Using Experimental Methods to Understand Why and How We Give to Charity

By Lise Vesterlund

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1 Introduction

Individuals who are concerned for a nonprofit's mission benefit from activities that increase the nonprofit's output. As these benefits are enjoyed by anyone with similar concerns, donations are both non-rival and non-exclusive, and they can be modeled as voluntary contributions to public goods. Noting the inherent free-rider problem, much theoretical and applied research has been done to understand how voluntary provision of public goods nonetheless is secured, and how it can be improved. The objective of this chapter is to review the literature that uses experimental methods to shed light on voluntary giving.

The chapter builds on Ledyard's highly influential review of public good experiments in the first volume of the handbook (Handbook of Experimental Economics, ed. by Kagel and Roth, Chapter 2, Princeton, Princeton University Press, 1995). Recognizing the substantial work on the topic, Ledyard limited his review to the linear public good game commonly examined in the laboratory, and he emphasized research on factors that trigger cooperation in that environment. The literature on voluntary giving has grown substantially since the first volume. Much work has been done to further determine the factors that drive cooperation, and many new questions have emerged. The essential role of heterogeneity in beliefs and preferences has come to light, and spurred by Nobel Prize Winner Elinor Ostrom, there has been a growing interest in the mechanisms groups use to insure that public goods are provided. Particularly significant have been studies examining the effect on giving of endogenous group formation, and of punishments and rewards more generally.[1] Another strand of the literature has focused directly on voluntary contributions to charities and non-profits. This literature investigates both the motives for giving and the mechanisms non-profits use to raise funds. In contrast to the literature on group-selected mechanisms, the assumption is that the contribution mechanism is selected by those soliciting funds.

Just as it was not possible for Ledyard to cover the entire literature on public good experiments, it is not possible for this review to do justice to the large body of research that has been conducted since the

[1] See e.g., Ostrom, Walker, and Gardner (1992), Fehr and Gächter (2000), Sefton, Shupp, and Walker (2007), Ehrhart and Keser (1999), Page, Putterman, and Unel (2005), Cinyabuguma, Page, and Putterman (2005), and Ahn, Isaac, and Salmon (2008, 2009).

first handbook.[2] With the literature on cooperation in the linear public good game being relatively well surveyed, I focus instead on research examining contributions to non-profits.[3]

I first discuss recent work on motives for giving. In doing so it becomes clear that researchers have expanded the set of giving motives considered, and the environments used to identify these. The objective is no longer to determine whether individuals are selfish or cooperative, but rather whether giving can be viewed as rational, and if so what set of preferences are consistent with the observed pattern of giving. To address these questions researchers have moved beyond the linear public good environments initially examined and have developed innovative designs that better delineate between the alternative models of giving. In building on the charitable giving literature the review centers on studies that distinguish between the extent to which donations are motivated by a concern for others or by a concern for self.

Following the review on motives for giving I proceed to the literature on fundraising mechanisms. While the literature on mechanism design shows that optimal provision of public goods in some cases can be achieved through the correct use of taxes and penalties, it is unlikely that a fundraiser will or can select a donation mechanism that secures comparable outcomes. Fundraisers differ from the classic social planner both in their objective and in the tools that are available to them. Rather than maximizing aggregate welfare the fundraiser's objective is assumed to be one of contribution maximization, and the tools under consideration are limited to those that secure voluntary participation by donors.[4] The goal of research in this area has been to determine whether and why the mechanisms fundraisers employ are successful in raising contributions. For example, I report on studies that investigate why fundraisers announce past contributions, why they tend to rely on lotteries rather than the theoretically superior all-pay auction, and why they tend to match rather than rebate contributions.

[2] An indication of the substantial interest in this topic is that Ledyard's handbook chapter has close to 3,000 Google citations.

[3] For example, examining the classic linear public good game, Zelmer (2003) presents a meta study of the factors that influence cooperation, Croson (2007, 2008), Gächter and Thöni (2007) and Holt and Laury (2008) review the literature on behavior and motives for giving, finally, Chaudhuri (2011) reviews the effect on giving of conditional cooperation, punishments, communication, and endogenous group formation. The examination of group mechanisms is also closely related to the growing literature on political economy, see Palfrey (this volume). For related reviews of the charitable giving sector see Andreoni (2008) and List (2011).

[4] Contribution maximization may result from a concern for the non-profit's output or from a concern for personal employment and professional achievement as a fundraiser.

The two strands of the literature reviewed; motives for giving and mechanisms used to solicit gifts can be seen as representing, respectively, the supply and demand side of the market for voluntary contributions. Experimental investigations of either side reveal results reflective of the interaction between the two.

As the aim increasingly is to understand behavior in the market for charitable donations, researchers have begun to examine environments that better capture the market of interest, be it more sophisticated laboratory studies or the field itself. Much research is now done by examining field environments with public good characteristics. A consequence of this field-oriented shift, both in the questions and environments that are being examined, is that experimental studies on public goods increasingly are helping to form the debate on charitable giving.

2 Preferences for Giving

Practically every paper on charitable giving begins by noting that the nonprofit sector constitutes a significant portion of the US economy. According to the Center on Philanthropy Panel Study (COPPS) 66.1 percent of all households contributed an average of $2,385 to non-profits in 2008. While more than half of these donations are directed to or through the individual's house of worship, it is still the case that substantial contributions are made to complete strangers or organizations that cannot reciprocate the generosity. Much of the literature focuses on understanding what motivates this latter type of unconditional transfer. That is the emphasis is on explaining why people give their money to activities that, while benefitting others, provide no transparent material benefit to the individuals themselves.

Information on donor's beliefs on the contributions-by-others is needed to infer an individual's motive for giving. It is therefore difficult to determine motives from data on actual donations, be it from surveys, tax returns or organizational level data. An advantage of laboratory experiments and experimental techniques in general is that they permit the manipulation of information needed to infer motives. This section will discuss the many designs researchers have used to determine why people give.

Prior to reviewing the literature it is beneficial to remind ourselves how donations to public goods are modeled, and in particular how this framework relates to the experimental designs commonly used to study giving in the laboratory. In the standard model of voluntary giving n individuals are assumed to care about private consumption x_i and the total provision of a public good, G. Individual i's contribution

to the public good is denoted by g_i, and the provision of the public good is the sum of these, i.e., $G = \sum_{i=1}^{n} g_i$. With consumption of the public good being non-rival and non-exclusive, everyone benefits from the total provision of the public good. Denoting *i*'s income by w_i and normalizing prices such that $p_G = p_x = 1$, *i*'s budget constraint is given by $g_i + x_i \leq w_i$. Representing *i*'s preferences by a continuous and strictly quasi-concave function $U_i(x_i, G)$, *i's* preferred provision level is given by the continuous demand function:

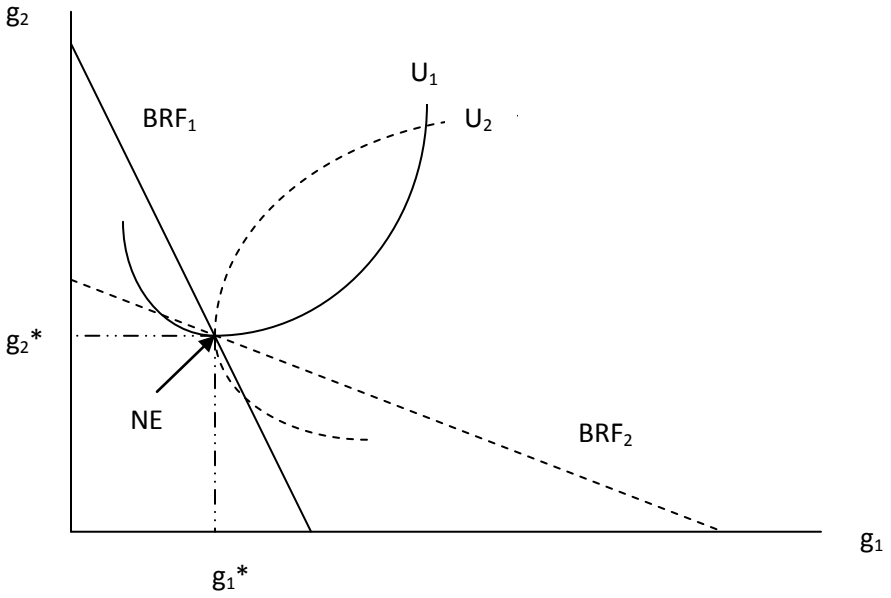
$$G^* = q_i(w_i + G_{-i}) \qquad (1)$$

where $G_{-i} = \sum_{j \neq i} g_j$ is the amount given by others to the public good. The demand function $q_i(.)$ is simply the individual's Engel curve for the public good. As shown by Bergstrom, Blume and Varian (1986) there exists a unique equilibrium $(g_1^*, g_2^*, .., g_n^*)$ of this game when both the public and the private good are normal goods, where *i*'s gift is given by

$$g_i^* = \max\{0, -G_{-i} + q_i(w_i + G_{-i})\} \qquad (2)$$

Since a donor does not consider the effect her contribution has on similarly motivated individuals, the standard free-rider problem arises and equilibrium contributions are inefficiently low. This is easily seen in the two-person example shown in Figure 1 below. Contributions by individual 1 and 2 are measured on the horizontal and vertical axis, respectively, and the intersection of the two downward sloping best response functions, BRF_1 and BRF_2, demonstrates the resulting Nash equilibrium (g_1^*, g_2^*). Looking at the individuals' indifference curves through (g_1^*, g_2^*) and recalling that utility is strictly increasing in giving-by-others, it is apparent that there exist contributions which are preferred by both contributors, and result in greater overall provision of the public good. That is the equilibrium provision of the public good $(G^* = g_1^* + g_2^*)$ is inefficiently low.

Figure 1: Voluntary Contribution Equilibrium



This voluntary public good model is used for modeling contributions to non-profits and to charities. When donating to a charity the motive for giving is thought to be a concern for the well-being of those who receive services from the charity, be it children securing an education, the hungry getting food, the homeless receiving shelter, etc. The motive for giving is one of altruism, with the return from giving arising from the effect donations have on the wellbeing of the recipients.[5] As the benefit results from the impact of the gift, rather than the gift itself, an individual's donation will benefit the recipient and the donor, as well as anyone else who is concerned for the recipient's well-being. Thus the recipient's well-being is a public good in an altruistically inclined population (Becker, 1974). Equivalently when donating to a broader set of non-profits an altruist is someone who cares about the output that results from the donation.

In studying giving in the laboratory most research centers on examining behavior in the dictator game and in the linear public good game. In the dictator game a decision maker is simply given an endowment and asked how much of the endowment she would like to give to an anonymous recipient. In the classic set up the recipient is another participant in the experiment (e.g., Forsythe et al, 1994), later studies look at transfers to recipients outside the laboratory (e.g., Fong and Luttmer, 2009), or let an existing

[5] Philosopher Thomas Nagel notes "by altruism I mean not abject self-sacrifice, but merely a willingness to act in the consideration of the interests of other persons, without the need of ulterior motives" (1970, p. 79). Dawes and Thaler (1988) argue that altruism is 'taking pleasure in other's pleasure.'

non-profit replace the role of the recipient (e.g., Eckel and Grossman, 2006). In capturing the response to a request to give to others, the dictator game has primarily been used to characterize preferences for giving. [6] However with only one decision maker the dictator game does not capture how the incentive to free ride affects the interaction between potential donors.

The linear public good game (frequently referred to as the voluntary contribution mechanism or VCM) by Isaac et al. (1984) provides a strategic environment where it is possible to study the interaction between multiple donors. Participants in the VCM are paired in groups of n people and each is given an endowment w_i which they must distribute between a private and a public account. Payoffs are linear, with the private account generating an individual return of r, and the public account generating a return of m to every member of the group. Thus an allocation to the public account, g_i, constitutes a contribution to a public good. The individual return from giving, m/r, is referred to as the marginal per capita return (MPCR), and the individual's payoff from contributing g_i equals

$$\pi_i = r(w_i - g_i) + m\sum_{i=1}^{n} g_i$$

Thus the individual's return from the public good is $m\sum_{i=1}^{n} g_i$. Contributing to the public account generates a collective benefit of $(n-1)m$ to the other group members and costs the individual $r-m$. To study a social dilemma it is assumed that $\frac{1}{n} < \frac{m}{r} < 1$, such that it is socially optimal to give, yet costly for the individual to do so. Compared to the public good game demonstrated in Figure 1 the payoffs of the linear VCM aims to induce preferences where the actions available to the individual lie strictly in the core. That is, the dominant strategy and the efficient outcome are at the boundary of the strategy space. The equilibrium prediction being zero provision $(g_1^*, g_2^*, .., g_n^*) = (0,0,..,0)$ and the efficient outcome being full provision $(g_1^*, g_2^*, .., g_n^*) = (w_1, w_2, .., w_n)$.[7]

[6] A common critique of the dictator game is that the decisions do not mirror those seen outside of the laboratory. It is argued that individuals outside of the laboratory rarely make transfers to random strangers. This argument seems to miss the point that dictator games are meant to capture environments where someone is asked to give a transfer (or favor) to a random stranger. A positive response to such directed requests are not uncommon in the field, and the critique that the dictator game has no parallel outside of the lab seems exagerated.

[7] Recently economists have begun to also study contributions in non-linear public good games where the Nash equilibrium and Pareto efficient outcomes are interior to the strategy space. Interior equilibria have traditionally been secured by making the return to either the private or the public good non-linear. In reviewing the literature Holt and Laury (2008) conclude that neither design results in equilibrium play. However examining a 2-person and 4-person public good game with piece-wise linear returns Bracha, Menietti, and Vesterlund (2011) and Recalde, Riedl, and Vesterlund (2013) document a very high frequency of equilibrium play.

Common for the dictator and public good game is that individuals who aim to maximize own earnings are predicted to make zero transfers. Experimental investigations of both games reveal behavior different from this prediction. In the classic dictator game individuals contribute on average 25 percent of their initial endowment to a random participant (see e.g., Forsythe et al., 1994). In the VCM contributions typically start off around 50 percent of endowments, then decrease with repetition, but remain substantial even when participants have had time to gain experience in the game (see e.g., Isaac and Walker, 1988; and Ledyard, 1995; Holt and Laury, 2008; and Croson, 2007, 2008, for reviews).

Researchers have used both the dictator and the public good game to shed light on what motivates charitable giving. Contributions in both environments can be seen as evidence that individuals are concerned for the welfare of others. Thus by manipulating the incentives to give we can determine how certain parameters and mechanisms influence contributions to others. I first review the literature asking whether giving can be viewed as rational, in the sense that individuals have well-behaved preferences over payoff-to-self and payoff-to-others. I then present a series of studies examining both the precise motives for giving and the role error plays in these environments. I also discuss a recent literature which questions the extent to which contributions observed in the laboratory or the field can be seen as evidence of an underlying motive for giving, or rather as an attempt to signal a particular motive for giving, be it as a signal to one-self or to others (self-signaling versus social-signaling). I conclude the section by trying to reconcile these different interpretations of the data on giving.

2.1. Is Giving Rational?

To draw inference on motives researchers have asked first whether contributions in the laboratory can be viewed as intentional and, second, whether it is rational. Unfortunately the prediction of zero giving in both the dictator and linear public good (VCM) games implies that positive contributions need not be deliberate. Mistakes made by payoff-maximizing participants can only result in positive transfers which may be falsely viewed as evidence of other regarding behavior. The finding that giving in the VCM decreases with experience suggests that errors partially account for the transfers initially seen in these settings. The early work on intentions was reviewed by Ledyard (1995) and suggests that while mistakes play a large role, a sizable share of giving is intentional. [8]

[8] Andreoni (1995) presents an early examination of intentionality. He compares decisions in the linear VCM to those in a comparable game where participants are paid based on relative rather than absolute performance. While the choice set and earnings are comparable in the two games, only confusion can explain giving in the

The seminal work by Andreoni and Miller (2002) proceeds by asking whether giving can be viewed as rational. That is, is behavior consistent with utility maximization and can it be captured by a well-behaved preference ordering. To test if behavior follows the neoclassical principles of revealed preference Andreoni and Miller give participants several opportunities to transfer part of an endowment at varying prices to an anonymous partner. Participants in this extended dictator game are presented with eight (or eleven) budgets of the following format "Divide 60 tokens: *Hold*_____ at 1 point each, and *Pass*_____ at 2 points each" (that is, the endowment is 60 tokens, a token held is worth 1 point to the decision maker, and a token passed is worth 2 points to the anonymous partner). Securing a large number of intersections between the budgets it is then determined if a participant's choices satisfy the generalized axiom of revealed preference (GARP). Surprisingly 98 percent of participants make choices that are consistent with utility maximization, hence the observed transfers can be generated by a continuous, convex and monotonic utility function over payoff-to-self and payoff-to-others. To assess the power of the test Andreoni and Miller (2002) ask how difficult it would be to violate GARP in the examined environment. They rely on both an ex ante and ex post evaluation. The ex ante test is that of Bronars (1987) and determines how likely it is for a synthetic individual, who randomly selects an allocation on any given budget, to violate the axioms of revealed preference. Relying on uniform draws the test does not take into account the participants' transfers in the study. As an ex post test they therefore look at the violations that result when a synthetic individual draws from the set of transfers selected by participants in the study. They find that the vast majority of these ex ante and ex post synthetic individuals violate GARP and conclude that contributions in the dictator game can be viewed as rational.[9]

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second zero-sum game. While there is evidence of both confusion and intentional giving, Andreoni concludes that about half of the contributions in the linear VCM are made by individuals who understand that free riding is an option but nonetheless opt to contribute (see Anderson, Goeree and Holt (1998) and Houser and Kurzban (2002) for comments on the ability to draw inference on confusion in this environment). Examining a finitely repeated VCM Houser and Kurzban (2002) follow an approach similar to Andreoni (1995), however they compare contributions that result when the other members of an individual's group are human versus when they are computers. Setting the 'computer' contributions at levels comparable to that seen in the human interaction Houser and Kurzban (2002) conclude that half of the contributions in the finitely repeated VCM can be attributed to confusion (see also Ferraro and Vossler, 2010). For further investigations of confusion versus intentional play in the repeated VCM see e.g., Isaac and Walker (1988), Andreoni (1988), Croson (1996), Andreoni and Croson (2008), Keser (2000), and Muller, Sefton, Steinberg and Vesterlund (2008). Finally Arifovic and Ledyard (2011) merge their individual evolutionary learning model with heterogeneous other-regarding preferences to capture the behavioral patterns commonly seen in the repeated VCM.

[9] See Andreoni, Gillen and Harbaugh (2011) for a discussion of the power of revealed preference tests.

Fisman, Kariv and Markovits (2007) replicate the results of Andreoni and Miller when using a graphical interface to elicit choices over a substantially larger set of budgets. Each participant in their experiment is asked to make decisions over 50 randomly selected budgets. For each case the participant is given a graphical representation of a budget over payoffs to self and payoffs to an anonymous partner, they are then asked to point and click on a preferred allocation in the budget set. Similar to Andreoni and Miller choices are by and large shown to be consistent with utility maximization. First, half of the participants make choices that fully exhaust the budget, with the number increasing to 84 percent when allowing for a 5 token margin.[10] Second, while the number of violations of GARP increases relative to Andreoni and Miller, this increase is to be expected given the larger number of budgets. Importantly the observed violations become consistent with utility maximization if one allows for only minor adjustments in the participant's budgets.[11] Fisman et al. also examines the ex ante Bronars' test and find that participants make many fewer mistakes than predicted for synthetic individuals who randomize among the allocations on the budget set. Similar to Andreoni and Miller (2002) they conclude that contributions are consistent with a well-behaved utility function.

