The Effects of Seed Money and Refunds on Charitable Giving: Experimental Evidence from a University Capital Campaign

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Abstract

We design a field experiment to test two theories of fundraising for threshold public goods: Andreoni (1998) predicts that publicly announced "seed money" will increase charitable donations, while Bagnoli and Lipman (1989) predict a similar increase for a refund policy. Experimentally manipulating a solicitation of 3000 households for a university capital campaign produced data confirming both predictions. Increasing seed money from 10% to 67% of the campaign goal produced a nearly sixfold increase in contributions, with significant effects on both participation rates and average gift size. Imposing a refund increased contributions by a more modest 20%, with significant effects on average gift size.

JEL: C93 (Field Experiments), H41 (Public Goods)

Keywords: Charitable Giving, Threshold Public Goods, Field Experiments

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Introduction

In this paper, we provide experimental evidence on two different theories of charitable fundraising, one concerning the role of seed money and the other concerning the role of refunds to donors. Andreoni (1998) develops a positive theory of capital campaigns by charitable organizations: the organization provides a public good, but only if the capital campaign reaches some minimum threshold of contributions. One testable implication of the theory is that publicly announced seed contributions can increase the total amount of giving to a capital campaign. More specifically, Andreoni's model of charitable giving for a threshold public good has multiple equilibria, and in the absence of seed money there exists a Nash equilibrium with zero charitable giving.[1] The zero-contribution equilibrium can be eliminated, however, by initial commitments of seed money, which lower the remaining amount to be raised in the public fundraising campaign.

Professional fundraisers appear to take seriously the role of seed money: a recent course for fundraisers recommends not starting the public phase of a fundraising campaign until "40 to 50% of the goal is pledged" as seed money.[2] In reading the conventional wisdom of fundraisers, however, we have not been able to find documentation of a single quantitative measurement of the role of seed money. We fill this gap by conducting a controlled field experiment to measure the impact of seed

[1] Existence of the equilibrium at zero requires another assumption: that the minimum threshold for public-good provision exceeds the amount of the largest individual gift in a nonzero equilibrium. Though this assumption seems plausible, we cannot be sure that it will hold in practice in a field setting. A field experiment represents a joint test of both the mathematical and the behavioral assumptions of the model – that is, we attempt to see whether the assumptions of the theory actually appear to hold in one particular charitable capital campaign.
[2] This quotation comes from The Fundraising School (1999). See Andreoni (1998) for additional evidence from three other fundraising experts, who recommended initial seed-money amounts of 40%, 33%, and "at least 20%," respectively.

money in a real capital fundraising campaign, and demonstrate that seed money does indeed affect contributions in the manner predicted.

Bagnoli and Lipman (1989) discuss a second instrument at fundraisers' disposal when raising money for a threshold public good: the ability to offer a refund to contributors if the threshold is not met. They propose a fundraising strategy that refunds all money to contributors in case the threshold is not reached. In the threshold-public-good contribution game, there exist inefficient, free-riding equilibria that fail to provide the public good, but a refund policy can make it easier to achieve the efficient equilibrium where the good is provided. In particular, when Bagnoli and Lipman restrict attention to the set of undominated perfect equilibria (a plausible refinement to Nash equilibrium), they find all such equilibria have efficient public-good provision in the presence of a refund.

Previous evidence on theories of threshold public-good provision comes from two sources: anecdotes[3] and laboratory experiments. Croson and Marks (2000) provide a survey of the experimental literature on threshold public-good games. While the role of seed money has not yet been studied in the laboratory[4], the question of refunds has received considerable attention. Bagnoli and McKee (1991) experimentally confirmed the prediction of Bagnoli and Lipman (1989), that a refund mechanism does produce efficient public-good provision. While their experiments all used a refund rule, other laboratory experiments have directly compared behavior with and without such a rule.

[3] See Bagnoli and McKee (1991) for examples of anecdotes suggesting the utility of a refund policy.

[4] Several authors, including Erev and Rapoport (1990) and Cooper and Stockman (2001), have experimentally investigated threshold-public-good games where the players move sequentially. In a sense, early players in these games have the opportunity to provide "seed money" that might affect subsequent players' decisions. However, this literature does not focus, as we do, on alternative seed-money choices by the fundraising agency.

Dawes et al. (1986)[5], Rapoport and Eshed-Levy (1989), and Isaac et al. (1989) all find that a promised refund increases overall contributions. Cadsby and Maynes (1999) show that this effect is larger when the threshold is relatively high.[6] When donors can choose not just whether to give, but also how much to give, the experimental evidence indicates that refund rules do have a positive effect on giving. In laboratory experiments, the experimental design imposes all of the underlying assumptions of the theory – for example, that subjects have complete information about everyone's utility functions. In this paper, we ask whether these results continue to obtain in a field setting, where such simplifying assumptions are not guaranteed to hold.

