Auctions for Charity: The Curse of the Familiar*

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Abstract

Auctions and raffles are commonly used to fund public goods. We run fundraising events in the field at the meetings of a well-known service organization across the United States to examine the fundraising properties of five mechanisms: one that is common in the literature, two that are familiar to practitioners in the field, and two that are new. Consistent with a novel model assuming independent private attachments to the charity, we find large differences in performance between the two most familiar formats, but these disparities are dwarfed by the differentials achieved using the new and less common formats.

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1 Introduction

> "[T]he onus is on philanthropists, nonprofit leaders and social entrepreneurs to innovate. But philanthropic innovation is not just about creating something new. It also means applying new thinking to old problems, processes and systems."
>
> Laura Arrillaga-Andreessen, philanthropist

The conversion of donated goods and services into more liquid assets to fund public goods is a familiar exercise to most charities and non-profits. According to the Internal Revenue Service, for the reporting year 2018, the most recent year for which aggregate data are reported, 4.2 million filers itemized non-cash charitable contributions, with a reported fair market value of 70.8 billion dollars. Indeed, for some organizations, this "transformation problem" is a formidable logistical challenge. Raffles and auctions are common solutions to this problem and, over the last decade or two, a vibrant literature on mechanism choice for non-profits has emerged. Along with the analysis of standard formats, a nascent literature has arisen that has offered new ones, which, in theory, should do better. For both analytical and empirical reasons, however, an ordering of mechanism performance based on expected revenue, not to mention participation and bids, is complicated.

As a theoretical matter, revenue equivalence does not hold, even in the simplest strategic environments wherein non-profits use the revenues to provide a public good. For example, the sealed-bid analysis of Goeree et al. (2005), working within the structure developed in Morgan (2000), was the first to show that in a world of altruistic bidders with independent private valuations, each of whom (also) receives a benefit that is proportional to the total amount raised, "all-pay mechanisms," including raffles, should do better.[1] The intuition is straightforward: in "winner-pay mechanisms," a class that includes most, but not all, familiar auction formats, a bidder who "tops" her rivals foregoes the externalities associated with their bids. What remains unclear, however, is the robustness of this result to the addition of new, perhaps dynamic, formats and endogenous participation choices.[2]

It is also hard to assess the relative performance of auction and raffle mechanisms with revenue proportional benefits because the few experiments that have been conducted tend to be modest as a consequence of each auction yielding just one revenue observation. In addition, experiments often compare just a few existing formats and new ones have yet to be tested or compared to the formats that are typically chosen by charities and other

[1] Engers and McManus (2007) confirm many of these predictions while extending the literature by analyzing strategic choices of the auctioneer to set reserve prices or dissolve the auction. Carpenter et al. (2010a) compare the same sealed bid mechanisms but allow participation to be endogenous.

[2] Another consideration, pointed out in Haruvy et al. (2018), is whether paying voluntarily can affect both predictions and results.

organizations investing in the public good. On top of all this, aside from a few important stylized facts, the experimental results have been inconclusive.[3]

The theory and experiment described in this paper were designed to extend the developing literature on charitable mechanism design in a number of important dimensions. Our first contribution is analytical. In contrast to the benchmark in this literature, Goeree et al. (2005), we compare an expanded set of mechanisms and allow for endogenous participation, all in an independent private charitable attachment (as opposed to value) setting, which is a better match for the context of our field experiment. To test our predictions, we report the results of a field trial conducted on behalf of a national service organization at almost a hundred events across eleven US states. Our purpose is to provide a robust evaluation of five auction mechanisms in a natural setting.

The choice of which mechanisms to include was driven by three considerations. First, to make our results useful to practitioners, we included the two mechanisms used most frequently by charities in the field - the English or "live" auction and the raffle. Not only does including these two formats allow us to test how familiar formats compare to new and less familiar ones, a field comparison of just these two mechanisms is novel and should be of general interest for those organizations that might be reluctant to try something new.

Second, and with a nod to recent theoretical developments, we included two formats that ought to do better than those commonly used in the field. Goeree et al. (2005) show that the all-pay auction, in which the highest bid wins but all bids are forfeited, should yield more revenue than any winner-pay format like the second-price auction or, by extension, its strategic equivalent, the live auction. Further, Orzen (2008) finds that the all-pay also does better than the raffle in a common value environment because the raffle provides weaker incentives to compete due to the randomness of its allocation rule. More recently, Carpenter et al. (2014) show that a "bucket auction," in which bidders take turns making monetary contributions to a "bucket" and the winner is the person who makes the last contribution, should do even better than the standard all-pay because it too is all-pay but has the incentives of a war of attrition. Following the related literature, we model the bucket auction as a second-price all-pay auction. While we find, in accordance with previous analyses, that bidders in the bucket bid more aggressively than in the all-pay, we also find that the incentives governing entry are identical, implying the two mechanisms generate the same level of participation. As a result, the bucket auction is predicted to perform best in terms of revenue, largely because of the competitive environment it instills.

[3]To see this, compare the results of Morgan and Sefton (2000), Dale (2004) and Carpenter and Matthews (2017) concerning raffles, Davis et al. (2006), Carpenter et al. (2008), Schram and Onderstal (2009), Corazzini et al. (2009), Onderstal et al. (2013) concerning standard auction formats and Goerg et al. (2015), Orzen (2008), Carpenter et al. (2014) and Damianov and Peeters (2018) on new mechanisms.

Third, to examine the field validity of erstwhile empirical results, we were also careful to consider mechanisms that have previously done well in the lab. Though already included, both the all-pay and bucket auctions have done well in the lab environment (Orzen, 2008; Schram and Onderstal, 2009; Corazzini et al., 2009; Carpenter et al., 2014) but this performance is judged solely on the revenue properties of the mechanisms. Because we are interested in participation and bidding too, we included winner pay formats which, in theory, should attract more bidders. In addition to the live auction, we consider a "hybrid" that combines a lottery for participants financed by entry fees with a live auction for those who choose to enter. Our model predicts that, although this hybrid format should not do particularly well on participation due to the participation fee, it should outperform the commonly used formats (i.e., the live and the raffle) because it collects revenue from two sources.[4]

According to our analysis, the bucket auction is predicted to raise more money than any other mechanism, while the raffle is predicted to generate the largest number of participants, a consideration important to charities investing in a "warm list" of continuing donors, because it incentivizes less competitive bidding. Considering our experiment, our title is intended to underscore both our central result and one of the most important lessons of our work: whatever the revenue differential between the two most familiar auctions, our analysis suggests that both perform much worse than the new mechanisms, a pattern suggesting that behavioral mechanism design has much to contribute.

We proceed by describing our experimental setting and provide details of the fundraising formats we tested in the next section. We then summarize predictions from the new model fitted to our experiment. Analyzing our results, we first present an overview of participant behavior before reporting our main findings - format performance differences. We conclude by discussing the results and implications of our experiment.

2 Experimental design

When considering where to run our experiment, we sought regional variation to broaden the representativeness of our results but we also required a host that, to a great extent, could provide a controlled environment, one with a common setting and philanthropically-minded participants. After a successful local pilot, we decided to conduct our auctions at meetings of various local Rotary International clubs across the United States. Rotary is a service organization with 34,000 chapters and 1.2 million members worldwide. Members believe in the "commitment to service above self" and when they are not volunteering in

[4] Ironically, despite the entry fee, the hybrid attracted the highest number of bidders in lab experimental comparison (Carpenter et al. 2010b).

their communities, members help raise money to support education and job training, provide access to clean water, combat hunger, improve health and sanitation, and eradicate polio.[5] Local Rotary clubs meet weekly over a meal (usually breakfast or lunch) and are accustomed to hosting speakers and events in addition to the weekly business conducted at the meetings. We "piggybacked" on this structure, which allowed us to control for the meeting environment across different locations, to conduct charity auctions with randomly assigned formats and 12 active bidders, on average, at various chapters across the country.