Evidence suggests that these results also hold when there is more than one recipient. Andreoni (2007) finds that with two rather than one recipient, it continues to be the case that there are only a few GARP violations. Furthermore doubling the number of recipients increases total giving, but does not double it, thus the average contribution to an individual decreases as the size of the group grows. Fisman, Kariv and Markovits (2007) also examine transfers to two recipients. They find only a marginal increase in total giving relative to the one-recipient case.[12] As Andreoni (2007) they find few and small violations of GARP, and conclude that transfers are consistent with utility maximization.

In sum laboratory studies find that transfers respond to changes in the environment in a manner which is consistent with the individual maximizing utility over payoff-to-self and payoff-to-others.[13] As choices can be seen as intentional and rational it is thus reasonable to ask what these preferences look like, and what motivates charitable giving more broadly.

[10] Individual endowments range between 50 to 100 tokens, thus the margin of error is between 5% and 10% of the individual's budget

[11] That is Afriat's (1972) critical cost efficiency index is close to 1.

[12] This insensitivity to scope is similar to that seen in the contingent valuation literature (see Kahneman, 1986; Kahneman and Knetsch, 1992)

[13] See Korenok, Millner and Razzolini (2012) and Deb, Gazzale, and Kotchen (2012) for extensions to models of impure altruism.

2.2. Motives

The motives for other-regarding behavior have received substantial attention over the past two decades. Cooper and Kagel (this volume) review the insights that have been gained from the literature on concerns such as fairness and reciprocity. The emphasis here is on unconditional transfers, as these correspond to donations for which there is no apparent material motive for giving. [14] Unconditional transfers, such as charitable giving, were initially modeled as being motivated by pure altruism. Theoretical investigations soon revealed that pure altruism generates predictions that differ from the charitable giving behavior typically observed in the field. The predictions that have gained most attention are those of complete crowd-out and extreme free riding. Both result from the altruist's sole motive being the desire to increase the nonprofit's output and therefore viewing giving-by-others as a perfect substitute for giving-by-self.[15] Perfect substitutability implies that an increase in government provision funded by lump-sum taxes fully crowds out individual contributions, as the individual decreases her donation by precisely the amount of the lump sum tax. Similarly, as shown by Andreoni (1988), perfect substitutability implies that in the limit as the population gets large there will be extreme free riding, and only those who care most for the public good and have the highest income will contribute.[16]

To develop a model with comparative statics that mirror those of the field it was argued that donors also receive a private benefit or warm-glow from giving (Andreoni, 1989, 1990).[17] That is the act of giving generates a benefit which does not depend on the effect the donation has on the non-profit's output or on the recipients' well-being.[18] Individuals motivated solely by warm-glow will therefore not respond to changes in giving-by-others and those who are motivated by both altruism and warm-glow

[14] The models of other-regarding preferences discussed in Cooper and Kagel (this volume) can also help explain unconditional transfers. I refer to their chapter for discussion of the significant contributions on fairness and reciprocity (Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999; Rabin, 1993; Levine, 1998; Dufwenberg and Kirchsteiger,1998; Falk and Fischbacher, 2006), egocentrism (Cox et al. 2008) and efficiency (Andreoni and Miller, 2002; Charness and Rabin, 2002).

[15] Provided the individual remains a contributor (see Bergstrom, Blume, and Varian, 1986).

[16] This finding is commonly referenced when demonstrating the weakness of the pure altruism model. As noted by Vesterlund (2006) this prediction relies on the somewhat unusual assumption that the individual's demand for the public good does not increase with the increase in the population. That is, it implicitly relies on the assumption that the number of recipients and the need for the non-profit's output stays constant as the population increases. The result does not follow if the need for the public good increases at the same rate as the population.

[17] See also Cornes and Sandler (1984) and Steinberg (1987)

[18] Note that if the warm-glow of giving decreases with the recipient's well-being (that is the joy of giving decreases when the need for funds is small) then extreme free-riding is also predicted in a model of impure altruism.

(impure altruists) will view giving-by-others as an imperfect substitute for giving-by-self. Assuming that warm-glow is perceived as a normal good, and that it is operative at all levels of provision, this model of impure altruism eliminates the complete crowd-out and extreme free-riding predictions of the pure altruism model.

Much research has been done to determine the extent to which giving is explained by a concern for the welfare of others (altruism), a warm-glow from giving, or error. Although the objective ultimately is to determine motives for giving in the field, a natural starting point has been to look at motives in the laboratory.[19] Researchers have relied on two methods of identification: one alters the cost and benefit from giving in the VCM, the other tests the crowd-out predictions that result from pure and impure altruism models of giving. Studies using both methods are discussed below.

2.2.1. Altruism, Warm-glow, or Noise: Changing the Cost and Benefit from Giving

To examine motives for giving we may alter the incentive to give in the VCM. However identification requires more than a simple change in parameters. When transferring an endowment from a private account with a return of r to a public account with a return of m, the marginal per capita return ($MPCR = m/r$) both increases the return others get from the transfer and decreases the individual's cost of making the transfer. Thus an increase in the MPCR is predicted to increase giving for a pure altruist, for a pure warm-glow giver, and for someone who is more prone to make errors when it is cheaper to do so. Slight modifications of the VCM however make it possible to separate the cost and return from giving, and thereby identify what likely motivates giving.[20]

Palfrey and Prisbrey (1997) consider a partner design where participants are matched with the same group for ten rounds and then matched with a new group for each of three subsequent segments of ten rounds. The return from the public good, m, is common knowledge and is the same for all members of the group. Deviating from the standard VCM they let the cost of contributing, r_i, vary by individual. The distribution of r_i is commonly known, but the individual's actual return is private information. Individual payoffs are given by:

[19] See Andreoni, Harbaugh and Vesterlund (2007) for a discussion of the role altruism plays across a series of different environments.

[20] See e.g., Carter, Drainville and Poulin (1992), Saijo and Nakamura (1995), Palfrey and Prisbrey (1997), and Goeree, Holt and Laury (2002).

$$\pi_i = r_i (w - g_i) + m \sum_{j=1}^{n} g_j$$

Depending on r_i mistakes may result in both over- and under-contributions. When $m/r_i < 1$ it is a dominant strategy to give nothing, and when $m/r_i > 1$ it is a dominant strategy to give everything. Furthermore when $m/r_i < 1/n$ it is inefficient to contribute to the public good. By varying r_i it is thus possible to determine what type of preferences best capture behavior.

To account for the fact that data may be noisier when it is cheap to make mistakes Palfrey and Prisbrey use a quantal response model of equilibrium behavior to estimate preferences. While examining both non-divisible and divisible endowment transfers they estimate a linear utility function where participants are predicted either to give or not to give to the public good.[21] They find, as studies before them, that contributions decrease over the course of the experiment, and their empirical analysis suggests that this decrease is partially attributed to a decrease in mistakes. Contributions are shown to decrease with the cost of giving, and to increase with the return to the public good. The latter effect is however not significant. Palfrey and Prisbrey conclude that there is strong and substantial evidence that giving is explained by warm-glow and error, but not by altruism.[22]

The finding that giving is not motivated by altruism is however not robust. Anderson, Goeree and Holt (1998) examine data from the linear VCM studies by Isaac and Walker (1988) and Isaac, Walker and Williams (1994) and find that contributions increase with the return to the public good and with the population size (provided a not too large MPCR). The broad characteristics of these data are seen as being indicative of concerns for altruism. When estimating preferences they find significant evidence of both altruism and error, but find no evidence of warm-glow.

Reexamining the Palfrey and Prisbrey payoff structure Goeree, Holt and Laury (2002) note that the return from the public account both increases the return to others and decreases the cost of giving. To separate the dual effect of the MPCR they allow the return from the public good to vary between self and others. Contributions generate an internal return (m_i) to the decision maker and an external return

[21] One set of treatments provides participants with one indivisible unit and asks them to either keep it in the private account or to place it in the public account. Another set of treatments provides participants with nine divisible units and asks them to allocate these between the private and the public account.
[22] See also Offerman et al. (1996) who finds evidence of warm-glow in a step-level public good environment.

(m_e) to the other members of the group (Carter et al., 1992, use a similar payoff structure). That is the payoff from contributing is given by:

$$\pi_i = r\,(w - g_i) + m_i g_i + m_e \sum_{j \neq i} g_j$$

Goeree et al. ask participants to make a series of ten decisions. In each decision the participant is asked to allocate 25 tokens between a public and private account. Decision problems vary both the internal and external return as well as in the number of people in each group. The parameters of each decision problem are common knowledge and chosen to preserve the character of the standard VCM. That is it is not payoff maximizing for the individual to give, and efficiency is achieved through full provision. With no feedback between decisions participants effectively make ten one-shot decisions.

As seen in Figure 2 below, the primary results by Goeree et al. replicate the finding that contributions increase with the internal return m_i (decreasing costs), however consistent with altruism they also find that contributions increase in the external return m_e and with the size of the group (N). The response to the external return of giving suggests that a pure warm-glow specification fails to capture behavior.

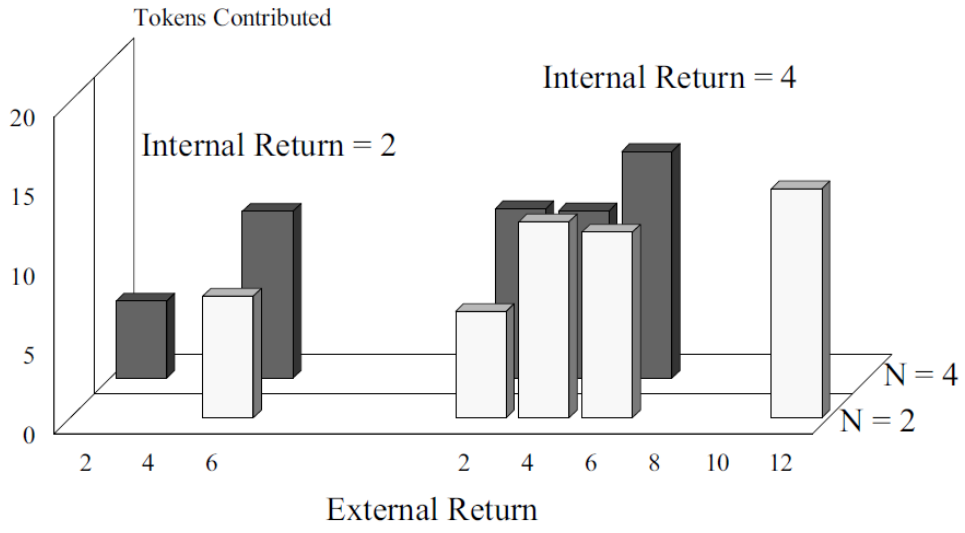

Figure 2: Average contributions out of 25 tokens by return to giving (external and internal) and by group size (N=2,4) (Note: Goeree, Holt and Laury, 2002; Figure 1).

Using a logit probabilistic choice function they estimate the participants' preferences for giving. In comparing the pure altruism and pure warm-glow model they find that pure altruism has greater explanatory power. Furthermore when estimating an impure altruism model where individuals benefit

both from the return to others and from the donation itself they find that the coefficient on warm-glow has the wrong sign and is insignificant.

Asking the same question and using similar designs and methodologies Palfrey and Prisbrey and Goeree et al. reach strikingly different conclusions. Palfrey and Prisbrey find evidence of warm-glow and noise, while Goeree et al. find evidence of altruism and noise. Seemingly small design differences may have contributed to the different results. Although both estimate preferences over one-shot payoffs, the Palfrey and Prisbrey study is instead a partner design where participants are paired for a total of ten periods. What appears to be a decision error in their study may instead result from the participants' attempts to sustain contributions over the finitely repeated game. Failure to contribute when it is payoff-maximizing to do so need not result from error but may be instead an attempt to punish others. Similarly the decision to make a costly contribution may result from an attempt to reward or sustain cooperation. Another suggested reason for the difference between the two studies is that the cost of giving is heterogeneous and private information in the Palfrey and Prisbrey study. This uncertainty over cost may have provided participants with moral wiggle room and an 'excuse' for low contributions and this may in turn have decreased giving.[23] Note however that Palfrey and Prisbrey (1993) find no significant effect of letting the cost of contributing be commonly known.

2.2.2. Altruism, Warm-glow, or Noise: Crowding Out

Another method frequently used for separating the altruistic and warm-glow motives for giving builds on the empirical approach used when examining secondary data.[24] Specifically it tests the crowd-out prediction of the alternative models of charitable giving. Crowd-out for pure altruists is predicted to be complete when an increase in government giving is funded through a lump sum tax. By contrast a model of warm-glow giving predicts only an income effect from the lump sum tax. Finally the impure altruism

[23] See e.g., Dana, Cain, and Dawes (2006), Dana, Weber and Kuang (2006), Andreoni and Bernheim (2009). With r_i varying the Palfrey and Prisbrey (1997) environment is also one of heterogeneous endowments.

[24] Studies using tax return or actual contribution data often estimate the effect of government contributions on individual giving. While this comparative static is informative for policy purposes, it cannot be used to draw inference on motives unless donors know how changes in government contributions influence overall giving-by-others (Vesterlund, 2006) or without controlling for the fundraiser's response to such changes (see e.g., Andreoni and Payne (2003, 2011) and Zhang (2011) for examinations of the effect government grants have on fundraising expenditure and on the resulting private contributions). An advantage of our experimental studies is that they make it possible to control and manipulate the information individuals hold about overall provision, and to secure that changes in individual contributions do not result from changes in solicitations.

model, where individuals are motivated both by altruism and warm-glow, predicts that the degree of crowd-out lies between that of the pure-altruism and warm-glow models.

Andreoni (1993) develops an early experimental test of the crowd-out hypothesis. Groups of three participants are randomly formed every fourth round and are in each round asked to contribute to a public good. Deviating from the linear VCM, Andreoni uses a Cobb-Douglas payoff structure to secure that both the predicted equilibrium and the Pareto efficient outcome are interior to the strategy space. Two treatments are compared: a no-tax and a tax treatment. The payoffs of the two treatments are shown in Table 1 below. Contributions are described as investments and each cell reports the individual's earnings given her contribution and the sum of contributions by the two other group members. Looking first at the no-tax treatment in panel a, the symmetric Nash equilibrium of the game is for each participant to contribute 3 tokens and the efficient outcome is for each participant to contribute 6 tokens. The Cobb-Douglas payoff structure eliminates equilibria in dominant strategies and participants may select contributions outside the core. With participants in the no-tax treatment being free to contribute any amount between 0 and 7, Andreoni captures the effect of a lump-sum transfer to the public good by imposing an initial contribution of 2 tokens and giving participants the option of adding between 0 and 5 tokens to this initial level of giving. Payoffs in the tax treatment (panel b) are simply a truncated version of those in the no-tax treatment, and the equilibrium prediction is for everyone to contribute one token. If individuals are purely altruistic the 2-token tax will be crowded out completely and contributions in the tax treatment are predicted to be 2 tokens smaller than those in the no-tax treatment.

YOUR INVESTMENT

TOTAL INVESTMENT BY THE OTHER TWO GROUP MEMBERS	0	1	2	3	4	5	6	7
0	0	1	3	6	9	10	11	10
1	1	4	8	11	14	15	15	14
2	5	9	14	18	20	21	20	17
3	12	17	22	26	28	28	25	22
4	21	28	33	36	37	35	32	27
5	34	40	45	48	47	44	39	32
6	49	56	60	61	59	54	47	38
7	68	74	77	76	72	64	55	44
8	90	95	96	93	86	76	64	51
9	115	118	117	111	102	89	74	58
10	143	144	140	131	119	103	85	66
11	175	173	166	153	137	118	97	75
12	210	205	193	177	157	134	109	84
13	248	239	223	203	178	151	122	93
14	290	276	256	230	201	169	136	103

Panel a: No-tax treatment

YOUR INVESTMENT

TOTAL INVESTMENT BY THE OTHER TWO GROUP MEMBERS	0	1	2	3	4	5
0	33	36	37	35	32	27
1	45	48	47	44	39	32
2	60	61	59	54	47	38
3	77	76	72	64	55	44
4	96	93	86	76	64	51
5	117	111	102	89	74	58
6	140	131	119	103	85	66
7	166	153	137	118	97	75
8	193	177	157	134	109	84
9	223	203	178	151	122	93
10	256	230	201	169	136	103

Panel b: Tax treatment

Table 1: Individual payoff by individual and group investment (Note: Andreoni, 1993)

If however participants benefit from being the one who voluntarily contributes to the public good, i.e., the individual receives a warm-glow from giving, then the forced contribution is an imperfect substitute for giving-by-self and crowd-out will be incomplete. Comparing giving between the tax and no-tax treatment Andreoni finds an average crowd-out of 71.5 percent over all rounds of the game and a crowd-out of 84 percent in the last round of the game.[25] Both of these measures differ significantly from the 100 percent crowd-out predicted by the pure altruism model. Andreoni concludes that behavior is consistent with participants being impure altruists.

Bolton and Katok (1998) extend the crowd-out examination to the dictator game where a decision maker is informed of an initial exogenous transfer to an anonymous recipient and given an endowment which the decision maker may keep or use to increase the recipient's transfer. The central comparison is once again between transfers in a 'tax' and a 'no-tax' treatment. In the no-tax treatment the exogenous transfer to the recipient is $2 and the decision maker's endowment is $18, in the tax treatment the exogenous transfer to the recipient is instead $5 and the decision maker's endowment is $15. That is the tax treatment captures the effect of a $3 lump sum tax. Under pure altruism and complete crowd-out individuals who give more than $3 in the no-tax treatment are predicted to decrease contributions by $3 in the tax treatment. Comparing average transfers in the tax and no-tax treatment Bolton and Katok (1998) find that 73.7 percent of the 'tax' is crowded out.[26] As Andreoni (1993) they fail to find evidence of complete crowd-out and conclude that giving is explained by impure altruism.

[25] Chan, Godby, Mestelman, and Muller (2002) examine an environment similar to that of Andreoni (1993) but consider both a high- and a low-tax treatment. While they replicate Andreoni's results for the low (and comparable) tax treatment, they find complete crowd-out when the tax is large. They conclude that warm-glow fails to explain the result. Gronberg, Luccasen, Turocy, and Van Huyck (2012) note that an unfortunate consequence of the Chan et al. study is that the solution concept differs between the two treatment, with zero giving being a dominant strategy in the high-tax treatment. Relying on Keser (1996) they therefore alter the payoff such that there is a dominant strategy equilibrium in both treatments. They find, as in Andreoni (1993), that there is incomplete crowd-out. However Sutter and Weck-Hannemann (2004) fail to replicate Andreoni's initial crowd-out result. Using the same design they see the same level of contribution in the tax treatment, but find greater donations in the no-tax treatment. The resulting level of crowd-out is 97.5%, and they cannot reject that individuals are motivated solely by pure altruism.

[26] The crowd-out measures reported by Andreoni (1993) and Bolton and Katok (1998) do not account for the fact that contributions below the imposed contribution level cannot be fully crowded out. For example, in the Bolton and Katok case contributions of less than $3 in the $18/$2 treatment cannot be fully crowded out in the $15/$5 treatment. Failure to account for this truncation biases the results toward incomplete crowd-out. See Ottoni-Wilhelm et al (2013).