To our knowledge, this is the first study to investigate the effects of seed money or refunds in a real charitable-giving campaign. We have taken advantage of a unique opportunity to address these issues as part of a capital campaign at the University of Central Florida (UCF) to fund a new Center for Environmental Policy Analysis (CEPA). Having received permission to design the fundraising campaign as an experiment, we broke down the full capital campaign into several smaller capital campaigns, each of which would serve as a separate experimental treatment. We solicited contributions from 3000 Central Floridian residents, randomly assigned to six different groups of 500, with each group asked to fund a separate computer for use at CEPA. The results are striking. We show that increased seed money sharply increases both the participation rate of donors and the average gift size received from participating donors. In addition, we find

[5] Dawes et al. (1986) conclude that the difference is not statistically significant, though the sign of the point estimate is consonant with results in previous studies.

[6] Dawes et al. (1986) and Rapoport and Eshed-Levy (1989) examine a binary (all-or-nothing) contribution decision, while Isaac et al. (1989) and Bagnoli and McKee (1991) allow for continuous contribution strategies. Cadsby and Maynes (1999) show that allowing continuous rather than binary contribution strategies generally produces higher levels of threshold public-good provision.

that refunds have a small, positive effect on the gift size, but no effect on the participation rate.

The remainder of our paper is organized as follows. Section 2 presents the experimental design. Section 3 contains the experimental results, while Section 4 discusses the implications for the economic theory of charitable giving. Section 5 concludes.

2. Experimental Design

We designed our solicitations to experimentally compare outcomes between different seed-money amounts and different refund rules. We used three different seed proportion levels: 10%, 33%, or 67% of the $3,000 required to purchase a computer. These proportions were chosen to be as realistic as possible for an actual fundraising campaign (see the anecdotal evidence in footnote 2), while also satisfying the budget constraints we were given for this particular fundraiser. These chosen seed proportions allowed us to express round numbers to potential donors, whom we asked for totals of $2,700, $2,000, and $1,000, respectively, to fund the computer in the 10%, 33%, and 67% treatments.

We also experimented with the use of a refund, which guarantees the individual her money back if the group does not reach the goal.[7] Thus, potential donors were assigned to one of six treatments, each funding a different computer. We refer to our six

[7] We did not experiment with policies regarding the treatment of contributions in excess of the threshold. Rather, for each treatment, we noted that any additional revenues above the threshold would be allocated to fund CEPA's other needs. In the laboratory, this type of "utilization" rule has been found to have the greatest positive effect upon total group contributions when compared to other schemes, such as proportional rebates or "burning" excess contributions so that there is no benefit at all (Marks and Croson (1998)).

treatments as 10, 10R, 33, 33R, 67, and 67R, with the numbers denoting the seed-money proportion, and R denoting the presence of a refund policy.

In carrying out our field experiments, we wished to solicit donors in a way that matched, as closely as possible, the current state of the art in fundraising. With advice from fundraising companies *Donnelley Marketing* (and associates) in Englewood, Colorado and *Caldwell* in Atlanta, Georgia, we followed generally accepted rules believed to maximize overall contributions. First, we purchased the names and addresses of households in the Central Florida area that met two important criteria: 1) annual household income above $70,000, and 2) household was known to have previously given to a charity. We purchased, from *Donnelley Marketing*, the names and home addresses of 3,000 Central Floridians who met both criteria, assigning 500 to each of the six treatments.

Second, we designed an attractive brochure describing the new center and its purpose. Excerpts from the brochure read as follows:

> The primary objective of The *Center for Environmental Policy Analysis* (CEPA) will be to improve the quality of Florida's public and private decisions that have environmental, economic, and resource-use implications. In addition, the CEPA will propose economically efficient solutions to national and international problems ranging from endangered species protection to global issues such as climate change and sustainable development.
>
> The CEPA will accomplish these tasks through an integrated program of communications, publications, and education, designed to lead from awareness through knowledge to action. Through these programs, the CEPA will improve communication between the public, including various governmental branches, and the business community.
>
> The CEPA will also offer courses, seminars, and an opportunity for students to conduct research under the guidance of some of the nation's leading scholars in environmental and resource economics. The CEPA's current

> faculty have served on government advisory bodies, editorial boards, and have been visiting scholars at prominent universities around the globe.

Third, we wrote a letter of solicitation with three main goals in mind: making the letter engaging and easy to read, promoting the benefits of CEPA, and clearly stating the key points of the experimental protocol. In the personalized letter, we noted CEPA's role within the Central Florida community, the total funds required to purchase the computer, the amount of seed money available, the number of solicitations sent out (500 for each treatment), and the refund rule (if any). We also explained that contributions in excess of the amount required for the computer would be used for other purposes at CEPA, noted the tax deductibility of the contribution, and closed the letter with contact information in case the donors had questions.