We chose a prize for each event that would be site-independent and context-free. We decided that the prize should also be familiar, something that would be natural at a fund-raiser and that it should be acquired easily at our different field locations. Our lot consisted of two bottles of relatively high quality wine (both received *Wine Spectator* scores of 90 out of 100). We included one bottle of non-vintage prosecco (that showed a "good blend of baked apple, sour lemon and grapefruit") and one bottle of South American cabernet sauvignon (with "crushed plum, fig and black currant fruit woven with Mauro tobacco and bittersweet cocoa"). The combined retail value of the wine was $35. At each event, we provided the prize and all proceeds from the auction went directly to supplement the fund-raising efforts of the local Rotary chapter that hosted the event.

To conduct the events, we recruited eleven auctioneers from various graduate programs in economics in addition to our two local research assistants. Each auctioneer attended a training session at which we explained the background and goals of the research project, worked through the details of the protocol, and met with the president of the local Rotary chapter to strategize about the best way to gain access to clubs. Shortly after arriving home, each auctioneer received a standard provision of supplies that allowed him or her to conduct events. The auctioneers worked first to get on the meeting schedule for clubs in their local area and were able to use our local president as a reference. Once the schedule was set, we randomly assigned mechanisms to clubs, stratifying on location with the purpose of making sure that each of our auctioneers would run multiple different mechanisms.

Prior to every event, the Rotary chapter contacts let the members know that our research assistant was going to visit to conduct a fundraiser for Rotary and then talk about raising money for charity, more broadly. However, neither the leaders nor the members knew the details of the event in advance. Most importantly, they did not know which mechanism would be used. Once an event started, the auctioneer followed a highly scripted protocol. Club members were given a large manila envelope and told to take out a survey to complete while they ate. Once the surveys (and meals) had been completed, the auctioneer introduced her- or himself and said that (s)he was there to talk about ways of turning donations in-kind

[5] https://www.rotary.org/en/about-rotary.

into cash but that they would start with an example – our wine auction. The auctioneer then displayed and described the two bottles of wine and stressed that we had donated the wine but all the revenue from the auction would go directly to Rotary. Participants took out printed instructions from the envelope and read along as the auctioneer explained the rules, all of which, including any mechanism-specific language, are provided in the appendix.

Once any questions were clarified (by returning to the appropriate section of the instructions), the auction began. Club members were instructed to first pull out a "registration" card on which they indicated whether or not they would participate. For the sealed bid mechanisms (all-pay, raffle) this card also recorded their bids.

The bidding proceeded as follows. For the live auction, and the live component of the hybrid auction, the auctioneer was told to start by asking for an opening bid of $25 and to reduce the opening bid by $5 decrements until someone entered. Once the bidding began, the auctioneer was instructed to increase the price by $5 increments until (s)he could no longer and then drop to $1 increments until the final price was determined. In the all-pay, participants wrote their bids on the registration cards and included them with payment in a sealed envelope.[6] In the raffle, participants indicated on the registration card the number of $5 tickets they would like to purchase and the auctioneer collected payments before randomly selecting the winning ticket. In the bucket, each participant was given a common endowment: a clear bag that contained 30 red poker chips, each worth $5. Participants were told that they would only have to pay for the chips that they used and that more chips were available, if needed. They were then sorted by their randomly assigned participant numbers and organized into a circle. The auctioneer presented a small galvanized bucket to the person with the lowest participant number who started the auction. This person could either place a $5 chip into the bucket or withdraw from the auction. The auctioneer then cycled with the bucket around the circle (in order of increasing participant numbers) asking each person to add a chip to the bucket or withdraw. Eventually all but one bidder dropped out and the last remaining bidder was declared the winner. In the hybrid, before getting to the live auction component, members who wanted to participate had to pay a $5 entry fee for which they received one lottery ticket. After the live auction component had finished, the auctioneer drew one of the tickets at random and the ticket-holder won half of the entry fees. The remaining half was added to the auction revenue and donated to Rotary (this is known as a 50-50 lottery).

After the experiment finished, the auctioneer handed out a very brief exit survey (reproduced in the appendix) designed to gather supplementary information and participant

[6]It was common knowledge that payments could be made via credit card, check (made out directly to Rotary) or cash (and that the auctioneer could make change, if needed).

impressions of the auction formats. Once winners were determined, payments reconciled and the post-experimental questionnaires were collected, the auctioneer awarded the wine, announced how much money had been raised and publicly gave the chapter president the auction proceeds. After this, there was typically enough time for the auctioneer to do a quick debriefing. Members were given a two-page summary of the project with some previous lab results and the auctioneer answered questions and discussed the problem of in-kind donations and the virtues of the different charity auction mechanisms.

3 Participation, bid and revenue predictions

To get a sense of the expected fundraising capabilities of the five mechanisms implemented in the field, we study their equilibria and compare their relative performance on both the extensive (participation) and intensive (expected bid) margins, as a means to decompose any expected revenue differences. The typical charity auction setting is one in which bidders have individual private valuations for the good being auctioned and common returns from the public good provided by the total donations collected (e.g., Morgan, 2000 or Goeree et al., 2005). However, to better fit the setting of our field experiment, we reverse these assumptions. Instead, we assume that our auctioneers offer a lot of widely available wine of known common value v, whereby the proceeds go toward the funding of the charitable cause.[7] The revenue from this sale confers additional individual private benefits to bidders. That is, each bidder has her own private "attachment" to the charity, mirroring the differing bonds members of any service organization form over the course of their affiliation and the importance they place on the initiatives funded by the charity. Specifically, for each dollar donated to the charity, bidder $i = 1, 2, \ldots, N$ (with $N \geq 2$) receives an additional surplus of α_i. Further, we assume the charitable return of each bidder is privately observed and is an independent draw from a continuously differentiable probability distribution F with support $[\underline{\alpha}, \overline{\alpha}]$ and density f, which is positive in the interior of the support. Additionally, we assume that the cause is beneficial to bidders. That is, $\underline{\alpha} \geq 0$ and $\overline{\alpha} < \frac{1}{2}$, which, in this setting, ensures that bidders do not have an incentive to contribute infinite amounts in any of the bidding mechanisms considered. Lastly, we allow for the possibility that bidders incur a participation cost of $c \geq 0$, which reflects their opportunity cost of time or their effort to prepare and submit a (sealed) bid or to formulate and execute a bidding strategy (Levin and Smith, 1994). The seller operates one of the following five mechanisms: all-pay auction (a), bucket auction (b), hybrid auction (h), live auction (l), or raffle (r).

[7] In the lab, Orzen (2008), Corazzini et al. (2009) and Damianov and Peeters (2018) all assume a common value.

Though the setting of our experiment dictated changes to our theoretical set up, leveraging heterogeneity in α instead of v relies on much of the same intuition as the existing literature (Engelbrecht-Wiggans, 1994, Goeree et al., 2005, and Engers and McManus, 2007) and leads to many of the same conclusions.[8] We also extend this previous work by assuming participation is endogenous, another feature of our field experimental setting. An analysis of endogenous participation for winner pay auctions is presented in Samuelson (1985) and Menezes and Monteiro (2000), and more recently in Carpenter et al. (2010) who consider the all-pay auction too. We expand their analysis by including the bucket and the hybrid formats as well as the raffle. The payoff structure of the raffle in the current setting is isomorphic to that of a non-perfectly discriminating contest in that the winning probabilities of players correspond to the ratio of their contributions to the total revenue raised. With the interpretation that contributions correspond to contestants' efforts, recent results from the contest literature will guide our raffle analysis (i.e., we follow Wasser 2013; for related papers see also Fey 2008 and Ryvkin 2010). A well known difficulty in the analysis of the raffle under incomplete information is the lack of closed form solutions for the equilibrium bidding functions. We address this difficulty by adapting the numerical routines of Wasser (2013) to account for the aspect of endogenous participation.