Eckel, Grossman, and Johnston (2005) extend Bolton and Katok's study by considering transfers to real charities, that is, they replace the anonymous recipient of the dictator game with a charity of the participant's choice. They examine the degree of crowd-out using two different types of framing. The first neutral frame mirrors that of Bolton and Katok as participants simply are informed of the initial allocation ($18/$2 or $15/$5). The second tax frame instead informs participants that a $2 or $5 tax was imposed on their initial $20 endowment, and that the money will be given to the charity of their choice. Framing is shown to have a substantial effect. In the neutral frame they observe essentially no crowd-out and in the tax-frame they find complete crowd-out. When participants are made aware of the tax, the evidence is consistent with pure altruism.[27]

Common for these crowd-out studies is that they elicit one measure of crowd-out and that incomplete crowd-out is seen as evidence of impure altruism. Ottoni-Wilhelm, Vesterlund, and Xie (2013) points to limitations of this approach. Revisiting the asymptotic results by Ribar and Wilhelm (2002) they first show that under the impure altruism model the degree of crowd-out will depend on where it is elicited. As the initial exogenous contribution to the recipient (or charity) gets sufficiently large the individual's marginal motive for giving will shift from one of impure altruism to one of pure warm-glow, and the degree of crowd-out will decrease. Hence the power to reject pure altruism depends on the provision at which the test is conducted. Furthermore, with crowd-out changing a single measure of crowd-out cannot identify the relative importance of warm-glow preferences. In determining the weight on warm-glow relative to that on altruism, infinitely many weights can explain any incomplete measure of crowd-out, ranging from almost pure altruism to pure warm-glow. Hence it is necessary to measure crowd-out around more than one level of provision to identify the relative concern for warm-glow and altruism.

Ottoni-Wilhelm, et al (2013) also argues that since the impure altruism model was designed to reconcile theory with pre-existing field evidence of incomplete crowd-out, we cannot see evidence of incomplete crowd-out as a test of impure altruism. In designing a direct test of the impure altruism model they note that the model predicts that crowd-out decreases as the amount given-by-others increases. Hence they uncover a testable comparative static of the impure altruism model which it was not designed to have.

[27] See also the Korenok et al. (2012) extention of Andreoni and Miller (2002) which determines if allocations can be rationalized by impurely altruistic preferences. While not examining budgets that allow for a test of crowd-out, they find that behavior by a majority of participants can be characterized by impurely altruistic preferences. A similar method is used in Deb, Gazzale, and Kotchen (2012).

Examining the sensitivity to the amount of giving-by-others they introduce a new experimental design that controls the level of giving-by-others, and use it to estimate crowd-out at a low and a high provision level. Creating what they refer to as an individualized charity they secure that each participant effectively contributes to an individualized public good and singlehandedly determines the total provision of that good. Specifically each participant is paired with a child who has just lost his or her home in a fire. The participant in the study is asked to make a contribution which will be used to purchase books for the child. These books are to be given to the child by the American Red Cross as they arrive at the scene of the fire to assist in relocating the family. To determine the response to the amount given-by-others the participant is asked to make a number of decisions. For each decision they are informed how much the child is to receive absent the participant's contribution, and they are given an endowment which they are free to contribute towards books for the child. As no other gifts are given to the child at the scene of the fire only the participant can influence the total value of the books to be transferred to the child. The six budgets examined are shown in Table 2 below.

Table 2: Experimental Budgets

Budget	Fixed initial donation (G_{-i})	Participant's endowment (w_i)
1	4	40
2	10	40
3	28	40
4	34	40
5	4	46
6	28	46

Note: Ottoni-Wilhelm, Vesterlund, and Xie (2013)

The degree of crowd-out in response to a $6 lump-sum tax is determined both at a low provision level of $4 (budgets 5 and 2) and at a high provision level of $28 (budgets 6 and 4). Unfunded crowd-out at a low and high provision level is measured between budgets 1 and 2 and between budgets 3 and 4. Finally the corresponding income effects are measured between budgets 1 and 5, and between budgets 3 and 6.

The experiment provides the first evidence that crowd-out depends on the level of giving-by-others at which crowd-out is measured. At the low level of giving-by-others crowd-out is essentially complete, but at the high level it is incomplete. If only one measure of crowd-out had been elicited the inference on motives at the low level would have been one of pure altruism, while at the high level it would have

been one of impure altruism. Importantly the results reveal that the decrease in crowd-out is statistically significant, thus confirming the comparative static prediction of the impure altruism model.

With behavior consistent with impure altruism they estimate preferences for giving. While confirming that in addition to the altruism component, the warm-glow component of utility is necessary to explain the experimental data, the structural model indicates that the weight placed on warm-glow is small. Warm-glow accounts for less than five percent of participants' contributions. Altruism accounts for more than 95 percent. The study demonstrates that there are environments where charitable giving is motivated primarily by altruism.

Inference from crowd-out studies have not been limited to looking at transfers. A study by Harbaugh, Mayr and Burghart (2007) use fMRIs to draw inference on motives. They compare neural activation in two different treatments. Individuals in a 'no-tax' treatment are given $100 and asked whether they are willing to make a specific transfer to a local charity, in a 'tax' treatment the transfer is instead mandatory. Consistent with altruism they find that an increase in funding for the charity elicits neural activity in areas linked with reward processing (increases in own payoff and in the charity's payoff increase activation in similar areas of the ventral striatum). Based on the relative activation seen when none or all the money is transferred they sort participants into a more and less altruistic half. As evidence that the observed activation is predictive of behavior, they find that the more altruistic half is twice as likely to accept proposed transfers to the charity. Consistent with impure altruism they observe an increase in neural activity (higher activation in the caudate, the right nucleus accumbens and the insulae) when moving from the tax to the no-tax voluntary treatment. This pattern of neural activation, combined with the fact that participants report greater satisfaction with the voluntary manipulation, lead the authors to conclude that both altruism and warm-glow explain charitable giving.[28]

Through careful experimental designs recent work has improved our ability to identify motives for giving. What we have not achieved, however, is broad agreement on what these motives are. Some studies find that giving primarily is driven by warm-glow, others find that it is driven by altruism and others that it is affected by both. To some extent these inconsistencies should not be surprising. First, as shown by Ottoni-Wilhelm et al (2013) the marginal motive for giving changes with the initial funding of

[28] While showing evidence of both warm-glow and altruism, the fMRI studies cannot shed light on the relative weight of these two motives.

the public good, and variation in provision provides a possible explanation for the varied inference on motives. Second, the underlying preferences for giving are likely to depend on what the funds are solicited for. In fact in examining donations to nonprofits or recipients outside the laboratory it is unlikely that consensus on motives can or should be reached. Just as the demand for one private good does not predict the demand for all other private goods, it is not to be expected that the demand, or the motive for such a demand, is the same for all generous acts. While altruism may drive giving to a charity such as the Red Cross, warm-glow may be what causes people to give to an already well-endowed alma mater such as Harvard.[29] Rather than seeing the examined experimental studies as an attempt to uncover a general preference for giving, it may be useful to see them as developing techniques that make it possible to determine what motivates giving to a particular charity.

2.2.3 Is Evidence of Kindness a Result of Kindness?

Further complicating our ability to draw inference on motives is a recent strand of the literature which argues that transfers in the lab and in the field do not reflect preferences for others, but rather the desire to be perceived as if one has such preference. Researchers have most commonly examined this hypothesis by modifying the experimental environment in ways that should not influence behavior given the initially inferred preferences. Two general modifications have been examined. The first provides participants with a chance to 'opt-out' of the giving environment. The second weakens the inference others can draw on the individual's type.[30] Donations motivated solely by concern for others should not respond to either of these modifications. Yet, as evidence that the inference on motives may be misleading, both of these changes have been shown to decrease giving.

I first look at the effect of offering participants a choice or an excuse to opt out of being 'informed-of' or 'being-in' the donation environment. Dana, Weber and Kuang (2007) compare two treatments where a

[29] Similarly, generosity toward one non-profit need not be a good predictor of generosity to another. Few would be surprised to find that a generous contribution to Planned Parenthood does not predict a generous contribution to the National Rifle Association. Nor should we be surprised that an individual's generosity in the laboratory does not extend to all domains. As a test of the external validity of lab experiments Laury and Taylor (2008) use the VCM design of Goeree, Holt and Laury (2002) to identify preferences for giving and to determine whether these predict the participant's contribution to an urban tree planting program. While the likelihood that someone contributes is correlated between the two environments, the parametric estimates of altruism do a poor job of predicting giving to the naturally-occurring public good. More than evidence that the laboratory study fails to generalize this may be evidence that preference for giving depends on the characteristics of the public good.

[30] In particular it has been suggested that contributions to non-profits can be used to signal wealth (Glazer and Konrad, 1996), prestige (Harbaugh 1998 a,b), or image (Hollander, 1990; Benabou and Tirole, 2006).

decision maker is paired with an anonymous recipient and selects between two allocations of payoff-for-self and payoff-for-other, (π_s, π_O). In one treatment the choice is between (π_s, π_O) = (\$6, \$1) and (\$5, \$5). In the second treatment the decision maker also selects between getting \$6 and \$5 for self, however she does not know what the associated payoff is for the recipient. That is, the choice is between (\$6, π_O) and (\$5, π'_O), where the recipient's associate payoff is determined by a coin flip prior to the session and equals either \$1 or \$5. While not informed of the payoff consequences for the recipient, the decision maker has the option of clicking a button to resolve the uncertainty. Interestingly 43% of decision makers do not click the button, and under this 'veil of ignorance' they are more likely to choose the allocation with \$6 for self. The choice of (\$6,\$1) increases from 26% to 63% when the \$1 payoff consequence is not revealed. It is as if the perceived randomness provides moral wiggle room to be selfish. A similar effect is seen in Dana, Cain and Dawes (2006), where a decision maker can opt out of the dictator game. Having made a transfer decision in a \$10 dictator game, the decision maker is informed that there is an option of reneging on the planned transfer and instead receiving \$9. If the opt out is selected the recipient never learns that the dictator game was an option. Although the opt-out is costly they find that a third of participants select it.[31] As evidence that initial transfers result from a desire not to violate others' expectations they show that only 4% of participants opt out when the recipient never learns that a dictator game is played. This elimination of responsibility is also seen in Hamman, Loewenstein and Weber (2010). They find that while dictators on their own make generous transfers, when asked to delegate the allocation decision to an agent they select an agent who makes a minimum or no transfer to an anonymous recipient. [32] The chosen agent implements allocations that are far less generous than the allocations they would have selected on their own. The finding that transfers decrease when there is an option to opt out suggests that the transfers seen absent this option do not solely reflect a concern for the well-being of others.

[31]See also Broberg, Ellingsen and Johannesson (2007) on the willingness to pay to opt out, and Lazear, Malmendier and Weber (2012) on the response to the cost of opting out as well as the effect this sorting has on the remaining contributors. Evidence of moral wiggle room is also seen in Linardi and McConnell (2011) who find that volunteering decreases when an excuse for not volunteering is introduced. In a field experiment Andreoni, Rao and Trachtman (2012) also find evidence of opting out as customers avoid doors to a supermarket where a solicitor for the Salvation Army is stationed.

[32] The willingness to delegate to a non generous agent may result from the fact that the recipients do not, to the same extent, hold the decision maker accountable for the delegated outcome (Bartling and Fischbacher 2012; Coffman 2011). Extending research on delegation Coffman (2011) finds that when gifts are raised through an intermediary the likelihood of giving and the size of the gift are much less sensitive to the identity and quality of the charity.

Further evidence that it is difficult to identify motives is seen in the many studies that find contributions to be sensitive to the inference others may draw on the donor's type. Transfers in the dictator game are commonly found to decrease when it is difficult to link the individual's decision to her identity. Hoffman et al. (1994, 1996) investigate a double-blind dictator game where neither the recipient nor the researcher are able to identify the decision maker. They find that this increase in social distance decreases giving to a mere 10 per cent of endowments. At the opposite end of the spectrum, Bohnet and Frey (1999) find that contributions increase in one-on-one interactions.

Visibility has also been shown to increase generosity in the VCM.[33] Rege and Telle (2004) conduct a one-shot VCM where participants after making their contribution decisions are asked, one person at a time, to step forward to announce their decision. Contributions increase when they are publicly announced. Andreoni and Petrie (2004) also examine visibility in the VCM. Participants are paired in groups of five for eight rounds, and the experiment manipulates the information given on the contributor and her decision. They find that information on contributions increase giving, but only when it is combined with a picture of the individual contributing.[34]

To better understand the effect of visibility Ariely, Bracha, and Meier (2009) conduct an experiment to test a model of image motivation proposed by Benabou and Tirole (2006). They conduct two types of real effort experiments where effort generates contributions to non-profits: click for charity and bike for charity. The receiving non-profit was either 'good' or 'bad' (Red Cross and National Rifle Association, respectively).[35] Manipulating the visibility of the exerted effort as well as whether the participant is compensated for effort, they determine when and why visibility influences behavior. The results of the

[33] Evidence that individuals respond to others observing their behavior is also seen in Haley and Fessler (2005) who document that a set of painted eyes induces more generous behavior in a dictator game. Similarly Bateson, Nettle, and Roberts (2006) examine contributions to pay for drinks in a university coffee room and find that, compared to a control image, an image of a pair of eyes almost tripled contributions.

[34] In contrast to the field, laboratory studies on visibility typically restrict the inference that may be conveyed through a visible contribution. Contributions in the laboratory can typically only be seen as a sign of generosity, however models such as Glazer and Konrad (1996) suggest that donations also can serve as a signal on wealth. Bracha and Vesterlund (2013) show that the effect of visibility is not clear when contributions serve both as a signal on generosity and wealth/ability. When ability is not known they find that visibility lowers the contributions by low-ability individuals. Given the costly contribution, it appears that individuals prefer to be perceived as poor and generous, rather than as rich and stingy. Evidence from the field also shows that visibility need not increase contributions, e.g., Onderstal, Schram, and Soetevent (2011) do not find an increase in giving when individuals contribute using an envelope with their address versus an envelope without such an identifier. See Section 3.3 for further discussion.

[35] Participants were Princeton undergraduate students. When asked to evaluate the two organizations 92% of participants positively identify with the Red Cross while 72% negatively identify with the NRA.

click for (a good) charity task are shown in Figure 3. For this task participants have five minutes to sequentially press two keys (X and Z). For every completed pair of clicks a donation is made to the non-profit. For the 'good' cause they find that visibility increases giving, and that extrinsic motivation reduces the image signal of giving when behavior is visible. That is effort decreases for the 'good' cause in the visible treatments when participants are financially compensated for effort. By contrast a monetary compensation causes individuals to increase their effort when performing in private. This suggests that extrinsic incentives decrease the image effect when giving in public. For the 'bad' cause they find instead that monetary compensation for effort does not affect contributions in public and increases it in private. The results are similar for the bike for charity task, and they interpret their findings as providing evidence that giving is motivated by concerns for image.

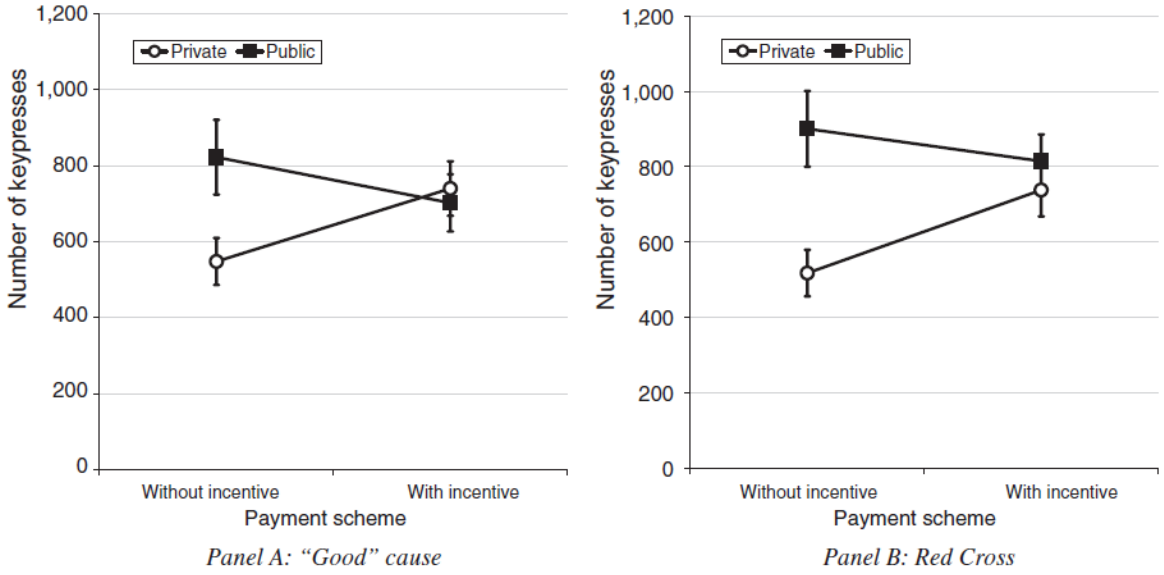

FIGURE 1. EFFECT OF INCENTIVES ON PROSOCIAL BEHAVIOR

Notes: Error bars are standard errors of the mean. Panel A shows effort for a "good" cause according to individual participant's perception of other students' identification at Princeton. Panel B shows effort for the Red Cross (the majority of Princeton undergraduates positively identifies with this charity).

Figure 3: The effect of incentives on prosocial behavior when behavior is visible (public) versus not visible (private) (Note: Ariely, Bracha and Meier (2009))

Related to the evidence on social distance and visibility are studies that modify the environment to alter the norm for giving and thus the signal one sends by giving. For example Bardsley (2008) and List (2007) examine contributions in a dictator game where the strategy space is modified to allow for the option of

taking from the recipient.[36] Both studies find that contributions decrease substantially when taking is permitted. Furthermore List (2007) shows that contributions decrease even further when the number of tokens that may be taken increases. Both authors argue that the response results from it being cheaper to signal generosity when there is an option of taking. While a zero transfer is seen as selfish in the standard dictator game, it may be seen as generous in the 'taking' game.

The ability to draw inference on generosity has also been shown to influence behavior. For example Andreoni and Bernheim (2009) develop a signaling model where the desire to be perceived as fair causes donors to select the focal 50-50 split in the dictator game. They conduct a series of $20 dictator games where with a certain probability (0%, 25%, 50%, 75%) the computer overrules the dictator's choice and forces a low transfer of either $0 or $1 to the recipient. Figure 3 summarizes their results. When the probability of a forced contribution is 0 they find, as others before them, a modal 50-50 split. However as the probability of a forced low transfer increases, transfers deviate from the 50-50 split and become the amount that could have been forced. As the probability of a forced choice increases we see in Panel a an increase in the frequency of actual $0 transfers, and in Panel b an increase in the frequency of $1 transfers.