The text of the solicitation letter was completely identical across treatments, except for the variables that changed from one treatment to another. In treatment 10NR, for example, the first of two crucial sentences read as follows: "We have already obtained funds to cover 10% of the cost for this computer, so we are soliciting donations to cover the remaining $2,700." In treatments where the seed proportion differed from 10%, the 10% and $2,700 numbers were changed appropriately. The second crucial sentence stated: "If we fail to raise the $2,700 from this group of 500 individuals, we will not be able to purchase the computer, but we will use the received funds to cover other operating expenditures of CEPA." The $2,700 number varied with the seed proportion, and in refund treatments this sentence was replaced with: "If we fail to raise the $2,700 from this group of 500 individuals, we will not be able to purchase the computer, so we will refund your donation to you." All other sentences were identical across the six treatments. A composite version of the solicitation letter can be found in Appendix A.

We contracted with *Mail Unlimited* for the actual addressing and mailing of the 3000 solicitation letters. All letters were mailed between November 29 and December 3, 1999, and we requested that donors respond by December 31, 1999. Following the advice of *Caldwell* representatives, we chose this timing in order to take advantage of both Christmas cheer and year-end tax considerations.

Finally, as we have noted in previous studies,[8] field experiments represent an exciting opportunity to test the validity and relevance of the predictions of economic theory. Unlike traditional field studies, we can create exogenous variation in the variables of interest, allowing for relatively novel tests of economic theory. These experiments may not be as "clean" as laboratory experiments, where researchers have even more control: inducing preferences to accord with theoretical assumptions, and excluding other complicating factors. However, field experiments have the virtue of resembling natural economic phenomena as closely as possible. They check the robustness of laboratory results in a natural setting, where the mathematical assumptions of the theory cannot necessarily be guaranteed to hold. This provides a useful middle ground between the sterile, controlled environment of the laboratory and the unruly nature of uncontrolled field data.

3. Results

Table 1 presents descriptive statistics for the six fundraising experiments. The first four rows of the table summarize the experimental design, indicating the seed money

[8] See, for example, Lucking-Reiley (1999), List and Lucking-Reiley (2000), and List (2001).

and the refund policy in each treatment. In total, across the six treatments, we received 183 donation checks, all dated between December 12 and December 31, 1999, from 183 different individuals.[9]

The next five rows of Table 1 show the results of the experiment. The total amount of contributions monotonically increases as we move from left to right across the columns of the table. Most notably, more seed money yields considerably more total contributions. As we move from the 10% treatment to the 67% treatment, total contributions increase by 560%. The two 10% treatments yielded a combined total of only $581, while the two 67% treatments yielded a combined total of $3,260. This result is consistent with the prediction of Andreoni (1998).

To a lesser extent, the use of a refund policy also increases the total contributions, consistent with Bagnoli and Lipman (1989). For example, at the 67% seed level, the refund treatment raised $290 dollars more than did the no-refund treatment. The direction of the effect was the same at all three seed-money levels, though the magnitude of the refund effect is considerably smaller than the magnitude of the seed-money effect. Whereas seed money increases total contributions more than fivefold, refunds increase total contributions by only 21%.[10]

In all, the six fundraisers brought in a total of $5,509 in donation checks.[11] Histograms of the distributions of gift amounts are displayed in Figures 1 to 3. The

[9] Some delays occurred, most likely due to the slowness of the UCF campus mail system, but all of the checks were received by mid-January, 2000.

[10] This figure comes from comparing the total contributions in all three refund treatments to the total contributions in all three no-refund treatments.

[11] We found this level of giving surprisingly high. Mixer (1993) indicates in a fundraising handbook that direct-mail solicitations typically yield a response rate of only about 1% from "cold" lists of potential donors. By contrast, our response rates ranged from 3.4% to 8.4%. The level of giving seemed especially high by comparison with a second field experiment we ran two weeks earlier. Soliciting another 3,000 people from the same mailing list as in the present paper, we attempted to raise money for another Central

largest individual donation received was $250, occurring in the 67R treatment; all other donations were $100 or less. Two of the three refund treatments failed to raise enough money to cover the costs of their respective computers (10R and 33R), so the checks in those treatments were returned to the donors. After refunds, the gain to the Center for Environmental Policy Analysis from the 3,000 solicitations was $4,267.[12]

3.A. Effects of seed money

We now consider statistical measures of the effects of seed money. As we increase the seed money from 10% to 67% of the computer price, the number of received donations more than doubles, from 3.7% to 8.2% of the solicited individuals.[13] The participation rate for the 33% seed level is intermediate, at 6.4%, making the donors' participation rate appear monotonic in the level of seed money. These differences in participation rates are statistically significant at conventional levels. Comparing participation rates at 10% versus 33% seed money, we compute a z-statistic of 2.76 ($p = 0.006$). Comparing 33% to 67% yields a z-statistic of only 1.55 ($p = 0.122$), but comparing 10% to 67% gives a z-statistic of 4.27 ($p < 0.0001$).