For the purpose of the equilibrium analysis, we note that, the live auction is isomorphic to a second-price winner-pay auction (see Engers and McManus, 2007, Proposition 1), the hybrid auction is isomorphic to a second-price winner-pay auction with a participation fee, and the bucket auction is approximated with the second-price all-pay auction. Let us assume that there are n participating bidders, bidder i submits the bid x_i, and all other participating bidders submit the vector of bids $x_{-i.}$ If $P_i^k(x_{i,}x_{-i})$ denotes the winning probability of bidder i in mechanism $k \in \{a, b, h, l, r\}$ and $C_i^k(x_{i,}x_{-i})$ the payment of this bidder, the expected payoff of bidder i is given by

$$E_i^k(x_{i,}x_{-i}) = P_i^k(x_{i,}x_{-i})v - C_i^k(x_{i,}x_{-i}) + \alpha_i \cdot \sum_{j=1}^{n} C_j^k(x_j, x_{-j}) - c.$$

We analyze the symmetric Bayes-Nash equilibrium bid functions in all five mechanisms in the appendix. For expositional clarity, and to facilitate the comparison across mechanisms, we analyze separately the all-pay auctions, the winner-pay auctions, and the raffle. For the case $c > 0$, further progress can be made using numerical methods. Below, we present a numerical approximation of the Bayes-Nash equilibrium by adapting the routines developed

[8]Indeed, an early version of the paper, included predictions based on a model of endogenous participation and independent private values that resulted in very similar predictions. These results are available upon request.

by Wasser (2013) to our setting of endogenous participation (also see the appendix for additional details on our numerical methods).[9]

To get a sense of the relative performance of the five mechanisms, we report participation, bids and revenues generated by each using parameter values based on our experiment, including \$35, the actual monetary value of the prize. We assume that the cost of participation is low, $c = \$1$ and to examine how the results change as the number of bidders increases, we present calculations for as few as 2 potential bidders and as many as 20. Further, the entry fee for the hybrid is \$2.5, half the fee charged in the field because each entrant nominally pays \$5 but has a $\frac{1}{n}$ chance of getting $\$\frac{1}{2}(5n)$ back from the 50-50 lottery component of this format. Lastly, we assume that the charitable return of bidders is uniformly distributed over the interval $[0, 0.4]$. The differences between the mechanisms are presented in Figure 1 below.

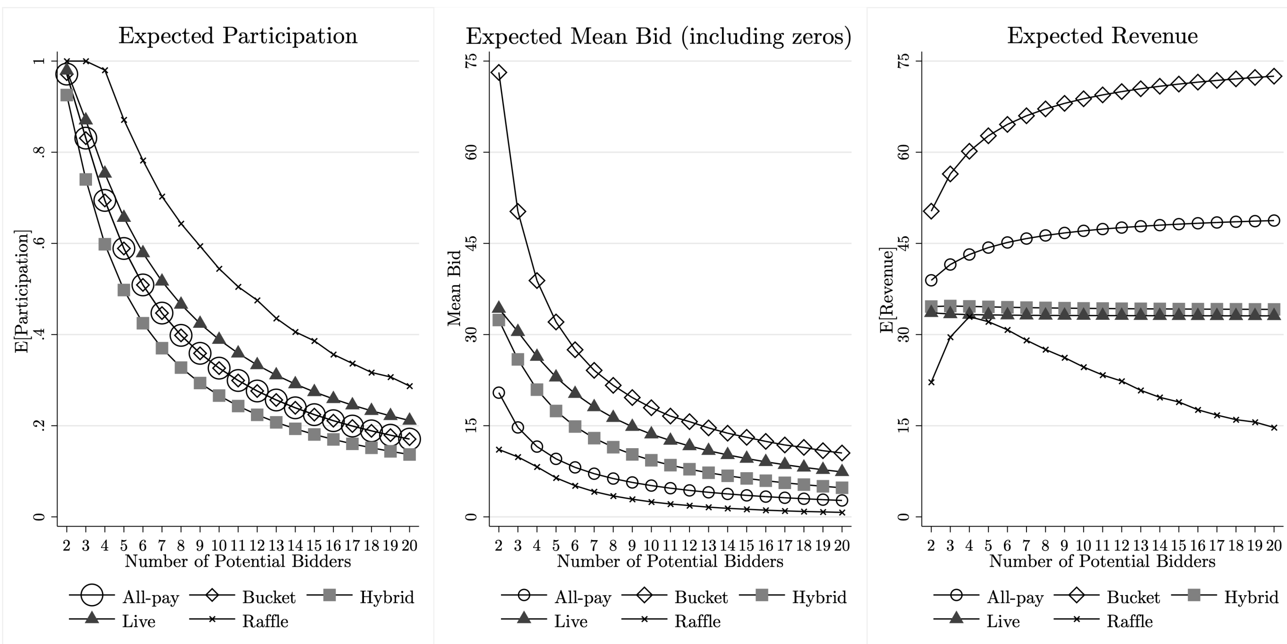

Figure 1: Charity Auction Theoretical Predictions (Note: numerical simulations generate predictions on expected rates of participation (left), mean bids, including zeros for non-participants (middle) and expected revenues conditional on endogenous participation (right)).

[9] As a reviewer pointed out, we note that our results, like those obtained with independent private values, do not necessarily hold for alternative information settings. For example, in a common value model with privately observed signals about the item's value, the English auction and the second price auction are not strategically equivalent. In the open format, bidders acquire additional information about the value of the item when they observe the prices at which their fellow bidders drop out of the competition (see, e.g., Milgrom and Weber, 1982 for revenue ranking results and Bikhchandani and Riley, 1991 for a discussion of equilibrium multiplicity). Further, in open formats, bidders may also deduce the charitable return of others from the prices at which they drop out. Thus, bidders may experience social pressure, or even signal their attachment to the charitable cause through their bidding behavior. All these aspects, which are unaccounted for in our model, might have an impact on the performance of the studied mechanisms.

The numerical simulations help highlight several aspects of the expected performance of the mechanisms. The first result to report is that a participant's attachment matters. According to the Bayes-Nash equilibrium of all mechanisms, the bids (and participation levels) are increasing in alpha. Moving to the extensive margin, we see that the raffle does particularly well, with expected participation rates often well over 50%. In fact, the raffle is predicted to perform best on participation. The driving force behind this result is that any participant bidding a positive amount has a positive chance of winning the prize and the mechanism elicits lower levels of competition due to the non-perfectly discriminating nature of the lottery contest. Placing second in the theoretical participation race is the live auction, which is no surprise given bidders have nothing (beyond the same participation cost faced by the others) to lose. Tied for third (and fourth) place in terms of participation, are the all-pay and bucket formats, which do just a bit better than the hybrid. Hence, the balance of our numerical simulations suggest that in circumstances like ours in which the number of active bidders is always greater than four, in terms of participation, we should expect: *Raffle* > *Live* > *All-pay* = *Bucket* > *Hybrid.*[10]

Considering predictions on the intensive margin, at the center of Figure 1, we see that the bucket is predicted to garner the highest average bid, regardless of the size of the event. In addition, the predicted difference between it and the second highest performer, the live auction, is large in "thin" auctions. The predicted average bids in the other four mechanisms are clustered in two groups. Along with the live in the better performing cluster, is the hybrid in third place. The anticipated difference between the live and hybrid auctions is not large, however. As expected, the remaining two all-pay mechanisms perform worst in terms of predicted bids, with the all-pay doing a bit better than the raffle. Summarizing, our model predicts the following ordering of mean bids: *Bucket* > *Live* > *Hybrid* > *All-pay* > *Raffle.*

On the right of Figure 1, we find that the bucket, which is predicted to incentivize competitive bidding, is expected to yield the most revenue under all conditions and the differential is always sizable. Because, like the bucket, the all-pay collects bids from everyone and doesn't scare away too many bidders, it comes in second place in the theoretical revenue race. The fact that the hybrid gathers revenue from two sources helps it do a bit better than the live auction. Finally, the reduced competitiveness of the raffle causes it to come in last place in the theoretical revenue competition. Summarizing our revenue predictions, we expect: *Bucket* > *All-pay* > *Hybrid* > *Live* > *Raffle.*[11]

[10]Notice in Figure 1 that participation in the all-pay and bucket auctions is identical. The intuition is that in both auctions, when the marginal bidder with the participation threshold value of alpha wins, this bidder wins the auction and pays zero. That is, conditional on winning, this bidder will be the only participating bidder in the auction. Hence, for both formats, at the threshold alpha the expected benefit of participating in the auction must equal the cost of participation.