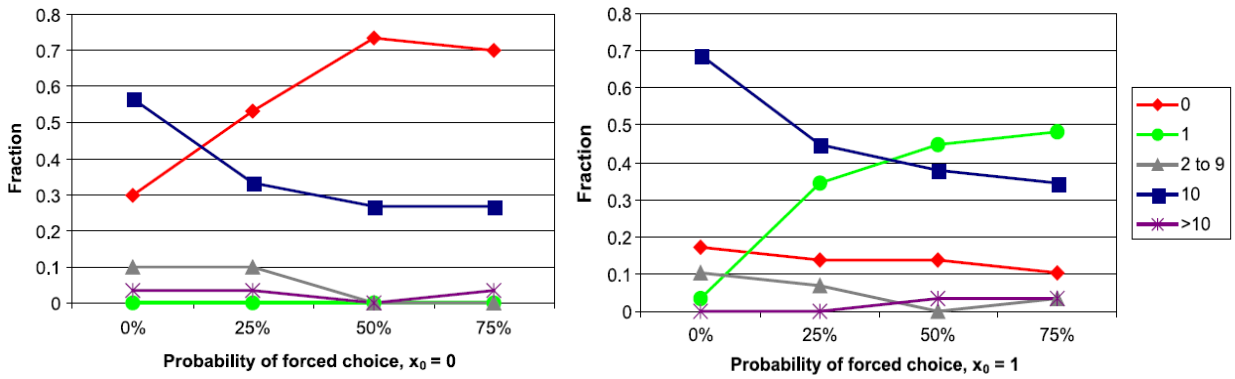

Figure 4: Frequency of Amount Allocated to Partners Conditional on the Probability of a Forced Choice. Panel a: Forced Choice is 0, Panel b: Forced Choice is 1. (Note: Andreoni and Bernheim (2009) Figure 3 and 4)

Evidence of the desire to signal generosity has also been examined in the field. DellaVigna, List, and Malmendier (2012) conduct a field experiment to examine the role social pressure plays in securing

[36] See also Cox (2008) who provides evidence of taking in a game when initial endowments are the same.

donations. In a door-to-door fundraising experiment they compare three different solicitation mechanisms. A baseline where households simply are asked to give, a flyer treatment where households one day in advance of the solicitation receive a flyer on their doorknob to notify them of the one-hour time interval in which a solicitor will arrive to their home the next day, and finally an opt-out treatment where the flyer includes a box to be checked if the household does not want to be disturbed. They find that the share of available households decreases in the treatments with a flyer (10% for the simple flyer and 25% for the flyer with the opt-out box). Donations are only affected in the opt-out treatment where a drop in small donations (less than $10) results in a 30 percent decrease in overall giving. The authors argue that the decrease in giving in the opt-out treatment demonstrates that giving is driven by social pressure. Estimating preferences they conclude that social pressure plays a greater role than altruism in motivating giving. In fact they suggest that the impact of social pressure is so large that door-to-door fundraising is welfare reducing.

The studies reported above make clear that contributions are sensitive to the characteristics of the environment. Social distance, wiggle room and visibility all influence giving. However none of these findings are likely to surprise a trained fundraiser. Those who solicit funds are fully aware that social distance and the possibility of opting out decreases giving. This is why resources are spent to secure a direct-ask over the much cheaper mail solicitation. Fundraisers would also not be surprised that the strategy space or visibility affects giving, after all they personalize the suggested donation levels and publicly announce contributions to others.[37] While it is clear that giving is influenced by a number of factors, it is less clear what implications this has on our inference on motives for giving. Is it necessarily the case that donors who cannot opt out in the DellaVigna et al. (2012) study give because of social pressure? An alternative explanation for opting out may be that the donor has self-control problems. Knowing that she is altruistic and will feel compelled to give when asked, the donor may opt out of giving, not because she wants to avoid the social pressure, but because she wants to limit the temptation to give.[38] Another reason we should use caution when inferring preferences from the opt-

[37] Harbaugh (1998b) shows that contributions to a large university increase when using coarse contribution recommendations.

[38] To demonstrate that temptation can explain behavior, consider a case where a flyer announced the distribution of free ice cream. Few would conclude that the decision to opt out of getting free ice-cream can be seen as evidence that those who, without prior notice, are offered and consume the ice cream do so in response to social pressure. There is conflicting evidence on whether individuals are tempted to be generous or selfish, e.g., Noor and Ren (2011) find that there is temptation to be selfish, and DeWall, Baumeister, Gailliot and Maner (2008) find that depletion increases selfishness. By contrast Rand, Greene & Nowak (2012) examine response time in a VCM, and find more generous contributions by fast decision makers or by those who are forced to quickly contribute.

out decision is that preferences themselves may respond to the direct solicitation. Schelling (1968) argued that the more we know about a recipient the more we care. Thus when surprised by a panhandler and standing face-to-face with him we may care more about his well being than we would have had we crossed the street to opt out of the request for funds. While the opt-out decision should cause us to question our inference on motives for giving, it does not help identify what motivates giving when there is no option to opt out.

One interpretation of the studies above is that it is not possible to draw inference on motives. Bardsley (2008) proposes a more constructive interpretation. He argues that preferences for giving might better be seen as attempts at reasonable approximations of specific motivations over limited domains rather than as general truths. Indeed the laboratory experiments on giving aim to map the domain individuals face when approached by a solicitor and asked to give. The interest in both the public good and dictator games is driven by the fact that they mirror environments where individuals are asked to give. While it may not be possible to identify preference for giving that predict transfers in all domains, careful experimental designs allow us to identify the class of preferences that are consistent with the behavior observed in common donation domain. While not providing general truths these findings will nonetheless provide insights on behavior in the domains of interest.

3. Fundraising

The simultaneous contribution game modeled in Section 2 relies on the assumption that individuals on their own and without knowledge of others' actions decide how much to contribute to a non-profit. Contributions in the field, however, make clear that a more complex contribution game is in place, and that it is strategically chosen by those soliciting funds. Fundraisers may design a campaign where individuals are informed of the behavior of others and asked to contribute at a particular point in time. Or they may opt to hold a charity auction or to alter the donor's incentive to give, be it by letting

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They conclude that individuals intuitively are cooperative and that selfishness requires reflection. Subsequent studies however cast doubt on the Rand et al. conclusion, see e.g., Tinghög et al (2003), Kessler and Meier (2013). Recalde et al. (2013) find evidence to suggest that the negative correlation between giving and response time may result from mistakes being made quickly. Looking at contributions in a public good game with interior equilibria, they replicate the Rand et al finding when the equilibrium is toward the bottom of the strategy space, but get the reverse result when it is toward the top of the strategy space. As evidence that mistakes are made quickly they find in contrast to slow decision makers that the contribution distribution for fast decision makers is independent of treatment. Fast decision makers are also shown to be significantly more likely to make mistakes that decrease both private and group earnings.

contributions generate a gift, tickets in a raffle, or a matched contribution by another donor. Substantial work has been done to characterize and understand what mechanisms fundraisers use to solicit funds and why they might be effective. As noted in the introduction the fundraiser differs from the social planner of the classic mechanism design problem both in objective and in the tools that she has available. Specifically, the fundraiser's objective is assumed to be one of contribution maximization, and she must rely on voluntary participation.[39]

In examining the market for voluntary giving it is essential that we understand the choices fundraisers make when designing the contribution game. I first discuss research examining the sequential and dynamic nature of voluntary giving. Second I review the literature on competitive contribution mechanisms such as lotteries and auctions. Finally I report on studies examining direct benefits such as matches and rebates.

3.1. Announcements: Sequential and Dynamic Giving

Fundraising is typically done in a sequential fashion. Potential donors are solicited for funds at a particular point in time and when asked to give they are informed of the contributions others have made before them. That is, donors may receive information on the sum of contributions that have been collected to date, the size of a 'leadership' donation in a capital campaign, the fraction of potential donors that have contributed thus far, or the funds raised in similar campaigns. There are many channels through which this information can influence behavior. I begin by examining sequential giving and then proceed to more complex dynamic environments where donors have multiple opportunities to give and contributions at any point in time are made simultaneously.

3.1.1. Sequential Giving

At first sight the fundraiser's reliance on sequential giving seems puzzling. Varian (1994) compares a simultaneous contribution game to one where donors contribute in sequence after being informed of the decisions of others. He demonstrates that the latter is likely to reduce provision. With altruistic preferences sequential giving enables the initial donor to free ride off of subsequent donors. Thus provision in the sequential game is predicted to decrease relative to that in the simultaneous game.

[39] The assumption of contribution maximization is equivalent to an assumption of provision maximization provided production of the public good is monotonically increasing in contributions.

Varian's result demonstrates that it is not obvious why fundraisers solicit sequentially. However concerns for both equality and reciprocity may cause behavior to differ from that predicted. To investigate the role of these factors experimental studies have examined the simple two-person quasi-linear example provided by Varian. The quasi-linear environment gives rise to the stark prediction that with heterogeneous preferences only one person contributes. The person with the strongest preference for the public good is predicted to be the sole contributor in the simultaneous game, and the person with the weakest preference is predicted to be the sole contributor when she is the second mover in the sequential game (provided a not too large difference in preferences).[40] With sequential giving the first mover gives nothing and the second mover contributes an amount which is no larger than that contributed in the simultaneous game. Examining a 2-person quasi-linear environment Andreoni, Brown, and Vesterlund (2002) confirm the comparative static prediction that contributions are larger in the simultaneous than sequential game.[41] However in contrast to the equilibrium prediction they do not find that contributions are made only by one player, rather the burden is shared close to equally between the two. The absence of a substantial first-mover advantage is explained by the second mover's unwillingness to contribute unless the first mover does so as well. Gächter, Nosenzo, Renner and Sefton (2010) expand on these findings. Examining a similar environment they replicate for a more extreme set of parameters the findings that contributions are lower under sequential than simultaneous moves and that the contribution distribution is not as unequal as predicted. First movers are unable to secure their predicted first-mover advantage. Interestingly unequal contribution distributions are seen when the first mover's preference for the public good is so strong that she is predicted to be at a disadvantage and to be the sole contributor. Gächter et al. interpret the two findings as resulting from second movers' willingness to punish first movers who free ride and unwillingness to reward first movers who contribute.

With evidence of lower giving in the sequential game the question remains why fundraisers announce past contributions to future donors.[42] A number of studies examine field-relevant modifications of

[40] Suppose for example that $U_i=x_i+\alpha_i \ln G$, i=1,2, and $\alpha_1 > \alpha_2$, then equilibrium provision is $G=\alpha_1=g_1$ in the simultaneous game and $G=\alpha_2= g_2$ in the sequential game, provided $\alpha_1 / \alpha_2 < e$.

[41] In addition to a standard summation technology they also report on provision under a sequential 'best-shot' technology as in Harrison and Hirshleifer (1989) and Prasnikar and Roth (1992).

[42] Vesterlund (2003) notes that the sequential structure examined by Varian (1994) assumes that donors can commit to only giving once. While such commitment is justifiable in the Stackelberg game, it is questionable in the voluntary provision model where a first mover has an incentive to contribute twice. Removing the first donor's ability to commit to a one-time contribution leaves the provision in the sequential and simultaneous games identical (see also Romano and Yildirim, 2005). In contrast to this prediction Klinowski and Vesterlund (2013) find

Varian's model to determine whether these help generate predictions consistent with the preference for sequential play. One explanation is provided by Andreoni (1998), who shows that sequential solicitations may be preferred when there are fixed costs of production. When no individual single-handedly is willing to cover the fixed costs, simultaneous giving may result in both positive and zero-provision equilibria. Thus campaigns that rely on simultaneous giving may get stuck in an equilibrium where donors fail to coordinate on a preferred positive provision outcome. Such inferior equilibria are eliminated when contributions are made sequentially. The reason is that a large initial 'seed' contribution indicates that the fixed costs can be covered, and this in turn causes followers to give and secure provision of the public good.[43]

Vesterlund (2003) provides a second explanation for sequential solicitations. Examining a model where the quality of the charity is uncertain she shows that sequential play helps reveal the quality and in so doing increases provision. Sequential play is consequently selected in equilibrium. While a fundraiser's endorsement of a non-profit is not a credible signal on quality, a large initial contribution is. The signal associated with the initial contribution encourages lead donors to inspect the charity and to contribute an amount large enough to trigger contributions from followers when the quality is high.[44] With a simultaneous solicitation strategy serving as a low-quality signal, fundraisers have no option but to solicit sequentially. Furthermore as the first contribution serves as a signal on quality, larger initial contributions secure that giving to high-quality charities exceed those that would result had the quality been common knowledge.[45]

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that contributions in a sequential public good game without commitment continue to fall below those in the simultaneous game.

[43] Cooper et al. (1993) demonstrate improved coordination when participants know that moves are sequential but do not know what those moves are (see also Rapaport, 1997; Weber et al., 2004). Further evidence on the role of sequential play is also seen in the examinations of communication in coordination games. Cooper et al. (1992) examine the effect of one-way cheap talk and Cooper et al. (1994) list leadership as being one of the "alternative institutions for resolving coordination problems." See also Arce (2001) and Foss (2001).

[44] Rose-Ackerman (1980, 1981) and Handy (1995) argue that for most agents the quality of charities is uncertain. They suggest that the presence of government grants, united funds or prominent individuals will help resolve the informational problem. Similarly Schiff (1990) suggests that the informational problem may be resolved when potential contributors choose to volunteer for an organization. For theoretical examinations see also Andreoni (2006), Potters, Sefton, and Vesterlund (2005, 2007), Komai, Stegeman and Hermalin (2007). Hermalin (1998) examines a related team production problem.

[45] Mirroring common solicitation patterns the model gives rise to an optimal solicitation order where the individual who is willing and able to give the most is solicited first.

A third explanation for sequential giving is that donor preferences depend on more than the consumption of the private and public good. Romano and Yildirim (2001) characterize the types of preferences that give rise to greater contributions under sequential play. Specifically they show that sequential play is preferred when initial contributions trigger a sufficiently large increase in contributions by followers, and leaders in response give more in the sequential game. For example, giving increases with sequential moves when individuals adhere to Sugden's (1984) principle of reciprocity, or when donors are conformists (Bernheim, 1994) and dislike effort differentials (Huck and Rey-Biel, 2006), or when donors are concerned about status and follow the lead of high-status donors (Kumru and Vesterlund, 2010).

The experimental examinations of these three possible explanations for sequential giving are many. List and Lucking-Reiley (2002) present an early study of behavior in the sequential game and determine whether seed money increases subsequent contributions.[46] Using a field experiment they solicit funds to purchase a $3,000 computer for the University of Central Florida Environmental lab. Potential donors are solicited by mail to contribute toward one of six computers in a 3x2 design varying the fraction of the cost that has already been contributed towards the computer (10%, 33% or 67%), and varying whether contributions short of the goal are refunded to the donor. The interest in refunds is motivated by Bagnoli and Lipman's (1989) finding that refunds can eliminate the coordination problem in a threshold provision problem.[47] To the extent that seed gifts serve as a coordination device, as suggested by Andreoni (1998), this effect is expected to be reduced (if not eliminated) when contributions short of the fixed costs are refunded.[48] The central results of the List and Lucking-Reiley study are reported in Table 2. As evidence that sequential play may be beneficial they find that followers appear to have upward sloping best response functions. The likelihood of contributing as well as the average contribution increases with the size of the seed gift. Increasing the seed gift from 10 to 67 percent of the total cost increases contributions six fold. Surprisingly the effect of the seed gift is

[46] Rather than comparing sequential to simultaneous giving, List and Lucking-Reiley (2002) examine the slope of the 'best-response' function. An early field experiment on the advantage of sequential giving was conducted by Silverman et al. (1984). Comparing three different funding schemes in a national telethon they find that announcing the names of individuals pledging money and the amount of money pledged resulted in greater contributions than when they were not announced. Seeing the effect of treatment the campaign dropped the prescribed randomization during the last 3 hours of the telethon and instead spend more time reading pledges because it was clear by then ''that reading pledges increased them'' (p. 308).

[47] Focusing on un-dominated perfect equilibria Bagnoli and Lipman (1989) show that refunds secure efficient provision of threshold public goods.

[48] For evidence that refunds improve efficiency see Isaac et al, 1989; Bagnoli and McKee, 1991; Cadsby and Maynes, 1999; Croson and Marks, 2000; Rondeau et al., 1999, 2005; Coats, Gronberg and Grosskopf, 2009.

independent of the offer of a refund (denoted by R in Table 3). As refunds eliminate the coordination problem, the insensitivity to refunds suggests that the increase in giving cannot solely be explained by the coordinating role of a large seed. The increase in giving is however consistent with signaling along the lines of Vesterlund (2003). With and without a refund a larger seed may be seen as evidence that the non-profit is of high quality. Similarly the insensitivity to refunds is also consistent with the positive response to seeds resulting from preferences along the lines suggested by Romano and Yildirim (2001).

Table 3: Contributions as a function of an initial seed donation (10, 33, or 67% of the $3,000 cost) and the offer of a refund (R)

	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

Note: Table 1, List and Lucking-Reiley, Journal of Political Economy, 2002.

While the field study by List and Lucking-Reiley (2002) demonstrates that a large initial contribution increases subsequent giving it is more difficult to determine what gives rise to the effect. An advantage of laboratory studies is that manipulations of the environment allow us to test the comparative static predictions of the three proposed explanations for sequential solicitations.

For example the key insight by Andreoni (1998) is that sequential giving can play a coordinating role when fixed costs are so high that coordination fails under simultaneous giving. A test of this hypothesis requires that the effect of sequential giving is examined for different fixed costs. However in the field it is difficult to vary the fixed costs of production while keeping other aspects of the environment constant.[49] Bracha, Menietti, and Vesterlund (2010) instead use the laboratory to test the coordinating

[49] For example in a field experiment Rondeau and List (2008) find greater contributions in a $5,000 campaign where an initial $2,500 has already been raised than when funds were raised for a $2,500 campaign. They argue that the differential arises from donors perceiving the former as being of higher quality.

role sequential giving plays under varying fixed costs.[50] They examine a two-person public good game with piecewise linear payoffs where there is an interior equilibrium in dominant strategies and an interior Pareto optimal outcome.[51] Participants are given an endowment of 10 tokens which they may invest in a public good. The 2x3 design varies the sequence of moves (sequential and simultaneous) and the fixed costs of giving (no-cost; low-cost, 6; high-cost, 8). As in Andreoni (1998) the return from the public good only arises when contributions are sufficient to cover the fixed costs. Following Potters et al. (2005, 2007) sequential and simultaneous giving is implemented by varying whether the second mover is informed of the first mover's action, that is both games are 'sequential' in moves and only information on the first mover's choice varies by treatment.[52] Consistent with Andreoni's model they find that the sequential game can help overcome coordination problems that arise in the simultaneous game. Specifically with high fixed costs (8), individuals often fail to provide the public good in the simultaneous game, and the sequential game successfully eliminates these un-desirable outcomes. Sequential giving increases both the likelihood of providing the public good and the participant's average earnings when fixed costs are high. Despite the equilibrium prediction that a similar result should hold for low fixed costs (6), the study finds instead lower contributions in the sequential than simultaneous game. The reason is that with low costs individuals overcome the strategic uncertainty of the simultaneous game by increasing their contributions to secure provision of the public good, thus contributing more than predicted. By facilitating coordination on the positive-provision outcome, sequential giving eliminates the risk of under-provision and decreases contributions to the predicted level, hence when fixed costs are low contributions fall below those of the simultaneous game. While behavior under low fixed costs differs from that predicted, the study nonetheless confirms the key insight that the sequential game improves provision when the simultaneous game results in coordination failure.

[50] Erev and Rapoport (1990) examine sequential and simultaneous giving in a threshold public good environment where three out of five participants must contribute to secure provision of a desirable public good. While they do not find that participants are more likely to contribute in the sequential game, the return from coordination is seen from greater provision in the sequential game.

[51] The return from the public good is constant at 50 cents and the individual's per unit cost is 40 cents for units 1-3, 70 cents for units 4-7, and $1.10 for units 8 and greater. Thus contributing 3 is a dominant strategy, and the efficient outcome is achieved with individual contributions of 7. In contrast to previous examinations with an interior Nash (see Laury and Holt, 2008, for a review) they find that contributions in this environment correspond to the equilibrium prediction (see also Menietti et al. 2009).