As the seed money level increases, we find that not only do more individuals contribute, but the sizes of the gifts become larger as well. At the 10% seed level, the mean donation amount is $15.42. Moving to the 33% seed level, the average amount

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Florida charity, Soldiers to Scholars, which helps decommissioned armed-services veterans go to college and mentor inner-city children. Despite putting up $2,400 in lottery prizes for donors, we managed to receive a total of only $188 in contributions, compared with $5,509 in the present experiment.

[12] Unfortunately, after subtracting expenses for the mailing list, materials, postage, and labor, the net result was a loss of more than $1,000. But this is better than average for a solicitation to a "cold" list of never-before-approached donors. Warner (1975) indicates, for example, that such a direct-mail campaign "normally costs about two dollars for every new dollar raised. The gross profit comes from renewals (people who gave last year and will give again this year when you send them another letter)." Instead of spending two dollars for every dollar raised, our costs were less than $1.30 for every dollar raised.

[13] These figures are computed by pooling across the refund and no-refund treatments at each seed-money level.

contributed increases to $26.12, a statistically significant difference (t = 3.27, p = 0.001). At the 67% seed level, the average donation amount increases again, to $39.87, itself a statistically significant increase over the 33% seed level (t = 3.33, p = 0.001). The difference of nearly $25 between the mean donation at a 10% seed and the mean donation at a 67% seed is, of course, also highly significant (t = 6.37, p < 0.0001).

We find it remarkable that both the participation rate and the average gift size are clearly increasing in the level of seed money. One might have expected the increased numbers of donations to be comprised mainly of small dollar amounts, from people who might not have contributed at all in a low-participation treatment. In fact, however, a comparison of Figures 1 to 3 indicates that the absolute number of small donations actually decreases as the seed money increases. Though there were 21 small gifts (under $10 each) at the 10% seed level and 19 such gifts at the 33% seed level, there were only 6 small gifts at the 67% seed level. By contrast, the number of large gifts (over $20 each) increases tremendously, from 13 to 36 to 69, as the amount of seed money increases from one treatment to the next.

3.B. Refund policy

The refund treatment variable does not appear to affect donors' participation rate. At the 10% seed level, the refund treatment generates a slightly higher participation rate than does the no-refund treatment (4.0% versus 3.4%), but the direction of this effect is reversed at the higher seed levels. Furthermore, none of the three differences are significantly different from zero at conventional levels (10 vs. 10R: z = 0.50; 33 vs. 33R: z = -0.26; 67 vs. 67R: z = -0.23).

However, the refund variable does seem to have a positive effect on gift size. Figures 1-3 reveal that the distributions of gift sizes in the refund treatments have larger upper tails than the distributions for the corresponding no-refund treatments. The effect on the mean is largest at the 10% seed level (Figure 1), where introducing a refund increases the average gift size by more than half, from $11.88 to $18.95. This effect is statistically significant at the 10% level (t = 1.83, p=0.068).[14] The other two seed-money levels also show positive effects of the refund, though not statistically significant: an increase of $3.44 in the mean contribution at the 33% seed level (t = 0.66, p = 0.512), and an increase of $9.02 at the 67% seed level (t = 1.37, p = 0.171). But since these three tests of the refund variable come from three independent samples, we can combine the three t-statistics into an aggregate test statistic[15] of t = 2.23 (p=0.026). We conclude that in aggregate, the refund variable does have a positive, statistically significant effect on the mean gift size.[16]

4. Discussion

In this section, we evaluate current theoretical models of charitable fundraising in the light of our data. We describe both successes and failures of the theoretical literature,

[14] We report large-sample (asymptotic) statistics, since this frees us of the need to make assumptions about population normality or equality of population variances. Our sample sizes range from 17 to 42, at which size the Central Limit Theorem has considerable force in guaranteeing approximate normality of our test statistics. Using a t-distribution instead of a standard normal distribution would inflate our p-values only slightly – for example, using the t distribution would change the p-value reported above from 0.068 to 0.072.

[15] We could simply pool all three data sets, but this would give a lower-powered aggregate test, because it would ignore the differences in the mean and variance of contributions across seed-money levels. Instead, we choose to aggregate the three t-statistics directly. Recall that the sum of three independent normal variables has a normal distribution with mean equal to the sum of the three means, and variance equal to the sum of the three variances. Since our three t-statistics are independent and standard-normal, their sum should have mean zero and variance 3 under the null hypothesis that the refund variable has no effect. Our aggregate t-statistic is therefore the sum of the three t-statistics, divided by the square root of 3.

[16] By contrast, an aggregate test statistic for the effect of the refund variable on the participation rate yields no statistical significance. The test statistic is very small (z = 0.008), unsurprising since the point estimates have different signs in different treatments.

and discuss implications of our results both for theorists and for fundraising practitioners. First we consider the effects of seed money, and then turn to the effects of a refund policy.