[11]One last thing to notice about Figure 1 is that in some cases (mostly when n is low) the mean predicted

4 Data preliminaries

In total, our research auctioneers conducted 96 events in 11 states with 1706 Rotary club members. The geographic distribution of our auctions is depicted in Figure 2. Starting in the Northeast, 4 sessions were conducted in Maine (52 participants), 8 sessions were conducted in Vermont (162 participants), 2 were conducted in upstate New York (20 participants) and 30 sessions were conducted near Pittsburgh and Philadelphia in Pennsylvania (490 participants). Among the mid-Atlantic and southern states we conducted 4 sessions in Virginia (48 participants), 15 sessions in Tennessee (280 participants), 1 session in Georgia (18 participants) and 2 in Tallahassee, Florida (40 participants). In the Midwest, we visited 5 Rotary chapters in Indiana (94 participants) and 21 chapters in Texas (418 participants). Lastly, on the west coast, 4 sessions were conducted in California (85 participants).

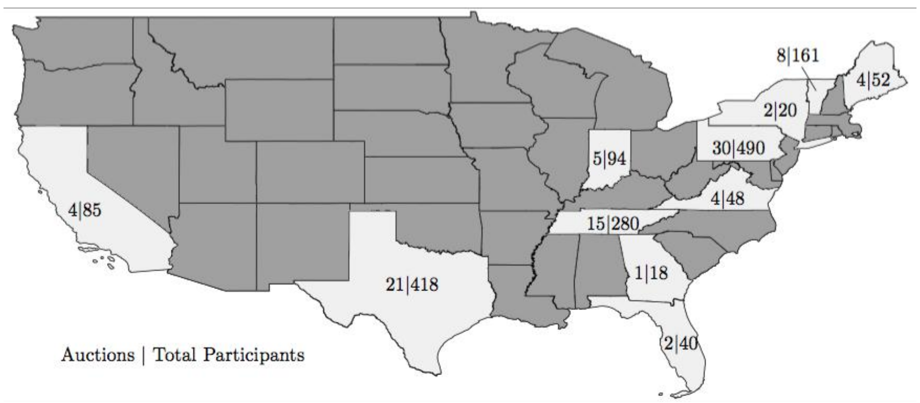

Figure 2: Auction sessions and participation by state.

We were able to collect auction data from 95 of our 96 sessions (in one case the meeting dissolved earlier than planned), which yielded almost 20 observations per mechanism. At the session level, we gathered participation, bid and revenue data from 20 all-pay auctions, 19 bucket auctions, 19 hybrid auctions, 19 live auctions, and 18 raffles. Overall, attendance at our events averaged 17.92 Rotary members (the minimum was 5 and the maximum was 29) and 11.79 of these members, on average, participated. This corresponds to a mean participation rate of close to 70%. The mean bid, excluding those people who chose to not participate but including those participants who opted in but then bid zero, was $24.41. In terms of revenue, our events raised a total of $18,081 for Rotary International. Perhaps more salient is the fact that, on average, we raised $190.32 with just $35 of wine.[12]

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bid in the bucket is larger than the revenue to be collected. To reconcile these results, recall that the bucket is isomorphic with a second-price all-pay auction in which the highest bid is never collected.

[12]Considering our known common value assumption, the surveyed mean value attached to the two bottles of wine was $31.36 for participants and the interquartile range was between $20 and $40. In other words, most values are close to the retail value of the wine.

Table 1: Treatment Balance

	All-pay	Bucket	Hybrid	Live	Raffle
Age	57.93	58.12	56.80	56.00	56.79
Female (I)	0.26	0.22	0.23	0.25	0.23
White (I)	0.82	0.84	0.87	0.90	0.89
College or More (I)	0.70	0.68	0.69	0.76	0.76
High Income (I)	0.54	0.56	0.50	0.51	0.53

Notes: Participant characteristic mean values and percentages by mechanism.

Given the membership of Rotary, our participants were representative. As seen in Table 1, the average age of session attendees was 57.11, 24% were female, and 86% had at least a college education. The median income of the group (measured in intervals) was $100k-$124k. For the purposes of our analysis we create an indicator ("High Income") for at least this level of earnings.[13] Comparing across the columns in Table 1, summary tests indicate that treatment balance was achieved, for the most part.[14]

5 Results overview

Recall that Figure 1 depicted the general patterns we expect to see in the data. Considering participation, the model predicts that for all mechanisms a smaller proportion of attendees will enter the auctions as the number of potential bidders increases. This is precisely what we see on the left of Figure 3. In fact, the point estimate for the linear term in the quadratic fit, pooling all events, is -0.03 ($p = 0.03$). Figure 1 also indicates that we should expect to see mean bids decrease as the events become more competitive, but much of the projected decline is driven by very thin auctions. Given we never had fewer than five active participants, a modest reduction in bids seems the sensible expectation for our data. This is not far from what we observe. As one can see in the middle panel of Figure 3, there appears to be no strong association between event size and a participant's highest/ending bid. Though the linear term in the quadratic fit is negative, as expected, we cannot reject the hypothesis that there is no relationship. Lastly, Figure 1 predicted that revenues will only increase at larger events for the all-pay and bucket auctions. Put differently, when the data from all the auction formats are pooled, it is not clear we should see much of an effect. Despite this, the

[13]Specifically, there were ten household income brackets participants could choose from (starting with "less than $25k" and ending with "more than $225k") and High Income is coded as 1 when a participant chose one of the top five choices (and is coded as 0 otherwise).

[14]Using t-tests, in only 8 of the 50 possible comparisons between mechanisms do we find demographic differences that rise to the 5% level of significance.

quadratic fit on the right of Figure 3 is upward sloping (and the linear point estimate is 6.79, $p = 0.04$), which could signal the dominance of the all-pay auction formats, a hypothesis we consider more carefully in the next section.

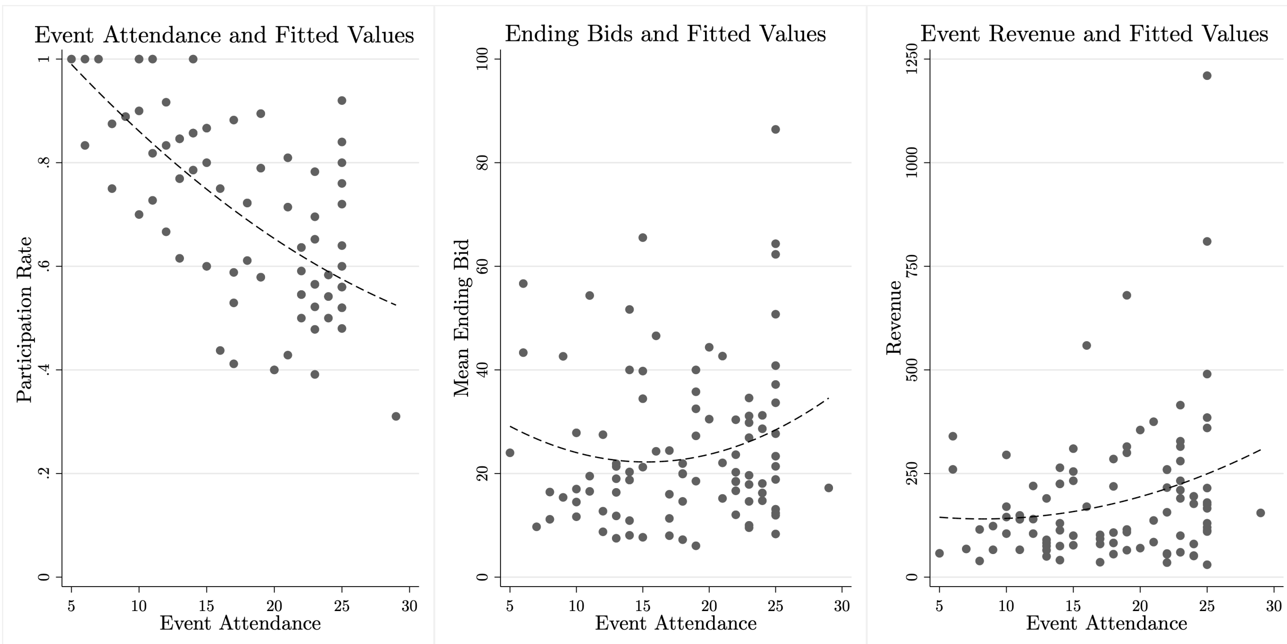

Figure 3: Auction behavior by event size (Note: actual participation rate (left), mean ending bids, including zero bids (middle) and realized revenues (right) for each of the 95 events).