[52] Rapoport (1997) notes that von Neumann and Morgenstern (1947) distinguish between 'preliminarity' (priority in information) and 'anteriority' (priority in time). The emphasis here is on the effect of 'preliminarity.' Cooper et al. (1993) demonstrate that 'anteriority' alone can improve coordination, that is 'virtual' observability may be sufficient (see also Rapaport, 1997; Weber, Camerer, and Knez, 2004). To identify the separate effect of information (i.e., seeing the partners' choice) it is necessary to not alter the sequence, but only whether the first mover's contribution is observed.

While the laboratory study suggests that sequential giving can play a coordinating role, the insensitivity to refunds calls this explanation of the List and Lucking-Reiley data into question. Is it reasonable to argue instead that their result is due to signaling? Past research has repeatedly shown that the cognitive demands required to implement a signaling equilibrium are substantial.[53] To determine whether participants nonetheless can use initial contributions to draw inference on the quality of the public good, Potters et al. (2005, 2007) investigate the role of sequential play when the quality of the public good is uncertain. In contrast to Vesterlund (2003) they examine an environment where the lead contribution is only partially revealing. Specifically they examine a two-person public good game where the individual in each round is given the option of keeping a dollar or giving it to a public good. The return from the public good is equally likely to be 0, 0.75 or 1.5. The efficient outcome is for both players to contribute when the return equals 0.75 or 1.5. Absent information on quality the expected return from giving is 0.75 and donors should not contribute. With full information, contributions should only occur when the return from the public good equals 1.5. Hence with symmetric information contributions fall below the efficient outcome. The role of sequential play can be seen in the asymmetric-information case when the quality of the public good is known by one but not the other player. With simultaneous play the informed player will only give when the return equals 1.5 and the uninformed player will never give. With sequential play the efficient outcome is however achieved when the informed player contributes first. Specifically the informed first mover contributes for any positive return to the public good (0.75 or 1.5), and the uninformed second mover mimics the action of the first mover as a lead contribution indicates a positive expected return from giving. To investigate the role of signaling, Potters et al. (2007) examine a 2x2 design varying whether the game is simultaneous or sequential, and whether only one or both players are informed of the return from the public good. A round of the experiment proceeds as follows. Participants are randomly paired in groups of two at the beginning of each round, and first movers are informed of the return from the public good.[54] First movers then decide whether to invest in the public good. When all first movers have chosen, second movers are either informed of the return from the public good (full-information) or told that each of the

[53] For example, in the entry limit pricing game of Cooper, Garvin, and Kagel (1997), play consistently starts off with the first mover choosing her myopic maximum, i.e., the choice that maximizes her payoffs if she ignores the effect her choice has on that of the second mover. Similarly the second mover typically starts off at the myopic maximum, ignoring the information that is contained in the first mover's choice. In their experiment play only converges to equilibrium with sufficient repetition.

[54] To secure comparable sessions the distribution of the return from the public good os drawn prior to the experiments and the same distribution is used for each of the four treatments.

three values are equally likely (asymmetric-information). Similarly the second mover is either informed of the leader's choice (sequential) or not informed (simultaneous). The second mover then decides whether to invest in the public good.

With giving in the sequential game being 50 percent larger than in the simultaneous game the experimental results are consistent with the predicted comparative static. Figure 5, panel a, shows behavior by the informed leader and uninformed follower in the two asymmetric-information treatments. The sequence of moves is sequential in both the sequential and the simultaneous game, however only in the sequential game does the follower see the leader's contribution prior to contributing. Under simultaneous play the follower contributes about a third of the time, and the leader only contributes when it is payoff maximizing for her to do so (i.e., when the return is 1.5). By contrast, under sequential play the follower copies the informed leader's decision by giving 81 percent of the time when a leader gives and giving only 8 percent of the time when a leader does not give. Perhaps anticipating the follower's response the leader contributes when it is collectively optimal to do so, thus securing that the uninformed follower more frequently contributes when the return is 0.75 or 1.5. As evidence of the efficiency gain, sequential play increases giving by both the leader and the follower when the return is 0.75. While this behavior is consistent with the follower inferring the quality of the public good from the leader, it is also consistent with followers being reciprocal and leaders anticipating this. The two full-information treatments help distinguish between these two hypotheses. Contributions under full information are shown in Figure 5, panel b, and suggest that non-pecuniary factors such as reciprocity do not explain the result. When there is full information, contributions are slightly lower (7 percent) in the sequential than simultaneous game. In particular sequential play does not facilitate greater contributions in the m=0.75 case. As sequential play does not increase contributions in the full-information case, but does increase them in the asymmetric-information case, the study concludes that signaling is a likely explanation for the increase in giving.

Figure 5: Contribution Rates
Panel a: Asymmetric Information

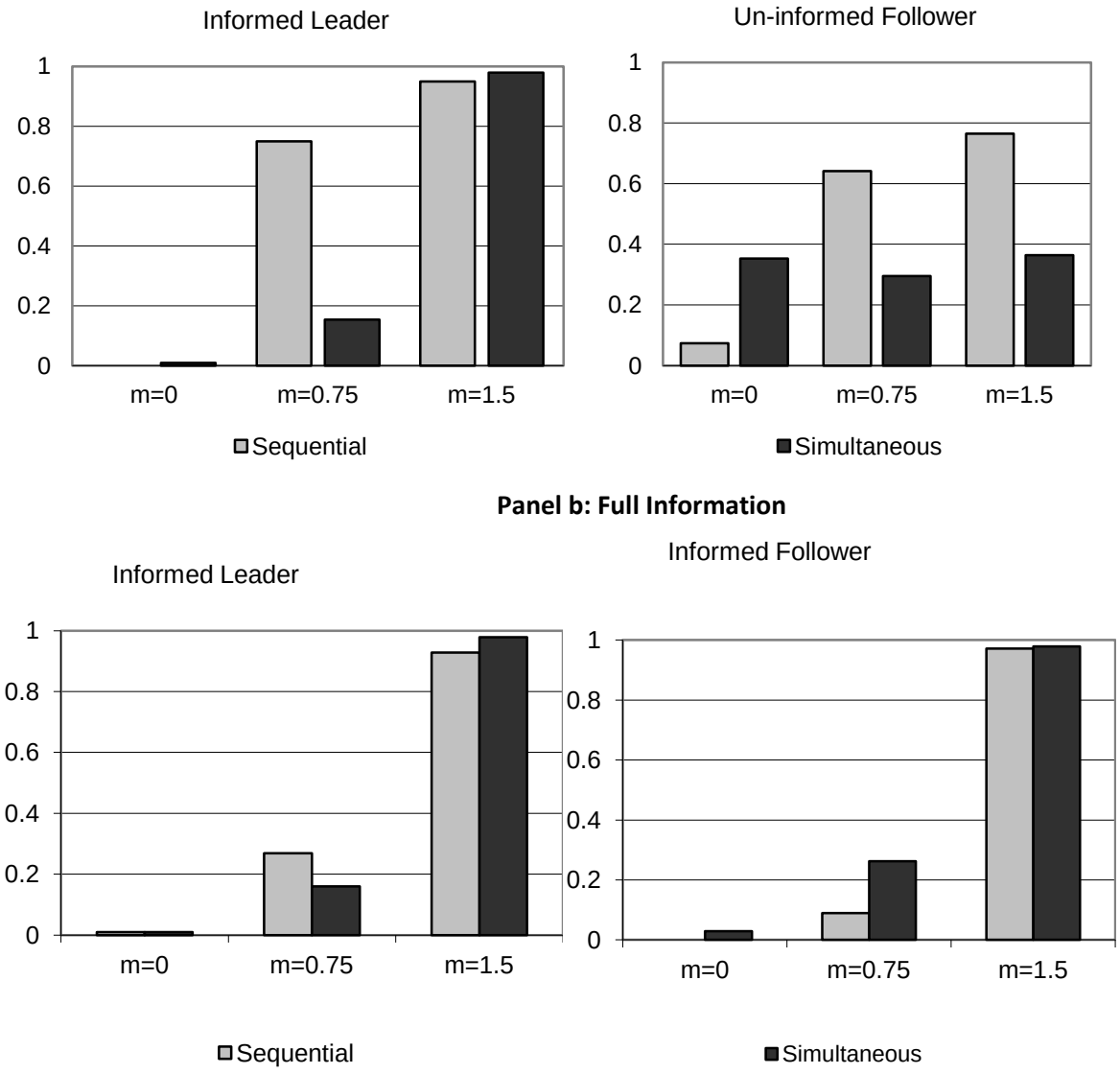

*Figure 1,2,3 and 4 from Potters et al. 2007

Komai, Grossman and Deters (2011) examine a three-person environment similar to that of Potters et al. (2005, 2007) and confirm the finding that leadership giving facilitates information transmission. They too find that when the initial contribution is partially revealing, it is possible for contributions under asymmetric information to exceed those under full information. Meidinger and Villeval (2002) examine instead the effect of sequential play when there is a fully separating equilibrium. They also find that sequential play increases giving, but the increase is driven by reciprocity rather than signaling. An explanation for the different results may be that the fully separating equilibrium is more cognitively demanding. Another explanation may be that Meidinger and Villeval examine behavior in a finitely

repeated game where reciprocity can play a greater role than in the random-matching settings of Potters et al. and Komai et al. The key insight of these studies is that despite signaling being cognitively demanding it can secure, independent of other-regarding preferences, larger contributions under sequential-play and render it the preferred solicitation strategy.

The evidence found in a number of field studies can also be seen as consistent with signaling playing a role in explaining the frequent use of sequential solicitations. Soetevent (2005) conducts an experiment using 30 churches in the Netherlands to determine the effect of sequential giving. For a period of 29 weeks, the familiar collection bags were randomly replaced with open collection baskets. For each offering, baskets were assigned with probability 0.5, bags were assigned otherwise. While donations in the collection bag are anonymous those in the collection basket are not as the contribution can be observed by those seated close to the individual contributing. In addition to varying the collection method the study also examines under what conditions a particular collection method is effective. At each service there were two offerings, the first was used solely for internal purposes whereas the second often was used to fund external activities or organizations. The results reveal that baskets only increase giving in the second offering, and only when the second offering was used to fund external causes. Furthermore donations to these causes were also more responsive to pulpit suggestions on donation amounts. One interpretation of the results is that there is greater uncertainty about the quality of an external cause and as a result the informational value of a recommendation or someone else's contribution is greater in this case. Another interpretation is that there is less of an excuse for avoiding the solicitations for external causes. The reason is that general support for the church is typically solicited through direct bank deposits, thus for internal causes it may be easier to claim that 'you gave at the office.' Finally it may be that external offerings give better opportunities to signal unselfish behavior, since there is no transparent material benefit to the contributor from giving. Consistent with Ariely et al.'s (2009) examination of Benabou and Tirole (2006) the extrinsic motivation reduces the image signal of giving when behavior is visible.

Results of a field experiment examining contributions to public radio (Croson and Shang, 2008; Shang and Croson, 2009) are also consistent with initial contributions serving as a signal on quality, but once again this is not the only possible explanation for the results. Croson and Shang manipulate the information individuals receive when calling to make a donation during an NPR fundraising campaign. Four different treatments are examined; callers are either given no information on the contribution of

others or they are informed that "We had another member, they contributed {either $75, $180, or $300}." They find that callers who were informed of the higher ($300) donation contributed 12% more than those who were given no information.[55] Interestingly the information only affects the contributions of new donors, whereas it has no effect on renewing members. Examining contributions a year after the campaign they find that new donors who received information are more likely to give and conditional on giving they give more. While the differential response to information is consistent with new members being more uncertain about the effect a contribution will have on the station it may also result from new members being more sensitive to information that suggests a contribution norm. The latter interpretation is also consistent with the results of Martin and Randal (2008). They conduct a field experiment manipulating the monetary content of a glass donation box at an art museum. As List and Lucking-Reiley (2002) this study is by nature solely on sequential giving. Compared to a control of an empty donation box they find that the contribution frequency increases when the box instead contains coins. Looking at two treatments where the coins are replaced with either large or small bills of the corresponding value they find a significant increase in mean contributions, the donation propensity however drops relative to that for coins. While the three treatments dominate the control, the small bill treatment secures the largest total donation. Across treatments they note that the composition of the donations (coinage vs bills) mirrors the composition of the initial content.

Evidence that individuals increase their giving in response to large gifts by others is also shown by Frey and Meier (2004) in a study on giving at the University of Zurich. When paying their tuition bill students were given the option of contributing to two social funds, the monetary donation to each of the funds is pre-specified (CHF 5 and 7 respectively). Frey and Meier examine the effect of informing students the share of students who in the past contributed to both funds equaled 64% in one treatment and 46% in another. Controlling for past donations they find that students give more when they are informed that 64% rather than 46% of potential donors made large contributions in the past.[56] Kessler (2011) shows

[55] There is no effect of the $75 information, and the $180 effect is only significant in some specifications.

[56] Along with their tuition payments students were asked to contribute to one or two social funds. They were provided with information on the fraction of students who previously had contributed to both funds. While 64% represented the previous year's average, 46% represented the average for the past ten years. Chen et al. (2010) examine contributions to online rating communities and find that social information increases giving when the information suggests that the individual falls below the norm. Individuals who exceed the norm decrease their contribution, but by much less than the increase seen for those who fall below the norm (530 percent increase versus a 62 percent decrease). Environmental studies also find that people respond positively to information on others' contributions (e.g., Allcott, 2011; Cialdini, Reno and Kallgren,1990; Goldstein, Cialdini and Griskevicius, 2008).

that even a signal of support can affect behavior. In a large scale field experiment involving over 36,000 employees at 278 workplaces he examines the effect on donations of allowing employees to wear a pin indicating support for a charity. He finds that the access to support-pins increases average work place giving by almost 10%. To investigate the channel through which contributions increase he conducts a complementary laboratory experiment which demonstrates that donations to a charity increase from those exposed to signals of support for the charity.[57]

As noted the evidence from the field is consistent with several of the theories on sequential giving. Indeed the observed response to sequential giving may result simply from individuals having other-regarding preferences or being sensitive to the norms for giving. As shown by Romano and Yildirim (2001) sequential play will be attractive when for one reason or another the best response functions of followers are positively sloped and sufficiently steep to warrant the first mover to increase her contribution in the sequential game.

While laboratory studies suggest that individuals are not solely concerned about the payoff received from the public and private goods, it is less clear that preferences alone can explain the reliance on sequential play.[58] Moving beyond Varian's stark quasi-linear example researchers have examined the effect of sequential play in the linear VCM where such other-regarding preferences may be more important. The results from these studies are mixed. Gächter and Renner (2003), Potters et al. (2007), and Rivas and Sutter (2008) find that contributions are positively correlated, but they do not find that sequential play increases giving. By contrast Güth, Levati, Sutter, and Van Der Heijden (2007) find that sequential play results in a large and significant increase in giving.[59] Examining an environment with

[57] Specifically individuals who did not wear a pin but were exposed to another person wearing a pin were twice as likely to donate and donated three times more than someone who was instead exposed to someone who did not wear a pin of support. Using elicited beliefs on the charity's quality Kessler (2011) rules out the possibility that the pin serves as a signal on quality. He argues instead that the response is due to individuals experiencing a disutility from failing to match the contribution by others. Those wearing pins were not only expected to contribute more they did in fact contribute more. See also Pogrebna, Krantz, Schade and Keser (2011) for the effect of cheap talk on contributions.

[58] Other-regarding preferences may also imply that sequential play decreases contributions as punishments by the second mover may decrease giving. While many studies document positively sloped best-response functions (see e.g., Clark and Sefton's, 2001, examination of the sequential prisoner's dilemma) it is clear that the best response is sensitive to the environment under investigation, e.g., with quasi-linear preferences Andreoni et al. (2002) and Gächter et al. (2010) do not find that the behavioral best response is everywhere increasing.

[59] In addition to examining the effect of sequential giving Güth et al. (2007) also examine the effect of allowing the first contributor to exclude members of the group in subsequent rounds. Such strong leadership is shown to be more effective.

heterogeneous endowments Levati, Sutter, and Van Der Heijden (2007) find that sequential play increases giving when the distribution of incomes is known.[60] Examining an environment with an interior Nash equilibrium Pogrebna, Krantz, Schade and Keser (2009) also find that sequential play increases contributions. Finally Moxnes and Van der Heijden (2003) examine a public bad environment and find in a within-subject analysis that investments in the public bad are lower when the decision of one player (the leader) is observed prior to the remainder of the group making a decision. While the effect is small, it is significant.

In contrast to the anonymous laboratory setting, in the field it is common that at least the identity of the lead donor is known. This difference may help explain why laboratory studies do not systematically find larger donations in the sequential game. It may be argued that the laboratory is stripped of many of the features that make sequential giving preferable in the field. For example, a central characteristic which is missing from the laboratory studies is that of the lead donor herself.

A better understanding of what may give rise to the behavior suggested by Romano and Yildirim (2001) is achieved by examining whether the typical characteristics of the lead donor are likely to influence behavior in the sequential game. For example lead contributors distinguish themselves by being wealthy, well-known and respected. These are all characteristics that make the donor ideally suited for signaling the quality of the public good, however they are also characteristics that may increase giving by followers who are concerned about their relative ranking in society.[61] Kumru and Vesterlund (2010) show that sequential play dominates simultaneous play when donors prefer to associate with those of higher social ranking than themselves. Furthermore using a simple linear example they show that aggregate contributions and earnings are larger when high-status donors are solicited before rather than after those of low status. To investigate this comparative static experimentally they induce a status differential in the laboratory using the procedures by Ball and Eckel (1998) and Ball et al. (2001). Having completed a brief quiz participants are assigned to a star or a no-star group, members of the star group are publicly recognized and given a round of applause. Participants are then reseated in a 'star' and 'no-star' section to the laboratory. They play 12 rounds of a two-person sequential contribution game where in each round they decide whether to keep a token or place it in a public account with an MPCR of 0.75.

[60] In the incomplete information treatment participants only know their own income and total income.

[61] Economists have come to recognize that status and concerns for relative standing can affect both economic decisions and the allocation of resources. See e.g. Frank (1985), Fershtman and Weiss (1993), Congleton (1989), Hopkins and Kornienko (2004), Heffetz and Frank (2010).

Using random matching participants are in each round paired in a two-person group consisting of a star and a no-star participant. The between-subject design simply alter whether the star-participant contribute before rather than after the no-star participant. They find that low-status followers are likely to mimic contributions by high-status leaders and this in turn encourages high-status leaders to contribute. [62] Total contributions almost double when individuals of high status contribute before rather than after those of low status, increasing from 0.46 to 0.83 tokens.

An interesting aspect of the models on sequential giving is that they often predict that both the fundraiser and the donors themselves will have a preference for sequential giving. Examining the Potters et al. (2007) signaling model, Potters et al. (2005) show that indeed sequential moves arise endogenously.[63] 81 percent of donors agree to move in sequence, and the resulting contributions are larger than those of the simultaneous-move game. In fact the increase in giving between the sequential and simultaneous game is much larger when sequential play arises endogenously. When sequential play is imposed the overall increase in giving is around 50 percent. In contrast endogenously selected sequential play generates contributions that are 150 percent larger than those seen when participants instead opt to contribute simultaneously. This effect is primarily driven by contributions in the endogenously arising simultaneous game being particularly small. The finding that the gain from sequential play is greater when it arises endogenously suggests that the advantage of sequential solicitations may be underestimated when we exogenously impose the structure in the laboratory.