4.A. Seed Money

Our empirical findings concerning seed money are broadly consistent with the theoretical prediction of Andreoni (1998). He predicts that seed money may increase the amount of public-good provision in a charitable fundraiser, from zero to some positive equilibrium level G* (greater than or equal to the threshold level). This main comparative-static prediction is certainly borne out in our data, where we find average total contributions to be $291 with a $300 seed, $834 with a $1,000 seed, and $1,630 with a $2,000 seed.

A few other key features of the experimental data, however, cannot be explained by Andreoni's theory. The theory indicates that there exists a critical seed-money level τ above which the equilibrium at zero ceases to exist, and only the equilibrium at G* remains. In particular, at the critical seed-money level τ there should be a discrete increase in public-good provision, from zero to some amount greater than or equal to the $3,000 threshold level. We do indeed see total public-good provision at well over $3,000 with a $2,000 seed. However, at lower seed levels we see contributions strictly above zero and strictly below the threshold amount, a result not predicted by the theory.

This finding might be explained in part by the fact that a charity may choose, as we did, to put contributions to some lesser purpose in case the threshold is not met (when no refund is offered). Such benefits, while missing from the theoretical model, might help explain the presence of below-threshold giving (however, it is difficult to see how this could explain below-threshold contributions in the refund treatment). It is also possible that a "warm glow" of giving, as in Andreoni (1989), could help explain below-threshold giving, although it is not clear how much "warm glow" givers might obtain in cases where the threshold public good fails to be provided.

A related puzzle is that observed contributions appear to increase continuously in the seed-money amount. Andreoni's theory, if taken literally, predicts that contributions in our experiment should jump discretely from an equilibrium of zero to an equilibrium of at least $3,000, but the experiment shows levels of giving rising continuously as the seed money rises from 10% to 33% to 67%.

In this regard, a potential improvement to the theory would be to relax Andreoni's simplifying assumption of complete information. In his model, agents have complete information about each other's utility functions, and thus can predict others' Nash equilibrium gift amounts with certainty. In reality, potential donors may have uncertain ideas about the magnitudes that other donors are likely to give, so donors may be playing an incomplete-information game. That is, donors may be making probabilistic assessments of their own likely role in meeting the threshold to provide the public good. Note, for example, that if agents were able to forecast perfectly the total amount given, they would not give at all in the 10% seed-money treatment, because total contributions fell well short (only 20%) of the $3,000 goal.[17] Introducing incomplete information

[17] Since donations in the no-refund treatment could be used for other purposes at CEPA in the case that a particular computer did not get funded, it is possible that these individuals were giving primarily towards non-threshold purposes at CEPA. In this case, however, such individuals would not be affected by an increase in the seed money amount, and this explanation then fails to explain giving in the 33% seed treatment, where total contributions still fell more than $1,000 short of the goal.

might help explain the observation of contributions increasing continuously in the seed-money amount.[18]

A third puzzle is that while Andreoni's theory predicts an increase from zero participation to some positive equilibrium amount of participation, it does not predict an increase in gift size by those contributing. Future theory might attempt to explain both the increase in participation and the shift in the distribution of gift sizes found in our data. One possibility would be to introduce a cost of participating into the theoretical models, since there is clearly some time cost of reading and responding to one's mail solicitations from charities. Such an extension might produce insights on the separate issues of participation rates and contribution amounts.

Most problematic for Andreoni's theory is the fact that in our experiment, seed money has similar effects both in the presence and in the absence of a refund policy. Andreoni proposes that seed money influences contributions by eliminating the danger of a zero-giving equilibrium. If this were the case, then seed money should be irrelevant in the presence of a refund (which itself rules out the zero-giving equilibrium).[19] Though Andreoni's model correctly predicts the positive effect of seed money on contributions, it may be proposing the wrong explanation for this effect.

Vesterlund (1999) offers a promising alternative theory for why announced seed-money amounts should increase giving. She models donors as being uncertain about the quality of the charity, and shows that seed contributions may serve as signals of quality to

[18] Menezes et al. (2001) provide a theory of threshold-public-good provision with incomplete information about other agents' preferences. While they do not address the issue of seed money, they do address the issue of refunds. They show that refunds produce more efficient outcomes, with higher probabilities of reaching the threshold, and that the effects of a refund are in some sense stronger in a model of incomplete information than in a model of complete information.

later donors.[20] Her simple model has only two possible types of charity: high-quality or low-quality, and only two donors (leader and follower). This discreteness renders her model incapable of explaining the continuous response of donations to seed-money levels. However, it seems plausible that a model with more than two possible qualities of charitable organizations might be able to predict the observed increasing quantities of contributions with each successive increase in seed money levels.

Another explanation is that if social comparisons are important[21], the seed might serve as a signal of "the right amount to give,"[22] and this would provide another reason for contributions to increase in the level of the seed money. Alternatively, it is not readily apparent how potential donors should interpret such a signal; high seed money might equally well indicate that with a lower goal to be reached, each individual donor's "fair share" declines. Perhaps future experiments will be able to distinguish between the different potential explanations.