At an even more fundamental level, the motivational cornerstone of our conceptual framework is the idiosyncratic return participants receive from the funds raised for the charity, α_i. In principle, these individual attachments to the charity vary and those people with greater attachments are more likely to participate in fundraisers benefiting the charity and bid more, subject to strategic concerns. In our post-experimental survey we gathered two measures of α_i, one for participation and one for bidding. Specifically, we asked participants to what extent did the fact that all the proceeds from the auction would be donated to the local chapter of Rotary affect their decisions to participate and how much to bid (see the appendix for the exact wording). A summary of these proxies for α are presented in Figure 4.[15]

[15]Given the surveyed proxies for α were gathered after the experiment, we worried about endogeneity, but at the design stage, we worried more about the potential risks of reversing the order of our protocol. Further, we realized that endogeneity is unlikely. It seemed implausible to us that a one-time, half-hour fundraiser conducted by an outsider would appreciably change the attachment of our participants to their local chapter of Rotary. Corroborating this view, there is not a lot of evidence that α varies significantly with format.

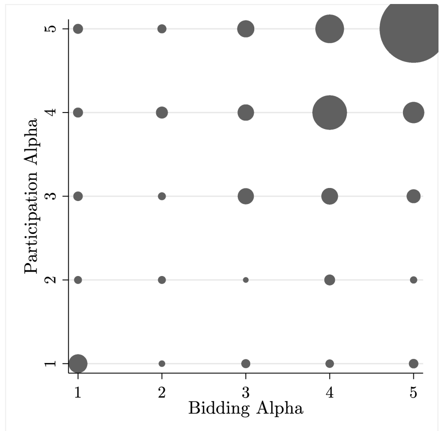

Figure 4: The Joint Distribution of α Proxies (each measured on a 5-point Likert scale).

As expected, many participants were very attached to their local chapter of Rotary. In fact, 51% of participants responded maximally to both prompts, indicating that the fact that the proceeds from the fundraiser would go to their local chapter mattered a lot for both participation and bidding. There is heterogeneity in one's attachment to Rotary, however, and almost 5% of participants were not very motivated to participate or bid because the local chapter would get the proceeds. In addition, many people were consistent in their motives. Seventy percent of the observations are on the diagonal, indicating people who were motivated to participate out of altruism were also motivated to bid more for the same reason.[16] Lastly, both proxies for α vary with the demographics of our participants. The levels of α are higher for women, participants with high income and Rotarians who spend more than 10 hours per month working for the organization.

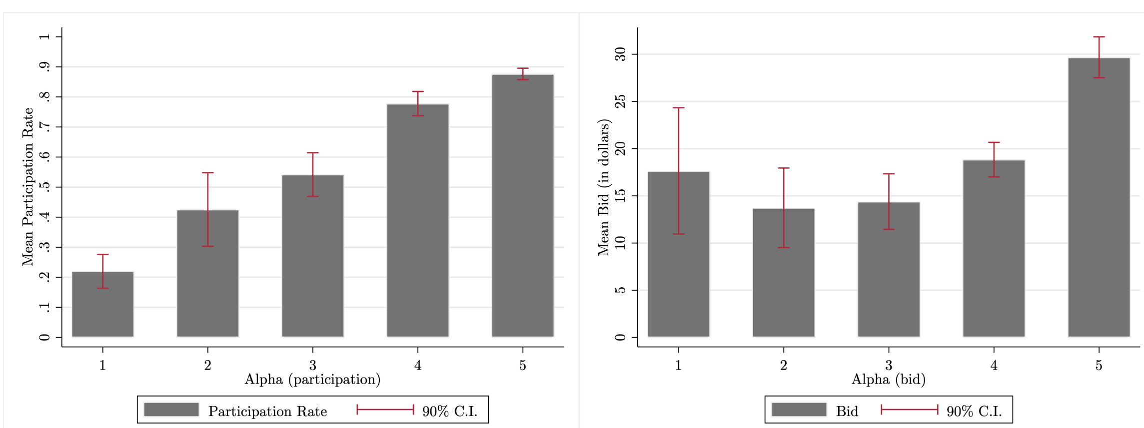

Figure 5: Overall Relationships Between α and Behavior.

[16]Further, Cramer's V measuring the association between the two α proxies is 0.42 and the Goodman and Kruskal gamma is 0.76.

As one can see in Figure 5, our participants do behave in accordance with their altruistic preferences, as the model hypothesizes. On the left, we see that there appears to be an almost linear relationship between our proxy for α and participation - the stronger one's attachment to Rotary, the more likely is one to participate in our fundraisers (pooling across formats). Here the coefficient resulting from a simple bivariate regression is 0.16 ($p < 0.01$), indicating that each step up the Likert scale increases the chances of participating by 16 percentage points, on average. The same is true for bids, as seen on the right of Figure 5; however, here the relationship is not quite as monotonic. While the trend is for bids to increase in attachment to the charity too, the behavior of participants with low attachments is more variable. Nevertheless, the overall trend is still upward - the bivariate regression coefficient (again pooling across formats) is 5.46 ($p < 0.01$). Summarizing, the evidence concerning altruistic preferences is largely consistent with the our modeling assumptions and results.

6 Mechanism differences

In many cases, charities that conduct fundraisers such as ours are as interested in participation as they are in revenue. An event that draws in potential donors because it is interesting, fun or stimulating may raise as much as or more money in the long run through the development of a "warm list" (Landry et al. 2010) than one that initially generates a lot of revenue but leaves donors feeling "tapped out". In addition, auction revenue is determined both by bidding behavior and participation. With this in mind, we analyze our auction data in three steps. We start by testing for differences in participation rates across the five mechanisms, we then repeat the tests to explore any differences in bidding behavior and we conclude the analysis by comparing the revenues generated by each mechanism.

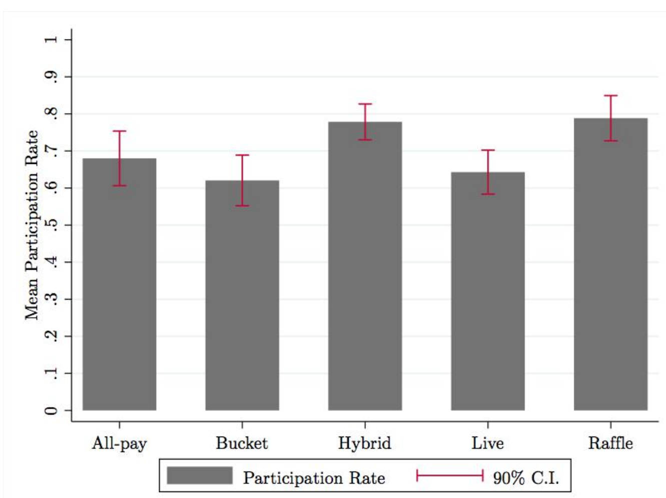

Figure 6: Participation Rates by Mechanism.

In Figure 6, we present mean participation rates by auction format. As mentioned above, the first thing to notice is that participation is relatively high, in general. All mechanisms yield participation rates between 60% and 80%. However, there are some modest differences. Starting with the familiar formats, the raffle attracts the most participants on average (79%), while the live auction does poorly (64%) by comparison. Considering that the other three, less common formats, perform (more or less) somewhere in between the raffle and the live, it is unlikely that experience with the mechanisms drives our participation differences.