Arbak and Villeval (2011) also examine endogenous leadership. In a three-person VCM game participants can contribute either in a first or second round.[64] When selecting to contribute in the first round participants must specify how much they would like to give as a leader. The game is designed such that only one person can be the leader, with the leader being randomly determined. The design secures that lead and follower contributions are identified for those who volunteer to be leaders, and

[62] Evidence of a greater tendency to mimic high-status participants is also seen in Eckel, Fatas and Wilson (2010). They examine four-person groups in a network where one central player is linked with each of the other participants, but no other participant is linked. Thus the central player observes and is observed by the others. The central player may be seen as a leader as only he is observed by others. Altering the status of the central player, by allocating the central position to the person who earns the highest or the lowest, score on a trivia quiz, Eckel et al. find that higher status leaders are attended to and mimicked more systematically.

[63] The examined environment may give rise to two equilibrium contribution orders. Either the uninformed and informed donors contribute simultaneously or the informed contribute prior to the uninformed.

[64] The design is similar to that of the endogenous timing duopoly games by Hück, Muller, Normann (2002) and Fonseca, Hück, and Normann (2005).

helps determine what motivates people to lead. Although it is costly to be a leader, a quarter of participants volunteer to lead, securing that about half the groups contribute sequentially.[65] Contributions in these sequential groups are significantly larger than in groups that do not have a leader. Those who volunteer to lead tend to give more and while their contributions decrease slightly when they are randomly assigned to be followers, they remain higher than those seen for volunteer followers. Güth, Levati, Sutter and van der Heijden (2007) also investigate endogenous leadership in a linear VCM, finding that only a third of their groups opt to have a leader, despite groups with a leader being substantially more efficient. The advantage of endogenous leadership is also documented in Rivas and Sutter (2011). Examining the VCM they find that exogenous leadership does not increase giving, whereas endogenous leadership increases giving and sustains it over the course of the experiment.[66] The experimental evidence on endogenous sequencing suggests that sequential moves may be a particularly robust mechanism when donors benefit from it.

3.1.2. Dynamic Giving

Closely related to the research on leadership giving is a literature on giving in a more complex set of dynamic games. Typically the contribution games are such that donors have many opportunities to give and they are free to contribute whenever and as often as they wish. Importantly donors are informed of the current level of contributions throughout the campaign. Thus donors can slowly increase their contribution and can condition it on the donations by others. As argued by Schelling (1960) this dynamic structure may make it possible for individuals to slowly build trust and ultimately coordinate on a high provision outcome.[67] A number of studies have investigated these dynamic provision environments

[65] Gächter, Nosenzo, Renner, and Sefton (2012) further investigate what drives leaders to make large contributions. In a two-person linear VCM they ask participants to specify what they would contribute as leaders, and using a strategy method what their conditional contribution would be as a follower. To investigate what drives leaders to lead they elicit beliefs on what they expect followers to contribute. Characterizing half the participants as cooperative followers, they find that this subset of participants make larger leadership contributions. The greater level of giving is explained by this group being more generous and by them being more optimistic about the cooperation by followers. See also Jack and Recalde (2012) who examine the effect of having elected leaders lead by example.

[66] Huck and Rey-Biel (2006) also examine the conditions under which leadership is likely to arise endogenously and what characteristics are most attractive for a leader. They find that contributions are largest when the most generous and most conforming individuals contribute last. Nosenzo and Sefton (2011) expand on the study by Gachter et al. (2010) and ask whether in a quasi-linear environment sequential play will arise endogenously. They find that the inferior sequential move order where there is a first-mover advantage arises less than 20 percent of the time.

[67] Schelling writes (1960, pp. 45–6): “Even if the future will bring no recurrence, it may be possible to create the equivalence of continuity by dividing the bargaining issue into consecutive parts. If each party agrees to send a

experimentally. As in the literature on sequential giving the question of interest has been whether contributions in these dynamic games exceed those in the comparable static game. An early experiment on real time contributions to public goods is presented by Dorsey (1992). Matched in groups of four he provides participants with 3 minutes during which they can revise an initial contribution to a public good. Updates on the current provision of the public good are provided throughout the period. A series of different payoff structures are considered.[68] Examining the linear VCM with an MPCR of 0.3 where participants can continuously revise their initial contribution upward he finds a limited effect of continuous-time revisions. In the first 3-minute game individuals are shown to contribute slightly more than 40 percent of their endowment, however contributions decrease as the game is repeated and ultimately fall to 10-15 percent towards the end of ten games. While the study does not report on contributions in the corresponding static game, Isaac and Walker (1988) examine contributions in the static version of the game and show initial contribution rates of around 35 percent declining to about 5 percent after ten periods of play. Thus Dorsey's study does not demonstrate a substantial effect of real-time revisions in the linear VCM.[69] Examining a similar five-person linear VCM with an MPCR of 0.33 Kurzban, McCabe, Smith and Wilson (2001) find that real-time upward revisions facilitate cooperation. Cooperation rates of 50 percent of endowments are sustained over the course of ten repetitions of the game, thus defying the common trend of decreasing contributions in repeated play of the public good game.[70] Cooperation is also sustained in Kurzban and Houser's (2001) examination of dynamic contributions in a linear VCM.[71]

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million dollars to the Red Cross on condition the other does, each may be tempted to cheat if the other contributes first, and each one's anticipation of the other's cheating will inhibit agreement. But if the contribution is divided into consecutive small contributions, each can try the other's good faith for a small price. Furthermore, since each can keep the other on short tether to the finish, no one ever need risk more than one small contribution at a time. Finally, this change in the incentive structure itself takes most of the risk out of the initial contribution; the value of established trust is made obviously visible…" See also Andreoni and Samuelson (2006) who ask how one can best distribute the stakes of a prisoner's dilemma game over two consecutive prisoners' dilemma. They find as suggested by Schelling that it is better to start small reserving about 2/3 of the stake to the second round.

[68] Dorsey (1992) examines four different payoff structures: linear VCM, a provision point, an implicit provision point, and a piecewise linear payoff. In addition to examining the effect of upward revisions of an initial contribution Dorsey (1992) also investigates the case where contributions can both be increased and decreased. The results under this 'cheap-talk' provision treatment are shown to generate markedly lower contributions.

[69] Real-time revisions do increase giving when there is a provision point or when payoffs are piecewise linear and only upward revisions are allowed. Friedman and Oprea's (2012) study documenting remarkably high levels of cooperation in continuous time two-person social dilemma games suggests that communication is important in these games, leading Charness, Friedman, and Oprea (2012) to augment Dorsey's (1992) environment with communication. With real-time provision over a period of ten minutes they find that communication causes a substantial and significant increase in giving.

[70] In addition to examining the effect of dynamic play the study also investigates the effect of downward revisions in contributions, as Dorsey (1992) they find that this decreases cooperation. Furthermore they examine the effect

Outside of the argument that dynamic play establishes trust there are several explanations for why dynamic contributions may result in greater giving to the public good. Marx and Matthews (2000) demonstrate that there are circumstances where dynamic play is needed to secure positive provision equilibria. When payoffs are increasing up to a completion point, and a discrete benefit is secured upon completion, then it may possible to secure provision only in the dynamic game.[72] Specifically while it is not in the donors interest to contribute in the static one-shot game, it is possible to sustain provision in the dynamic game through history-dependent trigger strategies. Duffy, Ochs, and Vesterlund (2007) examine the environment suggested by Marx and Matthews. Specifically payoffs are such that zero-provision is the unique equilibrium of the one-shot game, whereas positive and zero-provision equilibria arise in a dynamic game where donors can give over several contribution rounds. Of particular interest is whether the completion benefit plays the central role predicted by Marx and Matthews. Dynamic play is predicted to have no effect on giving in the absence of a completion benefit, while it may increase giving in the presence of such a benefit. In building on the theory by Marx and Matthews the payoff structure of Duffy et al. differs from that of Kurzban et al. (2001) and Kurzban and Houser (2001), yet the results confirm their finding that dynamic play increases giving. In contrast to the equilibrium prediction the increase in giving from dynamic play is however not sensitive to the presence of a completion benefit. To further investigate what causes the increase in giving Duffy et al. conduct an additional treatment where participants can contribute in multiple rounds of simultaneous giving, but are not given feedback on contributions between rounds. Thus the new 'dynamic' treatment is informationally equivalent to that of the one-shot static game. Casting doubt on the possibility that the increase can be attributed to increased possibilities of building trust, they find that total provision is independent of participants receiving feedback in the dynamic game. This suggest that part of the increase in dynamic giving does

information on others' individual contributions has on giving. High levels of cooperation are sustained when the lowest contribution in the group is announced and only upward revisions are permitted.

[71] Kurzban and Houser (2001) examine contributions in a four-person VCM with an MPCR of 0.5. Participants are first asked to make simultaneous contributions and are then sequentially asked whether they want to increase their initial contribution. The number of rounds of each supergame is randomly determined. Across supergames they find that about 50 percent of endowments are contributed. An advantage of the experimental design is that it provides a classification of individual contribution types along the lines of Fischbacher, Gächter, and Fehr (2001).

[72] A discrete completion benefit arises when the full benefits of a project are not experienced until the project is completed. For example, contributions to the homeless may have some immediate beneficial effect, but a discrete increase in benefits may be achieved when sufficient funds have been collected to build a homeless shelter.

not result from the ability to condition on that of others, and it causes them to conclude that special consideration should be given to trembles when comparing static and dynamic games.[73]

Choi, Gale and Kariv (2008) examine dynamic contributions in a pure threshold environment, where the return from the public good is fixed and only achieved if contributions are sufficient to cover a fixed cost. While there exist both positive and zero provision equilibria in the static version of this game, with sufficiently many contribution rounds the zero-provision equilibrium is eliminated in the dynamic game.[74] Consistent with past studies they find significantly greater giving when there are multiple rather than one simultaneous contribution round. Furthermore behavior in the dynamic game is shown to be consistent with that predicted by symmetric Markov perfect equilibrium. While they do not examine a no-feedback dynamic treatment, as in Duffy et al., they note that holding the time horizon fixed behavior responds to treatment variables in a manner predicted by theory, and thus they conclude that "something other than pure trembling is needed to explain the high provision rates."

The examined studies demonstrate that there is ample reason for fundraisers not to rely on a simultaneous solicitation strategy. While much work has been done to uncover the benefits of seed donations or sequential giving, the research on dynamic contributions is more limited, and more research is needed to fully understand what causes contributions to increase in these more complex environments. In particular it is essential that we properly account for the increased likelihood of error that arises when individuals are given multiple opportunities to give.

3.2. Lotteries

Lotteries are another common fundraising mechanism. While lotteries may not be the ideal source of revenue for governments, research suggests that they may be well suited for non-profits.[75] At first glance it is not clear why nonprofits would prefer to use lotteries over voluntary giving. How can it be to the organization's advantage that it spends part of its revenue to pay winners of the lottery? Morgan

[73] Virtual observability of the type demonstrated by Cooper et al. (1993) and Weber, Camerer, and Knez (2004) may also help explain the larger contributions in the dynamic game without feedback.

[74] That is dynamic play reduces rather than expands the set of equilibria. The elimination of the zero provision equilibrium is also what drives the advantage of sequential play shown by Andreoni (1998). In contrast Marx and Matthews (2000) examine the case where simultaneous play result in zero provision and sequential play expands the set of equilibria to also include one of positive provision.

[75] Provided the option to tax, it is not optimal for governments to rely on lotteries as a source of revenue. For a recent examination of state-run lotteries see for example, Kearney (2005) and Jones (2012).

(2000) provides a very intuitive answer to this question. He examines a fixed-prize lottery where the chance of winning is given by the number of tickets the individual purchased relative to the sum of tickets purchased. Assuming that the lottery revenue net of the prize is used to finance the public good, and that individuals are risk neutral and have quasi-linear preferences, he shows that the provision of the public good is larger under the lottery than under voluntary giving. The reason is that the lottery introduces a negative externality which counteracts the positive externality that results from public good provision. In purchasing an additional ticket the individual decreases the chances that a given lottery ticket will win. Morgan demonstrates that the failure to account for this negative externality counteracts the under-provision that results from failure to account for the positive externality associated with increasing provision of the public good. The net result is that funds raised through the lottery covers the cost of the prize and increases provision of the public good.

Conducting a laboratory experiment Morgan and Sefton (2000) compare provision in a VCM and in a lottery. The public good technology is independent of treatment and money given to the public good secures an MPCR of 0.75. To eliminate the possibility that contributions fall short of the prize, the experimenters fund an 8-token prize, hence funds spent on lottery tickets are directly contributed to the public good. To make the VCM treatment comparable they treat the 8-token prize as a donation to the public good, with an MPCR of 0.75 each participant in the VCM is therefore given a 6-token bonus payment. The experimental sessions were conducted both at Penn State and at Iowa. We discuss the Iowa design as it is directly comparable to the standard VCM.[76] Each session consisted of 20 rounds, five of which were for practice. In each round participants were randomly matched in groups of four, given an endowment of 20 tokens, and asked to contribute to a public good. In the lottery treatment a one-token contribution to the public good provided the individual with a ticket to the lottery. While zero provision is the equilibrium prediction in the VCM, the unique Nash equilibrium in the lottery is for each individual to bet 6 tokens.

Behavior in the VCM and lottery (lot) treatments are shown in Figure 6. Contributions in the VCM are initially at about 50% of the endowment and decreases slightly to about 40 percent at the end of the experiment. This sustained high level of giving is consistent with that seen in previous VCM experiments

[76] The Penn State sessions examined groups of two with repeated interaction, the revenue of the lottery was shown to dominate that of the VCM.

with a high MPCR (e.g. Isaac and Walker, 1988).[77] Surprisingly there is little evidence of a treatment difference. The revenue collected in both the VCM and the lottery is greater than predicted, and the public good provision does not differ significantly from that in the lottery treatment. Morgan and Sefton hypothesize that the deviation from the equilibrium is due to the tension between equilibrium play and efficiency. The greater-than-predicted giving under the lottery may result from the equilibrium being far below the efficient contribution of 20 tokens. To address this concern they consider a lottery (biglot) with a larger prize of wining (16 tokens). This increase in the prize raises the predicted individual bets from 6 tokens (with a prize of 8) to 12 tokens (with a prize of 16). Behavior in the 'biglot' treatment is more in line with the equilibrium prediction. Bets increase relative to the small-prize lottery, and provision of the public good net of the prize exceeds that of the VCM (with a bonus payment of 6). Morgan and Sefton conclude that behavior is consistent with the predicted comparative static when the equilibrium of the lottery is relatively efficient.[78] To rule out the possibility that bets are driven by joy of gambling or confusion, they cleverly conduct a treatment where the lottery is not welfare enhancing. The prize in this 'badlot' treatment is 8 tokens and bets do not generate a public good. In contrast to the joy-of-gambling hypothesis they find that behavior quickly converges to the equilibrium bet of 2 tokens. Hence participants realize that it is not in their interest to place bets in excess of the expected value of the lottery,[79]

[77] With an MPCR of 0.75 it costs the individual 0.25 tokens to increase the payoffs of the remaining group members by 2.25 tokens.

[78] For comparability it may be argued that the 'biglot' treatment should be compared to a VCM with a 12-token bonus, however note that the contribution rates seen with a 6-token bonus payment are comparable to those without a bonus payment (e.g., Isaac and Walker, 1988; Dale, 2004). For robustness it may be of interest to examine an even greater lottery prize for which the equilibrium prediction significantly exceeds the focal midpoint of the strategy space, see Dale (2004).

[79] Schram and Onderstal (2009) examine instead a lottery with private values and incomplete information and do not find that bets respond to an increase in the MPCR from 0 to 0.5 in a four-person group.

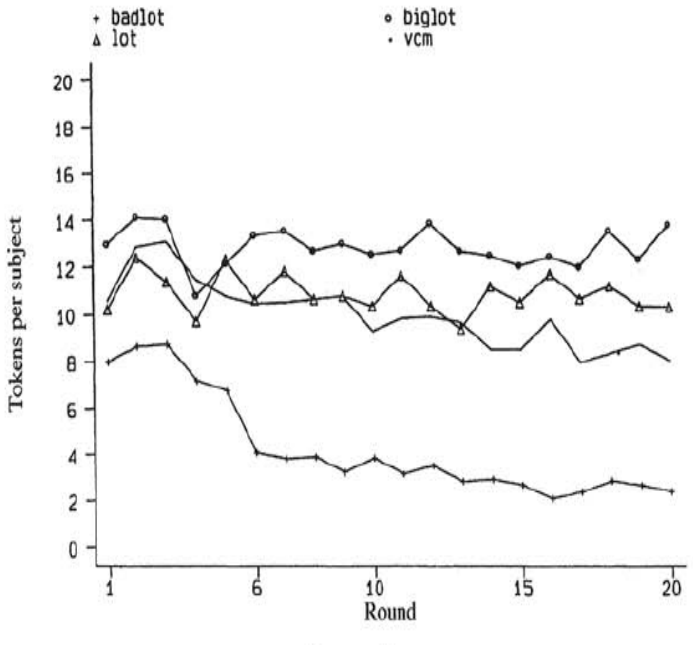

Figure 6: Average contributions in Iowa treatments (from Morgan and Sefton (2000), figure 8). Legends refer to vcm as the voluntary contribution mechanism with MPCR = 0.75, lot and biglot refer to fixed-prize lotteries with prizes of respectively 8 and 16 where proceeds are given to a public good with an MPCR = 0.75. badlot refers to a fixed-prize lottery where bets are confiscated.

Dale (2004) also compares contributions in a VCM and a lottery. The design is that of Morgan and Sefton (2000) with the exception that he increases the prize to 20 tokens and alters the manner in which the prize is funded.[80] As for lotteries in the field Dale opted to have the cost of the prize paid out of the bets collected for the lottery, and to have bets net of the prize contributed to the public good. Participants are informed that the lottery is carried out only in the event that the sum of bets equals 19 tokens or more. The equilibrium prediction is for each individual to bid 15 tokens per round. The behavior in Dale's VCM is similar to that of Morgan and Sefton, individuals initially contribute 10 out of their 20-token endowment, with contributions decreasing to about 8 at the end of the experiment. With mean bets in the lottery falling slightly below 13, the cost of the 20-token prize implies that the resulting provision of the public good does not differ by treatment. In contrast to Morgan and Sefton (2000), Dale (2004) does not find that lotteries improve provision.

[80] Participants make decisions over 20 rounds (5 for practice). They are randomly matched in groups of four at the beginning of each round. Depending on treatment they are then given the opportunity to use a 20 token endowment to either bet in the lottery or directly contribute to a public good. The MPCR is maintained at 0.75.

Orzen (2008) also investigates the advantage of the lottery. Examining groups of four with an MPCR = 0.5 and a prize of a 100 tokens, he directly funds the prize as in Morgan and Sefton. To secure comparability each participant in the VCM is given a 50-token bonus. Although bets are greater in the lottery than in the VCM, it is not until the very end of the 25-round experiment that the lottery secures larger provision. Over the course of the experiment revenue from the lottery net of the 100-token prize falls short of that seen in the VCM. The reverse finding is seen in a low-MPCR environment examined by Lange, List and Price (2007). Using an MPCR of 0.3 the tension between equilibrium and efficiency is much reduced, and as in previous studies (e.g., Isaac and Walker, 1988) they find that VCM contributions decrease to less than 10 percent of the individual endowments.[81] Confirming the predicted comparative static the provision of the public good is shown to be greater under the single-prize lottery than under the VCM.

Laboratory studies typically find that contributions in the VCM fall short of the sum of bets in the lottery. What is unclear is whether the difference between the two is sufficient to cover the cost of the lottery prize. The advantage of the lottery appears to depend on the precise parameters examined. Morgan and Sefton (2000) find increased provision under the lottery when the lottery prize is large and Lange et al. (2007) replicate this when the MPCR is low, however the lottery does not increase provision in the small-prize lottery by Morgan and Sefton (2000) nor in the studies by Dale (2004) and Orzen (2008).