For fundraising practitioners, our results reinforce the idea that seed money may have substantial benefits, and support the conventional wisdom that fundraisers should raise a significant portion of the fundraising goal in an initial stage of private fundraising, before the public campaign starts. The optimal amount of seed money remains an open

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[19] Pecorino and Temimi (2001) similarly note that "if refunds are allowed, there is no need for seed money." However, they also observe that seed money might be useful in practice for covering the administrative costs of processing a refund.

[20] In our application, the school itself is serving as the "leader," indicating the quality of the charity by demonstrating its ongoing commitment to the new research center.

[21] Harbaugh (1998a, 1998b), for example, presents evidence on the "prestige motive" for charitable giving.

[22] For example, Cooper and Stockman (2000) demonstrate that in sequential public-good games, subjects may decide not to give, even when it is a dominant strategy to do so, when previous players have failed to give, apparently because of fairness considerations.

empirical question, though in our application we can conclude that the optimal amount is greater than 33% of the overall fundraising goal.[23]

4.B. Refunds

As predicted by Bagnoli and Lipman (1989), we find that refunds do indeed increase charitable contributions. These field results are consistent with laboratory results due to Rapoport and Eshed-Levy (1989), Isaac et al. (1989), and Cadsby and Maynes (1999). Notably, however, we find that the effect of refunds is considerably smaller than that of seed money.[24]

One important difference between our field experiment and laboratory public-good experiments makes it intuitively clear why refunds would have a relatively small effect in the field experiment. In laboratory settings, contributions that fail to reach the threshold level are typically assumed to be completely wasted unless they are refunded. By contrast, in our field experiment, we inform donors that in the event the threshold is not reached, we will put the money to some other use at the Center for Environmental Policy Analysis.[25] This alternative use can be presumed to be less valuable than that of the computer for which we specifically solicited funds, but one might also presume that it is a considerably better outcome than burning the money (or returning it to the laboratory experimenter). Given this relatively positive use of non-refunded donations, the fact that

[23] Contributions are lowest at 10% seed money, higher at 33%, and highest at 67%. We should therefore expect the optimum either to be between 33% and 67%, or above 67%. Note that this optimality discussion assumes that others donate the seed money. If the fundraiser had to put up the seed money himself, the additional contributions from 10% to 67% seed money do not cover the cost of the additional seed dollars.

[24] Pecorino and Temimi (2001) present an example showing how refunds (with administrative costs covered by seed money) may provide an order of magnitude greater "bang for the buck" than would seed money without refunds. Our results, that seed money has a much greater effect on contributions than do refunds, suggest that their example may not have much empirical relevance. (Admittedly, our experiment was not designed to test their theory directly, as we do not include a treatment with zero seed money.)

[25] Perhaps this is a realistic assumption for other real-world charities as well, since they might try again to meet the threshold in a later round of fundraising advertised to a new set of donors.

we still find a significant effect of refunds is rather impressive, and represents a nice confirmation of the robustness of a laboratory result in the field.

Although our results confirm Bagnoli and Lipman's main comparative-static prediction about refunds, they also point out directions for extensions to the theory. First, Bagnoli and Lipman's model of threshold public-good provision predicts that implementing a refund policy may move the outcome from an inefficient level (not providing the public good) to an efficient one (providing it). Experimentally, however, the refund treatment never actually makes a difference in whether the public good is provided. At 10% or 33% seed money, the public good fails to be provided, both with and without the refund. At 67% seed money, the public good is provided, both with and without the refund. Thus, the refund does increase contributions as predicted by the model, but it does not do so in the "pivotal" manner predicted by the theory. When the refund does not make the difference between provision and no provision, it has no clear theoretical incentive effects on giving in the model. In a sense, this is an impressive victory for the model–even when its conditions are not met, it still has predictive power. On the other hand, it would be even better to have the theory match the observations more accurately. Perhaps this goal could be accomplished by relaxing one of the simplifying assumptions of the model, such as the complete-information assumption.

A second area for theoretical development relates to participation rates and individual gift sizes. Bagnoli and Lipman's theory is agnostic on the question of participation rates. Indeed, many different sets of individual contributions represent equilibria to their game, as long as the sum of the contribution amounts equals the threshold cost of the public good. The total could, in principle, come either from a small number of people making large gifts, or a large number of people making small gifts. But empirically, we see strong regularities. Refunds have no effect on participation rates, but a positive effect on the sizes of the contributions given by those participating. A theory capable of predicting these two separate results would be a useful addition to the charitable-giving literature.

For fundraising practitioners, we note that even though the refund policy increases the size of individual contributions, the prescription for optimal fundraising is not entirely clear. In this case, the charity actually received greater usable capital from the three no-refund treatments than from the three equivalent refund treatments. Because checks had to be returned to donors in two of the three refund treatments, the total capital raised in the refund treatments was $1,775, compared with $2,492 in the three no-refund treatments. Alternatively, when the seed money amount was large enough to guarantee that a refund would be unnecessary, the refund policy encouraged almost $300 more in contributions. Fundraisers need to take account of both factors when deciding on a policy for their capital campaigns; a fundraiser anticipating the possibility of a low response rate might well prefer not to use a refund.