There are a few other things to note in Figure 6. First, in line with our predictions (see Figure 1), the raffle does well on participation, a finding that is consistent with previous laboratory experiments (Carpenter et al., 2010b). Also in accordance with theory, the all-pay and bucket auctions are in the middle of the pack and the difference between the two formats is small. Compared to previous experiments, participation in the bucket is similar to the lab results of Carpenter et al. (2014) who show that this format attracts as many participants as other mechanisms, but the all-pay result is novel given it attracted more participation here than it has in previous field trials (e.g., Carpenter et al. 2008 and Onderstal et al. 2013). One interpretation of this difference is that the all-pay auction seems to do well among people inclined to give (i.e., Rotarians).[17] The big surprise, given our theoretical predictions, is the reversal of the live and hybrid auctions in the participation ordering. The model predicted the live auction to do well (because bidders have nothing to lose) and the hybrid to do poorly (because of the entry fee) but we find exactly the opposite. That said, this reversal is consistent with the lab results of Carpenter et al. (2010b) and one possible explanation has to do with the behavioral implications of the hybrid providing two chances to win instead of just one.

To generate conservative estimates of the participation differences, in Table 2 we regress event-level participation rates on format indicators in the first two columns. The first column replicates the findings presented in Figure 6 – there are two groups of mechanisms separated by a participation differential of slightly more than 10%. In one group, the raffle and the hybrid attract almost 80% of bidders and in the other group the all-pay, the bucket and the live attract closer to 65%. Wald tests comparing all combinations of the point estimates, confirms this grouping. In the second column we add the event attendance (i.e., the number of Rotarians attending the event) to account for the effects seen in Figures 1 and 3 and experimenter (i.e., auctioneer) fixed effects to make sure that we aren't attributing differences to the mechanisms when they are actually driven by the differential "charm" of our auctioneers. We also add characteristics of the attendees: their average age, the number who are

[17]That is, as Table 1 indicates, Rotarians have relatively high income and, by virtue of the "service" organization to which they belong, a demonstrated willingness to give.

female, the number who earned a college degree or more and the number who have incomes larger than the median of our entire sample. Using IRS and Census data from 2010 we also created controls at the zip code level for household-level averages of adjusted gross income, reported unemployment insurance received, charitable contributions, homeownership, and travel times to work.

Table 2: Participation Differences

	(1)	(2)	(3)	(4)	(5)
All-pay (I)	0.037	0.010	0.001	-0.005	0.079*
	(0.055)	(0.043)	(0.042)	(0.033)	(0.043)
Bucket (I)	-0.022	-0.020	-0.027	0.050	0.131***
	(0.053)	(0.052)	(0.050)	(0.039)	(0.046)
Hybrid (I)	0.136***	0.115***	0.115***	0.076***	0.052
	(0.044)	(0.043)	(0.042)	(0.037)	(0.051)
Raffle (I)	0.146***	0.131**	0.135***	0.105***	0.188***
	(0.049)	(0.041)	(0.037)	(0.030)	(0.041)
Event Attendance		-0.024***	-0.014***	-0.008***	-0.008***
		(0.006)	(0.002)	(0.002)	(0.003)
α Proxy				0.154***	0.170***
				(0.009)	(0.008)
Intercept	0.643***	0.771***	0.865***	0.152*	0.030
	(0.034)	(0.206)	(0.093)	(0.086)	(0.094)
Level of Analysis	Ses.	Ses.	Ind.	Ind.	Ind.
Experimenter Fixed Effects	No	Yes	Yes	Yes	Yes
Participant Demographics Included	No	Yes	Yes	Yes	Yes
Zip Code Level Controls Included	No	Yes	No	No	No
Zero-bidders Included	Yes	Yes	Yes	Yes	No
Observations	95	95	1583	1398	1227
Adjusted R^2	0.13	0.54	0.05	0.25	0.30

Notes: Dependent variable is event participation rate for session-level analysis and a participation indicator for individual analysis; omitted mechanism is the Live auction; OLS; (robust standard errors); * p<0.10, ** p<0.05, *** p<0.01; demographics include mean age, number of female attendees, number of attendees with high income, number of attendees with a college degree or more education; other zip code level controls include averages of adjusted gross income, unemployment insurance, charitable contributions, homeownership rates and travel times to work.

Although some of the auctioneers were more charming than others (i.e., about a fifth of the increased adjusted R^2 in column 2 comes from the experimenter fixed effects), the differences are orthogonal to our mechanism treatments (as stratification ensured). The addition of the other variables (to control for willingness to pay, philanthropic environment, population density, and perhaps sprawl/stress) contributes little to the explanatory power of the model and has no effect on our participation estimates.[18] In columns (3) and (4) of Table 2 we redo the analysis using the individual-level participation data. Here the point estimates are nearly identical but measured more precisely because of the increased number of observations. In column (4), we add our proxy for α and confirm that, across formats, participants with greater attachments to the charity are significantly more likely to participate. Also of interest in column (4) is the fact that, compared to column (3), the mechanism point estimates remain close in magnitude and significance indicating that any effect of α is unlikely to be format-specific. Lastly, in column (5), we exclude the 180 participants who opt into a mechanism, but then bid zero, Here the idea is that social pressure might lead people to be more likely to opt into "open" formats like the live, hybrid or the bucket where their participation can be observed, but then, effectively, opt back out by bidding zero. Indeed, only 2 of these people opted into the all-pay or the raffle, where participation is hidden, while the rest opted into the hybrid (98), the live (76) or the bucket (4). Comparing columns (4) and (5), we find that when the zero-bidder entrants are excluded, the same overall pattern of participation emerges, but the effective participation rates of the "closed" formats, the all-pay and the raffle, are higher. In the end, we conclude that the familiar raffle and the not so familiar hybrid attract more bidders than the other three mechanisms, however, while significant, the participation differences are modest, unless you focus on participants intent on actively bidding. In this case, the raffle does particularly well.

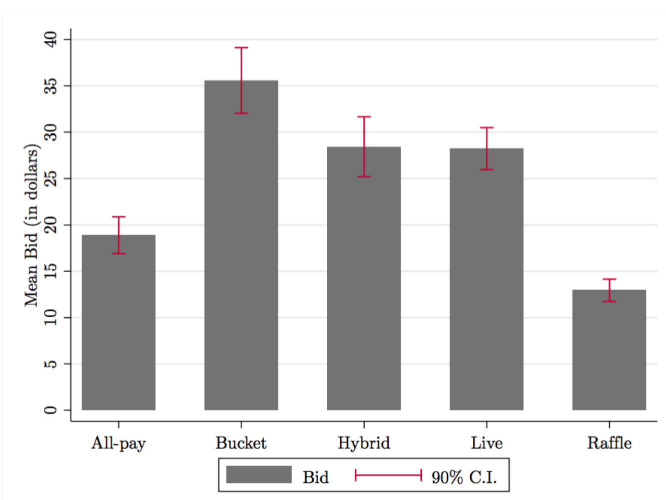

Figure 7: Bids by Mechanism (participants only).

[18]The point estimates for the control variables are reported in Table 2A in the appendix.

Average bids, including those from people who participated but bid zero (18% of the sample), are summarized by format in Figure 7. Notice first that the mean bids in the live auction and the hybrid are only slightly lower than the retail value of the wine. On average, participants bid \$28.22 in the live and \$28.42 in the hybrid (excluding the \$5 participation fee) which, as predicted (in appendix Proposition 2), are statistically indistinguishable from each other in the individual-level data ($t = 0.07$, $p = 0.95$). Also notice that participants in the all-pay and the raffle react as expected to the fact that their bids are always forfeited - they bid less than participants in the winner-pay formats. Again using the individual-level data, the mean bid in the all-pay is significantly lower than the mean bid in all the other formats except the raffle ($p < 0.01$ for all comparisons). Bidders in the bucket, do not reduce their bids, however. The mean bid in the bucket is \$35.58, an amount significantly greater than all the other formats ($p \leq 0.05$ or lower) and indistinguishable from the retail values of the prize ($t = 0.20$, $p = 0.84$). Considering our theoretical predictions by returning to Figure 1, we see that mean bids are ordered, more or less, exactly as predicted.