Landry et al. (2006) asks how the lottery fares in the field. Conducting a door-to-door fundraiser for the Center for Natural Hazards Mitigation Research at East Carolina University, they compare contributions in a standard voluntary contribution environment to one where individuals can win a fixed prize of $1,000. Participants were informed that their chances of winning depend on their ticket purchases relative to the number of tickets purchased by other households in the county. More than 2,000 households were approached for either the standard donation treatment or for the $1,000 lottery treatment. Households that were home when approached were twice as likely to contribute under the lottery treatment. The gross proceeds in the lottery treatments was roughly 50 percent larger than that of voluntary giving, with the response primarily resulting from a greater participation rate under the lottery. Similar to the laboratory studies, the resulting provision is not larger. When faced with a $1,000 prize, collections netted $688 thus falling $312 short of the prize. By comparison $452 was raised

[81] With an MPCR of 0.3 the marginal return from the public good is set only slightly above the level at which the public good ceases to be a public good (for there to be a social dilemma in a four-person group the MPCR needs to exceed 0.25).

through voluntary contributions. Landry et al. (2006) note that the provision under the lottery would be larger if more households had been approached. Assuming that mean bets remain the same, they show that the public good provision under the lottery would surpass that under voluntary contribution provided that 6,000 households were solicited.

In evaluating the revenue of the lottery to that of voluntary giving, it is important to keep in mind that the lottery comes with the risk that bets can fall short of the prize. As an alternative it may therefore be tempting to consider a revenue-dependent and 'safe' lottery, where a fixed share of the revenue is used for the prize and the remainder is used for the public good. For example the revenue may be split equally between the prize and contributions to the public good. Unfortunately, as shown by Morgan (2000), the revenue-dependent, or pari-mutuel, lottery is unlikely to be a successful fundraising mechanism. The reason is that in the revenue-dependent lottery the purchase of an additional lottery ticket does not impose a negative externality on others. While an additional ticket decreases the probability that any given ticket will win, it simultaneously increases the prize that can be won on a given ticket. If the size of the prize is a linear function of the revenue, then these two effects cancel each other out. Thus the purchase of an additional lottery ticket does not impose a negative externality on others and the public good provision that results under a revenue-dependent lottery is precisely that of voluntary provision. Along with his investigation of the VCM and the fixed-prize lottery, Dale(2004) also examines the revenue-dependent lottery. He finds that mean contributions in both the VCM and revenue-dependent treatment are greater than predicted, but that contributions and bets were similar in the two treatments. Accounting for the payment of the lottery prize, provision is therefore lower in the revenue-dependent lottery.

Another variation on the fixed-prize lottery that has received some attention is the consideration of multiple rather than a single lottery prize. Lange, List and Price (2007) examine the effect of multiple lottery prizes under the assumption that each individual only can win one prize. The restriction of one prize per individual implies that the predicted revenue when faced with homogenous and risk-neutral individuals is greater with one rather than multiple prizes. However when the population is sufficiently risk averse or when the marginal value of the public good differs sufficiently across individuals then there may be benefits to splitting a fixed prize into multiple small prizes of the same aggregate value. Experimental examinations of the multiple-prize lottery do not show that it is superior to the single-prize lottery. Lange et al. conduct a laboratory experiment with groups of four varying the MPCRs such that

one person has an MPCR of 0.9 and the remaining three an MPCR of 0.1. They find, contrary to the equilibrium prediction, that public good provision is greater with a single prize of 80 than with three prizes of 50, 20 and 10. A field experiment by Landry et al. (2006) also fails to find a difference between having a lottery with a single prize rather than multiple prizes. In fact their results show that revenue is the same whether participants are informed that they may win $1,000 or one of four $250 prizes.

3.3. Auctions

Morgan's recognition of the negative externalities associated with charitable lotteries has given rise to a broader literature on competitive fundraising.[82] A central question is whether such mechanisms in general improve provision of public goods. Of particular interest have been the commonly observed charity auctions. Winner-pay auctions are frequently used to raise funds for a public good, and social fundraising events are often combined with either a silent auction or a standard oral ascending auction. Will these winner-pay auctions also increase provision? As in the lottery an increased bid imposes both a positive and negative externality on others, the first resulting from the increased provision of the public good and the second from the decreased likelihood that others have the highest bid and will win the item. In contrast to the lottery, the winner-pay auction only uses the winner's bid to provide the public good, thus by winning the bid the individual eliminates the contribution by others. This latter effect is often detrimental when comparing it to the lottery. On one hand the winner-pay auction allocates the auctioned item to the highest bidder thus improving on the stochastic allocation rule of the lottery. On the other hand the winning bid by one individual eliminates the bids and public good contributions by others. By contrast both winning and non-winning ticket holders contribute to the public good in the lottery.[83]

[82] For the connection to the broader literature on contests, all-pay auctions and tournaments see the comprehensive and careful survey by Dechenaux, Kovenock and Sheremeta (2012).

[83] Whether the lottery is preferred to the winner-pay auction depends on the environment. Davis, Razzolini, Reilly, and Wilson (2006) compare revenue from an English auction to that of a lottery in a private value setting with complete information. Varying both the value distributions and the MPCRs they examine treatments where the lottery should dominate the auction and treatments where the opposite should hold. Their experimental results reveal instead that the lottery dominates that of the English auction in all conditions and independent of the predicted comparative static. Schram and Onderstal (2009) examine a private-value and incomplete information setting where the first-price auction and the lottery are predicted to essentially raise the same revenue, nonetheless their experimental results reveal substantially greater revenue in the lottery. In extending these results beyond the lab it may be of interest to examine these mechanisms when it is also possible to donate directly to the public good. After participating in the lottery individuals are not predicted to make additional contributions to the public good, however the same does not hold for the winner-pay auction where non-winners have an incentive to subsequently contribute to the non-profit.

Goeree, Maasland, Onderstal, and Turner (2005) and Engers and McManus (2007) provide theoretical examinations of the revenue from various types of charity auctions as well as from lotteries.[84] Examining a private value and incomplete information environment it is shown first that adding a charity component to an auction increases the winning bid. Second, the standard revenue equivalence result is broken in the charity auction, as the second-price auction dominates the first-price auction.[85] The reason is that bidders who don't win the auction benefit from a higher winning bid, and therefore have an incentive to drive up the price in the second-price auction. Third, and more importantly, neither of these winner-pay auctions is optimal. Goeree et al. (2005) and Engers and McManus (2007) show that all-pay auctions dominate both winner-pay auctions and lotteries. The reason is that all-pay auctions both secure that the item is allocated to the bidder with the highest valuation, and that by bidding an individual does not have to forgo the positive externality that results from the bids of others.

Much experimental work has been done to shed light on behavior in charity auctions. An initial question of interest is whether the revenue from a charity auction is greater than that from a non-charity auction. That is, does the winning bid increase when a share of the revenue is given to a public good. To get a sense of bidding in charity auctions Isaac and Schnier (2005) look at bids in three non-experimental fundraising auctions. The number of items for sale in each of the auctions range between 135 and 194 items. Only in one auction do they see bids in excess of the item's assessment, and in this case bids only exceed the required bid increment in half the cases.[86] However bidding below assesment can not be interpreted as bidders ignoring the charity component of the auction, or as evidence that the auction was unsuccesful. The relevant question is how the revenue from a charity auction ranks relative to that of a comparable non-charity auction.[87] Salmon and Isaac (2006) show that if the donor's benefit from

[84] The analysis of a charity auction relates to the examination of bidding among creditors in bankruptcy auctions (Burkart, 1995) and to the examination of bidding among heirs for a family estate (Engelbrecht-Wiggans, 1994).

[85] While it may be tempting to conclude that this helps explain why most charity auctions are of a second price format (silent or oral ascending), Salmon and Isaac (2006) notes that the revenue difference between the two is so small that it may not be unreasonable to expect the more aggressive bidding typically seen in the first-price auction to outweigh this predicted advantage of the second-price auction.

[86] In a series of six experiments they also examine bidding in the laboratory and find that bids rarely exceed the induced value. Related is also a field study by Gneezy, Gneezy, Nelson and Brown (2010). Under fixed pricing they find no effect on demand from a share (50%) of sales going to charity. The effect of the charity donation is however substantial when presented with a 'pay-what-you-want' option for the product.

[87] Related is also the examination of charity and non-charity on-line auctions. Elfenbein and McManus (2007) identify sales of similar items on e-Bay and on e-Bay Giving-Works charity auction and find that individuals on average pay a 6% revenue premium when a portion of the sale is given to charity. In contrast to expectation they do not find that the price paid responds to the portion of the price donated to the charity. Popkowski Leszczyc and

the public good provision is independent of who provides the good then we should not be surprised to see essentially the same revenue in the two auctions. Under this pure altruism assumption it would require a very strong preference for the public good to secure a noticeable response in the revenue from the charity auction. The reason is that the benefit from the public good both increases the return and cost of raising ones bid and these counterbalancing incentives theoretically net out. The incentive to bid to secure provision of the public good is outweighed by the fact that a raised bid eliminates another person's bid and thus their contribution to the public good. The revenue in the winner-pay auction is found to be insensitive to the return from the public good. Isaac, Pevnitskaya, and Salmon (2010) examine this hypothesis experimentally in a private-value auction with incomplete information. In a case where the auction's revenue is used to fund a public good, they see only moderate revenue increases in response to increases in the MPCR. Furthermore they see no or limited evidence of more aggressive bidding when proceeds are given to an actual charity, and this result does not change when soliciting bids from individuals who are committed to the non-profit. Similarly Schram and Onderstal (2009) find that the revenue from a first-price auction is the same whether the MPCR is 0 or 0.5. The limited evidence that bids are influenced by who receives the proceeds led Isaac and Schnier (2005) to conclude that for charity auctions, the main aspect of charitable giving is from those donating auction items to the organization, the bids themselves seem insensitive to the allocation of the auction's proceeds. Similarly, Orzen (2008) concludes that winner-pay charity auctions should not be seen as incentivized fundraising mechanisms but rather as a simple way of converting donated items into cash.[88]

The work by Goeree et al. (2005) as well as that of Engers and McManus (2007) suggests that there are more successful ways of converting such items into cash. In particular the public good provision is predicted to be greater when using an all-pay auction than a winner-pay auction. In fact the all-pay auction is predicted to outperform a series of fundraising mechanisms. Experimental studies have examined the potential advantage of the all-pay auction, asking whether the all-pay auction is superior to the VCM, the lottery and/or the winner-pay auction.

Rothkopf (2010) instead conduct a field experiment where they post identical items for sale in on-line charity and non-charity auctions. Their results reveal a substantial response to the charity auction, with revenue in some charity auctions exceeding the revenue in non-charity auctions by more than the cost of the donations, thereby making it profitable for the seller to donate to the charity. See also Haruvy and Popkowski Leszczyc (2009). Elfenbein, Fisman, and McManus (2012) examine results from eBay sellers who vary the presence of a donation in a set of matched product listings. Most charity benefits accrue to sellers without extensive eBay histories, and they interpret the results as being evidence that the charity serves as a quality signal on the product being sold.

[88] This suggests that the non-profit is likely to lose from the common practice where it asks one group of individuals to purchase gifts to auction off in a silent auction.

Orzen (2008) compares the VCM, the lottery and all-pay auctions in a common-value and complete information environment. He considers two different types of all-pay auctions: one where all bidders pay their bid and another where bidders pay the minimum bid. Goeree et al. showed that this later all-pay auction dominates the first. The reason is that the lowest bidder will recognize that an increase in her bid increases the payment of all others. The experiment consisted of 25 rounds, participants were randomly matched in groups of four at the beginning of each round, and each was given an endowment of 100 tokens which depending on treatment could be bid in the auction, bet in the lottery or placed in a public account with a 0.5 MPCR. To secure non-negative public good provision, the prize was provided by the experimenter and participants in the non-competitive mechanisms were given an individual bonus payment of 50 tokens. Initial behavior does not respond to treatment, but then separates. As predicted the revenue of the VCM is dominated by that of all other treatments. The revenue from the lottery and the pay-your-bid all-pay auction are the same. The pay-minimum-bid all-pay auction dominates all of the examined mechanisms and ultimately becomes efficient at the end of the experiment. Accounting for the cost of the lottery prize the pay-minimum-bid all-pay auction dominates the VCM.

Schram and Onderstal (2009) examine the all-pay auction in a private value and incomplete information setting. They examine three mechanisms: a lottery, a winner-pay auction and a pay-your-bid all-pay auction. All mechanisms are considered with and without a public good component. While the examination of mechanisms is between-subjects, each participant sees the mechanism both without and with a public good component (MPCR=0 vs. 0.5). Participants made decisions over 28 rounds and were at the beginning of each round randomly matched in groups of 3 people.[89] The revenue of the all-pay auction is found to exceed that of the lottery and in contrast to the equilibrium prediction the lottery exceeds that of the winner-pay auction.[90] The results of the study lead Schram and Onderstal to provocatively argue that if the charity responsible for selling Eric Clapton's legendary 1956 Fender Stratocaster "Brownie" had used an all-pay auction rather than a winner-pay auction then they could have raised the price of $497,500 by at least $100,000.

[89] There were 12 participants in each session of the experiment. Unknown to participants they were only matched within sets of 6 participants (two groups). This secured that each session consisted of two independent observations. The 28 rounds were split in four segments of 7, alternating between MPCR=0 and MPCR = 0.5

[90] The lottery and winner-pay auction are predicted to raise essentially the same revenue in this case.

Similar to Orzen (2008), Corazzini, Faravelli and Stanca (2010) examine an environment with a common value prize, however in contrast to earlier studies they let endowments be randomly determined and unknown to the other members of the group. Three mechanisms are examined: pay-your-bid all-pay auction, lottery and VCM. While the all-pay auction is predicted to dominate the lottery slightly, the two raise the same revenue at the beginning and at the end of the experiment. The lottery however dominates in the intermediate rounds. Accounting for the prize the VCM raises essentially the same revenue as the all-pay auction.

The reported results show mixed evidence on the attraction of the all-pay auction over the lottery. While Orzen finds no revenue difference between the lottery and the pay-your-own-bid all-pay auction, Schram and Onderstal find that the all-pay auction dominates the lottery, and Corazzini et al. find the opposite ordering.

In an attempt to better understand the merits of the all-pay auction researchers have also begun to investigate this mechanism in the field. Carpenter, Holmes, and Matthews (2008) compares three sealed bid auctions in a field experiment. In addition to examining a first-price auction and a first-price all-pay auction, they also examine a second-price auction. Each of these auctions was used at a fundraiser for a preschool. Inclement weather on the date of the all-pay auction caused them to repeat the all-pay auction at a different pre-school. While the revenue of the all-pay auction is predicted to be greatest, the revenue from the first-price winner-pay auction is predicted to be smallest. The results of the field experiment reveal the opposite ordering, with the revenue from the all-pay auction being the lowest and that of the first-price auction being the highest. The primary reason for the reversed ordering is that the participation rates differ markedly between the mechanisms. The participation rate was 53% in the first-price winner-pay auction, 39% in the second-price winner-pay auction, and finally a mere 13% and 14% in the two all-pay auctions. Based on surveys of the participants they conclude that the different participation rates may result from the participation costs of the auctions being perceived differently. Indeed a survey reveals that the all-pay auction is perceived as less fair and significantly more difficult to understand.

Onderstal, Schram, and Soetevent (2011) find similar results in a large door-to-door fundraising experiment. 4,500 households were approached and presented with one of four treatments: an all-pay auction, a lottery, a non-anonymous solicitation, or an anonymous solicitation. Despite improving the

Carpenter et al (2008) description of the all-pay auction they find that households are least likely to contribute under this mechanism and the revenue in the all-pay auction is found to be lower than in any of the other mechanisms.[91] The low contribution rate is attributed in part to the all-pay auction crowding out the intrinsic motive for giving and in part to donors being reluctant to make a non-anonymous contribution. Interestingly the results reveal that conditional on donating, households contribute less when asked to report their name along with the donation than under the anonymous solicitation where they could just contribute money. While the lottery is shown to out-perform the other non-anonymous mechanisms, the anonymous solicitation raises the largest number of funds. The authors conclude that in relying on voluntary contributions fundraisers must have been relying on the correct mechanism all along.

The theoretical literature on competitive fundraising mechanisms suggests that both lotteries and all-pay auctions are superior mechanisms. While some experimental studies have confirmed this for lotteries, the field evidence on all-pay auctions is far less promising.

3. 4. Rebates and Matches

Perhaps the most direct way of enticing individuals to give is to change their cost of making a donation. The cost of making a contribution to non-profits may be altered either by offering matching funds to a donation (be it from an employer or another donor), or by offering that part of the donation be refunded (in the form of say a tax deduction).

Past work on the sensitivity of charitable giving to the price of giving has used non-experimental data, such as tax filings or survey data, to determine how donations respond to changes in the marginal tax rate, and thereby to changes in the marginal cost of giving. It is not until recently that researchers have begun to use experimental techniques to determine the price sensitivity of charitable giving. The results on the price sensitivity of giving not only help determine whether and how a non-profit benefits from converting a contribution into a match, but it also addresses a recent literature advocating that individuals would give more if the tax deduction benefits were more salient and if it were less

[91] See also Ivanova-Stenzel and Salmon (2008) for a further illustration that endogenous entry may influence the revenue rankings in auctions. Interestingly, Corazzini et al. (2010) show a similar decrease in participation in the lab when participants in the all-pay public good auction are given heterogenous endowments.

cumbersome to file for such deductions.[92] This observation led Thaler and Sunstein (2008) to propose the introduction of a charity debit card, which not only keeps track of all charitable donations but also informs the donor of the net cost of such contributions. The extent to which such an initiative would increase giving however relies on how donors respond to salient changes in the price of giving. Experimental work helps address this issue by informing participants directly about the cost of giving.

In reviewing the experimental literature on the price sensitivity of giving, I will focus on studies that examine how responsive giving is to matches and rebates.

Karlan and List (2007) conduct a field experiment to examine how contributions respond to different match rates. Solicitations were mailed to 50,000 supporters of a "liberal politically-oriented non-profit that focuses on social issues and civil liberties." All potential donors were presented with the same request of funds, but the incentives for giving varied across treatments. Four different relative prices of giving were examined: no match (control), a $1 for $1 match, a $2 for $1 match, and a $3 for $1 match. Comparing the three match treatments to the control reveals that the match increased both the likelihood of contributing (by 22%) and the amount given (by 19%), thus total contributions to the non-profit increase when a match is offered. In contrast to expectations they find however that the response to the match is not sensitive to the size of the match.[93] Increasing the match above the one-for-one level does not affect contributions. Karlan and List (2007) notes that this insensitivity to magnitude is similar to the scaling effect documented by Kahneman and Knetsch (1992). Interestingly the response to the match is seen in only some geographical areas. Specifically the effect of a match is driven entirely by the response in 'red' states (states where Bush won the 2004 presidential election). There is little or no effect of the match in 'blue' states. This heterogeneity suggests that changes in the match are not simply viewed as a change in the price of giving.

A follow-up study by Karlan, List, and Shafir (2011) conducts a field experiment to examine the effect of smaller matches. While using a different organization they continue to examine donations to a liberal organization that focuses on civil justice issues. 20,000 supporters received a solicitation with either no-match (control), a $1 for $1 match, or a $1 for $3 match. While the results confirm the previously

[92] See Saez (2004) for discussion on optimal tax subsidy on charitable giving.