5. Conclusions

In this study, we have examined the impact of seed money and of refunds on charitable giving in a field experiment. We solicited contributions via direct mail from 3000 Central Florida residents, randomly divided into six different treatments. We find that total contributions increase with the amount of seed money available, as predicted by Andreoni (1998). In addition, consistent with Bagnoli and Lipman (1989), we find that refunds also increase total contributions, though this effect is considerably smaller than the effect of seed money. We also note that while the main comparative-static results of the two theories are confirmed, we present other empirical results that are at odds with theory, suggesting directions for enhancement of theoretical models in this literature.

Our results are also of interest for fundraising practitioners. In particular, our data show contributions to be monotonically increasing in seed-money amounts, but we would not expect this relationship to continue to hold for very large seed amounts. If the seed proportion approached 100%, we would expect the response to become backward-bending, with contributions eventually becoming *lower* as the amount of seed money increased.[26] Finally, we note that field experiments are a promising methodology for other aspects of charitable giving, such as matching-grant policies and rebate policies for excess contributions. Such experiments can provide valuable insights about the relevance of theoretical models to the actual field situations they purport to explain.

[26] Similarly, we do not know what would happen empirically if the seed money were reduced to zero. While we are tempted to assume that contributions would be lower at 0% seed money than at 10% seed money, it is possible that the response would be non-monotonic. In particular, if donors see 10% as "too low," indicating a lack of serious effort by the fundraisers, then perhaps the absence of any seed money would generate more contributions. We see this as an interesting topic for future research.

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Appendix A. Solicitation Letter.

Dear Ms. Doe,

As you are probably aware, Florida's recent rapid economic growth and development comes with potential environmental costs. Careful public policies are needed to protect local treasures such as the Everglades and the Florida panther while maintaining sustainable economic growth. To ensure that local decisions are made in the long-term interests of Florida citizens, we at the University of Central Florida are beginning a Center for Environmental Policy Analysis (CEPA). CEPA is a proposed research center to examine local, state, and global environmental issues such as air and water pollution, endangered species protection, and biodiversity enhancement. We believe that careful research will lead to solutions to important environmental problems.

CEPA will be housed in the Department of Economics in the College of Business. Although CEPA has some seed money available, we cannot begin operating until we have funded the equipment required for our researchers. Consequently, we are writing to ask for your help in creating CEPA at the University of Central Florida. We would like you to consider making a contribution towards the purchase of a $3,000 computer to be used by researchers at CEPA. We have already obtained funds to cover [10%] [33%] [67%] of the cost for this computer, so we are soliciting donations to cover the remaining [$2,700] [$2,000] [$1,000].

You are part of a group of 500 individuals to whom we are writing to fund this particular purchase. If we fail to raise the [$2,700] [$2,000] [$1,000] from this group of 500 individuals, we will not be able to purchase the computer, [but we will use the received funds to cover other operating expenditures of CEPA] [so we will refund your donation to you]. If we do raise at least [$2,700] [$2,000] [$1,000], we will purchase the computer and use any additional revenues above this threshold to fund CEPA’s other needs. In either case, you will receive a note from us to let you know the status of your donation.

I hope you will join us in our commitment to sensible environmental policy by making a financial donation to CEPA by December 31, 1999. All donations are tax deductible. Please complete the enclosed contribution form and make checks payable to "CEPA.” We have enclosed a postage-paid return envelope for your convenience. For further information about CEPA, please see the enclosed brochure. Please contact me if you have any questions about this fundraising campaign. Thank you for your time.

Table 1. Results of the field experiment.

	10	10R	33	33R	67	67R
Number of solicitations mailed	500	500	500	500	500	500
Seed money (%)	10%	10%	33%	33%	67%	67%
Seed money ($)	$300	$300	$1,000	$1,000	$2,000	$2,000
Refund?	N	Y	N	Y	N	Y
Number of contributions	17	20	33	31	42	40
Participation rate	3.4%	4.0%	6.6%	6.2%	8.4%	8.0%
Total contributions	$202	$379	$805	$863	$1,485	$1,775
Mean amount given	$11.88	$18.95	$24.39	$27.84	$35.36	$44.38
Std error of mean amount	$2.27	$3.13	$2.50	$4.59	$2.26	$6.19

