 100% successful due to their efforts. In effect, these quite large donors may be used to prevent the perception among small donors that contributions (and thus support for the projects) are falling. The experimental laboratory would again be an appropriate place to test this hypothesis.

4.3. Summary

In summary, it appears that context offers new hope by potentially increasing contributions and eliminating or nearly eliminating the decay that characterizes the VCM in low MPCR settings over time. The explanation for this result lies in the analysis of how the three factors affect contributions. Cheap talk alone increases initial contributions but also increases the rate of decay. Voting alone has no effect on either initial contributions or the rate of decay. A status quo of giving alone increases initial contributions but contributions still decay with successive rounds. In terms of interaction effects, cheap talk interacts with voting to reduce the rate of decay. Cheap talk also interacts with a status quo of giving to further reduce the rate of decay. Thus, elimination of decay in Treatment 8 is due primarily to the interaction effects of cheap talk with both voting and a status quo of giving.

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