[93] Note that the opposing income and substitution effect of the match implies that contributions need not respond to the match or to the size of the match. Hence the insensitivity of the match need not imply that individuals do not care how much public good is provided as result of the gift.

documented insensitivity to the match level, relative to the control treatment they do not find that a match has any effect on giving. That is, contributions on average do not respond to the price of giving. As in their earlier study they find that the lack of an effect masks a heterogeneous response by donors. While donors who are actively supporting the organization respond positively to the match, lapsed donors either don't respond or decrease their contribution in response to the match.

Limited evidence of an effect of a match is also documented in Rondeau and List (2008). This study examines the effect of matches on the provision of a threshold public good. That is the public good is only provided if sufficient funds are raised. Sierra Club supporters were asked to contribute toward a K-12 environmental education program. Potential donors were informed that donations would be refunded in the event that funds fell short of a pre-specified level. Despite examining a different provision environment they confirm the Karlan et al. finding that the introduction of a match does not significantly increase contributions.[94]

From the nonprofit's perspective it is not solely a question of determining the immediate consequences of a temporary match. The long term consequences are equally important. For example, the match may encourage more people to give and thus increase the existing donor base and future contributions, or it may result in an intertemporal substitution causing present giving to increase while future giving decreases, or it may be that a temporary match crowds out the intrinsic motive for giving potentially causing a permanent reduction in future giving. Meier (2007) conducts a randomized field experiment to examine both the short and long run consequences of short term matching incentives. As in his earlier work the experiment is conducted at the University of Zurich where students can contribute to two social funds (CHF 5 and 7 respectively). Meier examines the effect of introducing one of two temporary matches. Individuals who contribute to both social funds will trigger a donation from an anonymous donor of either CHF 3 or CHF 6, corresponding to a match rate of either 25 or 50 percent

[94] Contributions are found to increase when instead of a match an equivalent contribution is given unconditionally as a leadership gift. This finding may result either from the quality signal associated with an unconditional match being stronger than that of a conditional one, or from the match partially crowding out the intrinsic motive for giving. The effects of a match and a seed donation are subsequently examined in the laboratory where neither incentive is found to increase giving. The different results seen in the lab and field may be attributed to the fact that there is no uncertainty about the public good in the laboratory and thus the sole effect of increased contributions by others is that it crowds out the individual's giving. To compare the two environments it is essential to control for the probability of provision.

respectively. The effect of the match is identified by comparing the contributions of the treatment groups to that of a control group which was not offered a match.[95]

Meier finds that individuals are more likely to contribute to both funds when doing so triggers a match, however the response does not differ significantly between the 25 and 50 percent match. The consequences of the temporary match are less positive after the match is removed. Students who were subjected to the match decrease contributions in the three periods after the match is removed. This decrease in giving is so large that it overwhelms the initial positive effect and the overall effect of the match on the contribution rate is negative. In trying to understand the cause of this detrimental effect Meier examines the effect the match has on donations by those who were contributing to both funds prior to the match. He finds that these maximum contributors also decrease their giving after the removal of the match. This latter result causes Meier to argue that the long run effects of a match do not merely result from intertemporal substitution, but also from the match undermining the individuals' intrinsic motivation for giving. A similar detrimental effect of extrinsic incentives on intrinsic motives have been demonstrated and discussed by among others Frey (1997), Gneezy and Rustichini (2000), Gneezy (2003), Bénabou and Tirole (2006).[96]

The evidence from the reported field experiments demonstrates at best a small positive price elasticity of giving. Despite the price of giving being very salient it does not appear that it has a substantial impact on the individual's contribution to nonprofits. Accounting for tax deductions Karlan and List (2007) find a price elasticity of 0.225 between no match and any positive match, and they find a price elasticity of zero conditional on a match. Karlan et al. (2011) of course find no evidence that contributions are sensitive to the presence of a match. By all accounts this effect is low relative to that seen in non-experimental data, see e.g., Randolph (1995), Auten et al. (2002), Bakija and Heim (2010). One possible explanation for these differences may be that the experimental data relies on changes in a match, whereas the non-experimental analyses rely on the response to changes in tax deduction.

[95] For the effect of social information in this setting see the discussion of Frey and Meier (2004) in section 3.1.1.

[96] Evidence consistent with crowd-out of intrinsic motives is seen in charitable giving since Titmuss (1970). The study by Ariely et al (2009), discussed in section 2.2.3., demonstrates how extrinsic motivation can crowd out giving. Kessler (2011) finds that the offer of a raffle ticket crowds out the initial effect of wearing a pin for support. Carpenter and Myers (2010) find that paying small stipends to volunteer firefighters increases turnout for some, but that the effect is dampened for those who have greater image concerns. Thus confirming that extrinsic motivations can have unintended negative effects. See Gneezy, Meier, and Rey-Biel (2011) for a review.

Eckel and Grossman (2003) examine whether the behavioral response is the same under equivalent matches and rebates. As an example they ask whether the gross donations a non-profit receives under a 100 percent match differ from those received under a theoretically equivalent 50 percent rebate. Participants in their laboratory study are presented with a series of different budgets and asked to allocate money between self and a charity of their choice.[97] While the simultaneous choice of donation and charity differs from the cases where the incentive to give is offered by a particular organization, it mirrors the environment an employee faces when her employer offers to match a contribution or that faced by a tax payer when charitable contributions are tax deductible. Participants were presented with matches and rebates corresponding to relative prices of $1, $0.80, $0.75, and $0.50.[98] The data reveal that donors presented with a match contribute 1.2–2 times more than those presented with the equivalent subsidy. This differential response to equivalent matches and rebates has been replicated in a series of laboratory studies (Eckel & Grossman, 2006a, 2006b, 2008, and 2012, Davis et al. 2005, Davis & Millner 2005, Davis 2006), and while the difference between the rebate and match tends to be smaller in the field than in the laboratory, it still remains substantial and significant (Eckel & Grossman, 2008, 2012, Bekkers, 2005).

Four explanations have been provided for the differential response. Eckel and Grossman (2003) argue that the source of the difference lies in the match and rebate frame. While the rebate is cast in a reward frame, the match is perceived as being in a cooperative frame. Thus the rebate incentive may adversely affect the individual's intrinsic motive for giving. Davis et al. (2005) argue instead that the result can be attributed to confusion. Noting that contributions across incentives center around 50 percent of the endowment, they argue that the differential effect of rebates and matches results from a confusion-based constant pass rule. Davis and Millner (2005) propose that part of the effect may be attributed to an aversion to rebates. Finally, Davis (2006) argues that an isolation effect may explain the finding, suggesting that individuals focus only on the variable they have under their control, namely the amount of money they initially transfer. According to the isolation effect the donor's initial contribution, also referred to as the check-book donation, will be the same for an equivalent match and rebate, which in turn will imply that total contributions under the match exceed those of the rebate by precisely the magnitude of the match.

[97] The individual could select among a number of different non-profits, including African Christian Relief, Doctors Without Borders, Feed The Children, I Have A Dream Foundation, Women's Haven of Tarrant County, American Red Cross, AIDS Outreach Center, Cancer Care Services, Earth Share Texas, and YMCA of Arlington.
[98] That is, they examine rebates of 20, 25, and 50% and matches of 25, 33, and 100%.

The attempts to tease these explanations apart have been many. The work by Davis and co-authors have centered on demonstrating that the finding is not unique to charitable giving, thus casting doubt on the extent to which it is due to a crowding out of intrinsic motivations. Davis et al. (2005) show that an even greater difference between the match and rebate is found when individuals instead are making subsidized investment decisions. Similarly Davis and Millner (2005) replicate the finding when individuals are offered a discount on a candy bar in the form of half-off (rebate) or two-for-the-price-of-one (match). As for the non-profit donations they find that the participant's expenditure (on chocolate bars) is greater under the match incentive than it is under the rebate incentive. To better understand the role of confusion, Davis et al. (2005) let donations go to a pre-specified charity and only present participants with two decisions at a time, namely the equivalent match and rebate. They also provide participants with a complete payoff table specifying the equivalent payoff consequences of their decisions for the non-profit and the individual. While these changes to the experimental design reduce the difference between the match and the rebate, the contributions to the non-profit continue to be larger under the match. This robustness of the effect suggests that confusion is unlikely to be the only explanation for the observed phenomenon. Based on evidence from a survey, Davis and Millner (2005) argue that the remaining difference results from 'rebate' aversion. Such an aversion also helps explain their finding that giving under rebates is lower than when individuals are faced with a straight price reduction.

Eckel and Grossman have also attempted to simplify the design to secure that the effect cannot be attributed to confusion. Eckel and Grossman (2006a) move away from the initial within-subject design and find that the result remains when participants are subjected to only one of the two subsidy forms. In fact it appears that the difference increases in the between-subject design. To understand the potential role of rebate aversion Eckel and Grossman (2006b) conduct an experiment where prior to making the contribution decision participants select whether they prefer a one-for-one match or a 50 percent rebate. Once they have selected their preferred subsidy they are then asked to make a contribution under the selected incentive. They find that the rebate and match scheme are selected at the same frequency and they conclude that the evidence is inconsistent with rebate aversion. However consistent with previous evidence they continue to find that total contributions to the non-profit are larger for those who selected the match than for those who selected the rebate. Finally, Lukas, Eckel and Grossman (2011) acknowledge that the choice set under the rebate is smaller than under the match,

and they therefore allow participants to borrow against future rebates such that the set of possible contributions are the same under the two treatments. In addition they include payoff tables as in Davis et al. (2005). Once again the differential remains.

Davis (2006) does find a setting where total contributions are the same under the match and rebate. Changing the presentation of the two incentives he finds that the amount the donor initially gives under the rebate exceeds that of the match by precisely the size of the match. In his modified instructions he informs participants under the match that for each dollar of a total contribution to the non-profit, 50 cents were donated by the donor and 50 cents resulted from the match. Similarly under the rebate he informs participants that for each dollar of a given contribution to the non-profit, the $1 came from the donor who subsequently received a 50 cent rebate. Under this modified presentation he finds that the total contribution to the non-profit is independent of the subsidy. He sees this as evidence that the initial differences resulted from participants ignoring the effect of the subsidy, and he argues that an isolation effect causes individuals to focus only on the amount they initially give, i.e., the check-book amount.[99] Lukas et al. (2011) in turn argue that an isolation effect not only implies that the check-book amount is constant under an equivalent rebate and match, but also that within a given incentive the check-book donation is independent of the offered subsidy rate. Expanding the set of offered match and rebate rates they find first that the check-book donation is independent of the match rate, thus confirming the findings of the field studies previously discussed. However in their data the check-book donation is sensitive to the rebate rate. They conclude that the response to rebate is inconsistent with the isolation effect, and note that the differential response to the match and rebate can be seen as participants passing along to the charity the full benefit of the subsidy in the match treatment, but less than the full benefit in the rebate treatment.[100]

In light of non-experimental field data, the experimental evidence on the insensitivity to the price of giving is surprising, in particular because the experimental data is presenting the response to salient price changes. In contrast to the proposal by Thaler and Sunstein (2008) it may not be possible to improve giving by making the cost of giving more salient. So why would the price sensitivity in the

[99] An alternative interpretation is that the rewording altered the frame of giving between the two scenarios.

[100] This greater sensitivity to changes in the rebate is intriguing as it may reconcile the differences in the sensitivity to price seen using experimental versus non-experimental data. In determining the robustness of this finding it will be interesting to include data of earlier examinations, unfortunately the response to the rebate appears muted in these earlier studies.

laboratory differ from that derived from actual tax deductible giving? In explaining the difference it is important to recognize that the examined changes in the price of giving may not be directly comparable. For example as the value of a charitable tax deduction improves we are not only influencing the incentive to make contributions to non-profits but also the incentive to exaggerate such contributions. In comparing the response to price changes using experimental and non-experimental data it is crucial that this incentive to cheat is properly accounted for.[101]

While the verdict is still out on what causes the response to rebates and matches to differ, it remains clear that matches are more effective in securing contributions to public goods. If a non-profit was given the choice between offering a rebate or a match, then they should clearly opt for the match. In selecting a match it is interesting to note that the effect on total contributions arises from the match rather than from the effect the incentive has on donors. Laboratory and field evidence both suggest that the check-book donation an individual makes is relatively insensitive to the match rate, the observed increase in gross donation results from the match itself. While the emphasis in past work has been on the effect such matches introduce for the donor who is offered a match, it may be argued that the alternative to the match is not necessarily no-match, but rather that the donation given as a match is given instead as a direct donation to the non-profit. Huck and Rasul (2011) present such a study. Using four different treatments they varied the solicitation letters that were sent to 14,000 attendants at the Bavarian State Opera house. In a control treatment participants were simply asked to give, in two matching treatments participants were informed that a lead donor had offered to match contributions at a rate of 50 or 100 percent up to a lead contribution of €60,000, and in a leader treatment they were informed that a lead contribution of €60,000 had been made. The latter treatment helps identify the separate effect of having a match. With the average donor contribution in the leader treatment being €132, they find that contributions decrease to €101 under the 50 percent match and to €92.3 under the 100 percent match. When separating the role of having a lead contribution they find that the match itself decreases the amount individuals give. They conclude that fundraisers may secure larger contributions by simply announcing a large initial contribution, and abstaining from converting it into individual matches.[102] With individual contributions absent the match being only €74.3, the authors note that organizations nonetheless are well advised to accept gifts for which the donor insists on offering a match. Perhaps in

[101] See e.g., Ackerman & Auten (2011), Yermack (2009), Fack and Landais (2010) for discussions on the extent to which changes in the cost of giving causes tax payers to exaggerate their charitable donations.
[102] See section 3.1.1. for a review of the literature on sequential giving.

fully understanding the precise role of the match and the lead donations it may be of interest to also incorporate the leader's decision to offer such donations.

4. Conclusion

The literature on public good experiments has grown substantially since Ledyard's (1995) handbook chapter. In trying to narrow the review of research since then I opted to focus on the research on charitable giving. Moving beyond the linear VCM environment, researchers have gained important insights on what motivates people to give and on the mechanisms used to encourage such gifts. In reviewing the literature I focused on mechanisms for which a large number of studies had been conducted. While the discussion centered on one mechanism at a time, many of these studies simultaneously examine multiple mechanisms. The study by Huck and Rasul (2011) demonstrate that added insights may be gained by simultaneously examining different types of mechanisms. By considering both the effect of a lead donation and matching, Huck and Rasul demonstrate that the response to a lead donation likely explains why giving is sensitive to the presence of a match but not the level of a match.

In limiting the review to a few central topics, many vibrant research questions received no discussion. For instance, researchers continue to improve our understanding of what motivates individuals to give. Particularly exciting is the research on the tendency to give to an identifiable rather than statistical recipient. This 'identifiable victims' effect first noted by Schelling (1968) is supported by anecdotal evidence, but has just recently been documented using experimental methods. Small and Loewenstein (2003) show that transfers in a dictator game are larger when a recipient's id number is determined before rather than after a donation decision is made. It is however not easy to disentangle the identifiable victim effect. Small, Loewenstein and Slovic (2007) find in a series of field experiments that the attempt to help people recognize the discrepancy in giving toward identifiable and statistical victims has perverse effects as it decreases giving to identifiable victims, and does not increase giving to statistical victims.[103] They conclude that deliberative thinking causes people to become less sympathetic towards identifiable victims.

[103] See also Jenni and Loewenstein (1997), Small and Loewenstein (2007), Small, Loewenstein and Slovic (2007), Small, Loewenstein, and Strnad (2006). A negative effect of information is also seen in Eckel, De Oliveira, and Grossman (2007). The identifiable victim effect may relate to Duncan's (2004) impact philanthropy in which he argues that individuals have a preference for "personally making a difference."

In reviewing the literature on various fundraising mechanisms the emphasis was placed on the topics that have been particularly research active, however the variables used to design a fundraising campaign are many and researchers are beginning to examine many more of the options fundraisers consider when designing a campaign. For example while much work has been done on threshold provision of public goods, researchers are just now beginning to ask how these thresholds come about. In some cases the threshold for a campaign is determined by nature however there are many instances where the threshold is a strategic choice by the fundraiser.[104] Dorsey (1992) noted that dynamic provision was very effective when a threshold had to be reached to secure provision of the public good, leading him to suggest that a fundraiser may benefit from using an-all-or nothing strategy. Menietti, Morelli and Vesterlund (2009) show that if a threshold can be strategically selected then the fundraiser is likely to select too high a threshold resulting in overprovision of the public good. Indeed their laboratory study shows that over provision can be secured by setting an inefficiently high threshold.

In examining fundraising mechanisms researchers have also begun to account for phenomena such as reciprocity and time-inconsistent preferences. For example, Falk (2007) conducts a large scale field experiment to examine the role gift-exchange plays in charitable giving. Sending 10,000 solicitation letters he varied whether the solicitation contained no gift, a small gift or a large gift. The small gift was one postcard plus envelope, while the large gift was a set of four postcards with four envelopes. The presence of a gift had a substantial effect on the likelihood that individuals gave, with the small gift increasing the frequency of giving by 17 percent and the large gift increasing the frequency by 75 percent. There is also evidence that fundraisers may benefit from acknowledging that donors have time-inconsistent preferences. Frey and Meier (2004) examine the effect of changing the manner in which funds were solicited at the University of Zurich. Before 1998 students would receive two separate invoices, one billing them for their tuition plus their donation, and the other just for their tuition, and they chose which invoice to return (i.e. with or without the donation). Starting in 1998 students were instead given one bill and asked to tick off a box to indicate their willingness to contribute. However they no longer had to pay immediately, but could wait a month before they would receive an invoice for their contribution. Interestingly the percentage of contributors increased from 44 to 62 percent after this change. Similar results are shown by Breman (2011) who conducts a field experiment to explore intertemporal choices in charitable giving by varying the timing of commitment and payment. Her work

[104] Closely related is of course the large literature on threshold provision of public goods, see Croson and Marks (2000) for a review. Note however that this literature does not view the threshold as a strategic choice.

builds on that of Thaler and Benartzi (2004). The design is as follows: monthly donors were asked to increase their contributions immediately, in one month, or in two months. She finds that the mean increase in donations is significantly higher when donors are asked to pre-commit to future donations (32% in one month, 11% in two months). Follow-up data shows that the treatment effect is persistent, thus making the strategy highly profitable to the charity.

An area that deserves increased attention is that on the long term effects of a campaign. On one hand the initial incentive to give may simply encourage people to give now rather than later, thus decreasing future contributions. On the other hand once donors give it has been shown that they continue to give, hence it may be worthwhile to sacrifice funds in the short term to secure future 'warm-list' donors. Landry, Lange, List, Price, and Rupp (2010), Shang and Croson (2009), and Meier (2007) are among the few studies that examine the long term effect of the fundraising initiative. Moving beyond the one-shot solicitation or even the one-organization solicitation is clearly an important avenue for future work.

As the literature continues to become more field oriented we increase the likelihood that the results of our experimental studies will be used to directly inform policy and fundraising designs in the field. This field-oriented move has thus far been carefully founded in economic theory. The strengths of a theoretical foundation are many: it informs us on what factors or parameters are important, how we might identify them, and how we might interpret their behavioral response. Importantly it also gives us a common reference point and framework which allows researchers, who use the same language, to engage in a dialog on what drives behavior, thus generating the many bodies of work reviewed in this chapter. The increased attention to behavior in the field has helped us gain new and exciting insights on how and why people give to charity. As researchers are collaborating with organizations to shed light on which fundraising techniques are most effective, it is important to be wary of the temptation to consider solicitation modifications that are perhaps best examined by those trained in marketing. If we are to build our knowledge of the market for charitable giving through a directed dialog then it is essential that our research remains founded in economic theory.

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