Table 3 offers guarded bid estimates by first collapsing the data to session averages in columns (1) and (2). Compared to the live, participants in the all-pay and raffle bid considerably less. Conditional on participating, all-pay donors bid approximately \$9 less than live bidders and raffle donors give even less, almost \$14. Both of these differences are highly significant and do not depend on whether demographic or experimenter controls are included.[19] In addition, the hybrid point estimate is never significantly different from zero suggesting that, as predicted by theory, the lottery component of the hybrid has no bearing on the bidding behavior in the live component of this auction. Again, auctioneer fixed effects and participant demographics have little effect on these estimates. Lastly, the point estimate on the bucket differential hovers around \$6 which is a significant sum, but there is not enough power in the auction-level data to identify it precisely.

[19] As with participation, in Table 3A in the appendix, we report the point estimates for all the controls.

Table 3: Bid Differences

	(1)	(2)	(3)	(4)
All-pay (I)	-9.315***	-8.607**	-9.155***	-9.535***
	(3.066)	(3.848)	(2.283)	(2.003)
Bucket (I)	7.145	6.690	6.198*	6.164*
	(4.710)	(5.360)	(3.674)	(3.263)
Hybrid (I)	1.021	1.723	-0.665	0.745
	(4.936)	(5.126)	(2.884)	(3.356)
Raffle (I)	-13.828***	-13.780***	-14.990***	-14.809***
	(3.182)	(4.593)	(2.541)	(2.196)
Intercept	27.862***	10.165	20.421*	1.945
	(2.461)	(26.971)	(10.687)	(13.782)
Lambda			8.517	6.868
			(20.090)	(24.609)
α Proxy				4.645***
				(0.872)
Level of Analysis	Ses.	Ses.	Ind.	Ind.
Experimenter Fixed Effects	No	Yes	Yes	Yes
Participant Demographics Included	No	Yes	Yes	Yes
Zip Code Level Controls Included	No	Yes	No	No
Observations	95	95	1535	1469
Adjusted R^2 or Rho	0.21	0.27	0.29	0.24

Notes: Dependent variable is mean bid for session-level and bid for individual-level analyses; the omitted mechanism is the Live auction; OLS or Heckman with instruments of having cash on hand and a willingness to participate in a follow-up survey; (robust or bootstrap standard errors); * p<0.10, ** p<0.05, *** p<0.01; demographics include mean age, number of female bidders, bidders with high income and bidders with a college degree or more education; zip code level controls include averages of adjusted gross income, unemployment insurance, charitable contributions, homeownership rates and work travel times.

In the second two columns of Table 3, we re-examine bids by taking advantage of the individual level data. Doing so increases the power of the analysis considerably and has the additional benefit of allowing us to instrument for selection. We utilize a standard two-stage Heckman selection model in which the first stage instrument comes from our survey. Although all methods of payment were possible on the day of an event, we expected people to be more likely to participate if they had cash on hand (and that this would be equally true for all the mechanisms). Indeed, having access to cash at the time of the event is a strong predictor in the first-stage regressions: it increases the probability of participating by 8.5 percentage points (and has no significant effect on bids conditional on participation). In addition, the estimated effect of selection (Lambda $\times$ the average mills value) is economically significant: those who choose to participate submit bids that are between \$4.41 and \$9.24 higher. But, despite all this, a Hausman test indicates that the estimated selection effect does not bias the collection of mechanism coefficients significantly. Most importantly, the only noticeable change we see from using the individual-level data is that our estimate of the bucket differential increases and is now significant. While all-pay bidders in both the sealed bid format and the raffle reduce bids as expected compared to the live and hybrid auctions, we find that bucket auction bidders donate more than all others. Lastly, in column (4), we add our proxy for α to the individual-level analysis and corroborate our earlier finding that bidders with greater attachments to the charity bid more. Again this addition does not appreciably change the format point estimates, indicating the effect of attachment does not vary by mechanism.

At this point the careful reader should have a good sense of what the revenue comparisons will look like. Given participation is roughly similar across mechanisms but participants tend to reduce their bids in only two of the three all-pay mechanisms, the one in which they do not reduce their bids must do well. Indeed, in Figure 8 we report average revenues by mechanism and find that the most familiar auction mechanism (the live) tends to double the retail value of our prize while the least familiar (the bucket) increases it by more than an order of magnitude. Compared to the other formats, the live auction appears to underperform, but it actually did rather well for Rotary. On average, the live auction garnered \$63, which is close to double the wine's retail value. The hybrid, with its two components, did a bit better, \$103, on average.[20] And, consistent with theory, the all-pay (\$211 on average) did slightly better than the raffle (\$179) but both do considerably better than either the hybrid or live auctions. All the revenue differences are dwarfed, however, when we consider the bucket, which raised an average of \$393. Not only does the bucket come close to doubling the revenues generated in either the all-pay or the raffle, it yields more than six times the revenue raised in the live auction. Considering theory, the observed revenue ordering is as predicted with one exception: while the raffle was predicted to collect the least amount of revenue, in the field it outperformed both the hybrid and live auctions.

[20]However, if we just consider the live auction proceeds (i.e., in the absence of the lottery revenue), the hybrid generates an average of \$71 which is indistinguishable from the live (p=0.50).

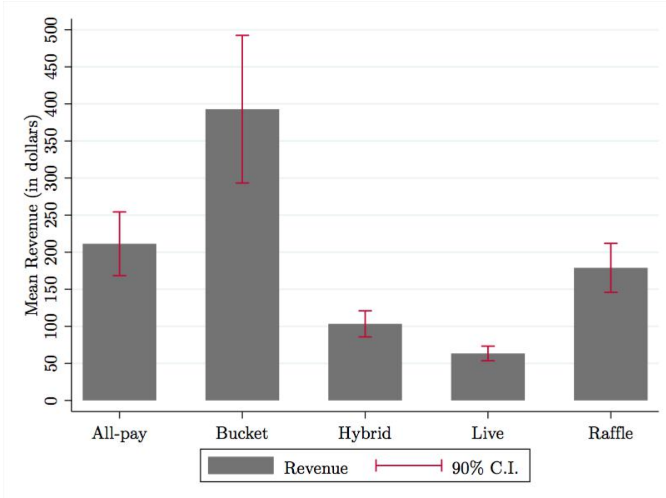

Figure 8: Revenue Raised by Mechanism.

In Table 4 we examine the revenue differences more closely.[21] Again, the live auction is used as the baseline mechanism. Column (1) suggests that all the mechanisms yield significantly more revenue than the live auction. Comparing the point estimates we also confirm that the hybrid raises significantly less money than any mechanism except for the live auction, the all-pay and the raffle raise equal amounts of revenue, and the bucket earns significantly more revenue than any other mechanism. In column (2) we add experimenter fixed effects, bidder characteristics and the zip code level controls to little effect.[22] In column (3) we include the number of active bidders (instrumented using the start time of the event) to make sure that the revenue differences are not being driven by differences in participation.[23] Although it is the case that, on average, another bidder increases revenue by slightly less than $12 across mechanisms, controlling for this affects our estimates of mechanism performance only slightly. Like the rest of the analysis, our revenue results are very robust: the hybrid and live auctions perform relatively poorly, the all-pay auction and raffle do relatively well, but the bucket auction raises the most revenue for charity in this field setting.[24]

[21]Because we supplement our auction-level analysis with individual bidder-level analyses, we do not have to worry about statistical power issues with our examinations of participation and bidding. However, one might worry that power is more scarce when we analyze revenue. This does not appear to be the case, given the large differences we find. For instance, the estimated power of the bucket versus live comparison is 0.99 and even the bucket versus its nearest rival, the all-pay, comparison, with much more variation in revenues, is estimated to be powered at the standard lower threshold of 0.8 (0.795, to be exact).

[22]Judging by the small bump in adjusted R^2 between the first two columns of Table 2, the differences among our auctioneers affect participation primarily and not revenue.