Figure 1. Contributions with 10% seed money

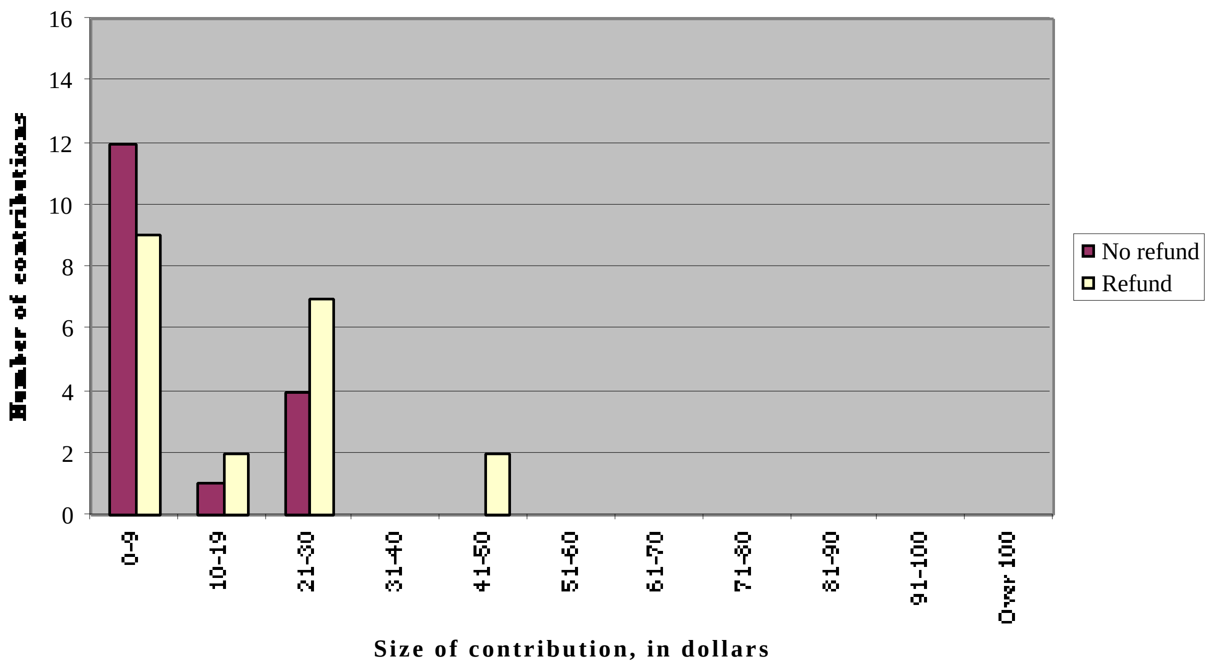

Figure 2. Contributions with 33% seed money

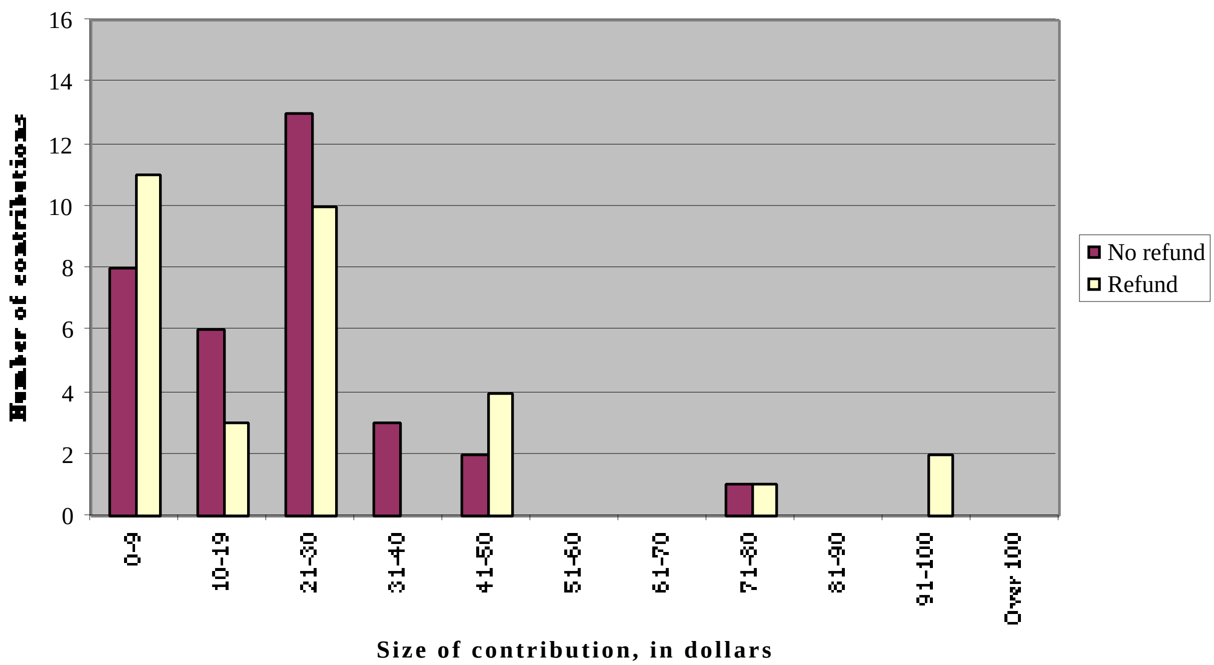

Figure 3. Contributions with 67% seed money