[23]In Table 2, we analyzed participation rates as an outcome, but we could have examined the number of active bidders instead. This suggests that the number of active bidders is likely to be endogenous in the analysis of another outcome, revenue. For this reason, we instrument using the start time of the meeting - more active bidders turn out at breakfast meetings.

[24]Table 4A in the appendix reports the point estimates for the controls.

Table 4: Revenue Differences

	(1)	(2)	(3)
All-pay (I)	147.965***	164.519***	168.854***
	(25.497)	(32.027)	(33.594)
Bucket (I)	329.474***	333.863***	345.748***
	(59.345)	(76.732)	(82.726)
Hybrid (I)	39.895***	57.518**	55.608*
	(11.622)	(26.787)	(30.928)
Raffle (I)	115.468***	130.436***	104.415***
	(19.757)	(34.481)	(38.610)
Active Bidders (#)$^{\alpha}$			11.943
			(14.385)
Intercept	63.421***	4.902	-90.018
	(5.676)	(329.920)	(382.508)
Experimenter Fixed Effects	No	Yes	Yes
Participant Demographics Included	No	Yes	Yes
Zip Code Level Controls Included	No	Yes	Yes
Observations	95	95	95
Adjusted R^2	0.41	0.45	0.48

Notes: Dependent variable is auction revenue; the omitted mechanism is the Live auction; OLS; (robust standard errors); $^{\alpha}$event start time is used as an instrument for the number of active bidders; * p<0.10, ** p<0.05, *** p<0.01; demographics include mean age, number of female bidders, number of bidders with high income, number of bidders with a college degree or more education; other zip code level controls include averages of adjusted gross income, unemployment insurance, charitable contributions, homeownership rates and travel times to work.

7 Discussion

Casual observation suggests that the set of mechanisms that charities use to raise money from contributed goods and services is small. When an auction is chosen, it is typically a "live" (aka English) auction and when an auction is not used, the alternative is almost always a raffle. It is hard to tell exactly how beneficial these choices are for charities because other mechanisms (e.g., the all-pay auction) are considered so rarely, there are selection issues (live auctions tend to be used when an event is possible and raffles are used when one is not) and there is very little field data on which to base an assessment. In other words, it is hard to know whether charities choose prudently or fall victim to the "curse of the familiar". In fact, our post-experimental questionnaire corroborates these claims. When asked how familiar they were with the format in which they participated, the mean live auction participant response was 4.13 on a 5-point Likert scale. Unsurprisingly, given the hybrid is a combination of a live auction and a lottery, it and the raffle were the next most familiar formats with mean assessments of 3.22 and 3.10, respectively. As expected given their novelty in the field, the all-pay and bucket formats were considered much less familiar, both with mean assessments just a bit over 2.

We conducted an experiment with Rotary clubs to examine the relative performance of this small set of common formats and to test whether charities might do better by considering new, more novel, formats. Our results are unique because we are able to organize a large number of identical events, the events took place across the United States and, crucially, we were able to randomly assign auction formats to fundraisers.

To reflect on our findings, we circle back to Section 3 and ask how well our results "jibe" with theory. As hypothesized, the charity attachment proxies we collected predict both participation and bidding. Overall, those participants who care more about the public good aspect of the fundraiser, are more likely to opt into an event and they bid more aggressively once the event begins. Considering participation, Figure 1 predicted that the raffle and live formats would do better than the bucket and all-pay, which should be indistinguishable, and that the hybrid would do worst. We find this mostly though there is one significant exception. Our data suggests that the hybrid does much better than expected. Considering our bidding hypotheses (also based on Figure 1), we find that theory does a particularly good job of anticipating our field results. As predicted, the bucket does best followed first by the two winner-pay formats then by the all-pay and the raffle does worst. Likewise, theory predicts almost all of our revenue results. In this case, the one paradoxical result we find is that, instead of the winner pay formats (the hybrid and the live) doing better than the raffle, we find the opposite: the raffle does better than expected and the winner pay formats do worse. While un-modeled behavioral reasons might contribute to the apparent reversal, this prediction depends on the assumed underlying distribution of αs. While the live auction can't raise more money in our setup than the common value, the raffle can if the αs are high enough and less varied than we have assumed.

Our post-experimental questionnaire also asked about perceptions of format fairness and whether one would participate again. Can these responses help explain the anomalies we find in our data? In terms of fairness, the hybrid auction, perhaps because it is very similar to the live auction, ranks among the "fairest." Again on a 5-point scale, the live auction tops the fairness ranking with a mean assessment of 4.59, but the hybrid is not far behind at 4.50. Further, being at the top of the fairness rankings overlaps with topping the willingness to participate again rankings. In this case, the hybrid and live auctions are indistinguishable, achieving mean ratings of 4.02. Hence, despite the participation fee imposed on bidders in the hybrid action, people find it fair and would happily pay the fee again. Perhaps this has something to do with it performing better than expected. Considering the raffle, it ranks almost as high as the live and hybrid in terms of fairness (mean assessment equals 4.21) and it is also third in subject willingness to participate again (a mean assessment of 3.64). Provided subjects find it fair and are willing to do it again, it is not too much of a surprise that because the charity collects bids from all the participants, the raffle does well.

Turning to the pragmatic lessons from our study, our data suggest that charities fare well when considering the broader "transformation problem." Our field auctioneers, were able to raise an average of $190 using donated wine with a retail value of $35. Considering the choice of a mechanism, three practical lessons arise from our experiment for charities. First, if we limit attention to the two mechanisms that are used with any regularity, we find that the raffle does much better than the live auction. Not only does the raffle generate almost three times as much revenue as the live auction, one can also expect more donors to participate in the raffle than in the live auction, a result that might be important for the development of a donor "warm list". Second, in reference to the theory of charity auctions, we confirm that choosing from the broad category of all-pay mechanisms, including the first-price auction, the bucket auction and the raffle, does improve revenue (three-fold, on average) compared to the two winner-pay mechanisms we considered - the live and hybrid auctions. Further, considering only the all-pay mechanisms, the first-price all-pay does raise slightly more money than the raffle, though the differential is small and not always significant. Third, and most important, our results suggest that charities are probably sacrificing a considerable amount of money by not considering other formats.[25] Not only is perhaps the most common option, the live auction, an inferior choice, both in terms of revenue and participation, in this case the curse of the familiar is at its strongest - the most common format did not just perform poorly, it performed worse than every other mechanism tested.

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[25]Pooling across our events, we find that the opportunity cost to our charity of using the live auction at 19 events instead of the bucket is $6260.

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9 Appendix

9.1 Theory

Proposition 1 (All-pay auctions). *In the all-pay auction (a) and the bucket auction (b) bidders with a charitable return of $\alpha \geq \alpha^{a,b}$ participate where the threshold value $\alpha^{a,b}$ is determined by the solution to the equation*

$$vF(\alpha)^{N-1} = c. \tag{1}$$

When $n \geq 2$ bidders participate, the symmetric Bayes-Nash equilibrium strategies $\sigma^j(\alpha)$ for $j = a, b$ and $\alpha^{a,b} \leq \alpha \leq \overline{\alpha}$ are given by the functions

$$\sigma^a(\alpha) = v(n-1)\int_{\alpha^{a,b}}^{\alpha} \frac{F(x)^{n-2}f(x)}{1-x}dx \tag{2}$$

$$\sigma^b(\alpha) = v(n-1)\int_{\alpha^{a,b}}^{\alpha} \frac{F(x)^{n-2}f(x)}{(1-x)-(1-xn)F(x)^{n-1}-\alpha(n-1)F(x)^{n-2}}dx. \tag{3}$$

The expected revenues are

$$R^a = vn(n-1)\int_{\alpha^{a,b}}^{\overline{\alpha}} \frac{(1-F(\alpha))F(\alpha)^{n-2}f(\alpha)}{1-\alpha}d\alpha \tag{4}$$

$$R^b = vn(n-1)\int_{\alpha^{a,b}}^{\overline{\alpha}} \frac{(1-F(\alpha)^{n-1})(1-F(\alpha))F(\alpha)^{n-2}f(\alpha)}{(1-\alpha)-(1-\alpha n)F(\alpha)^{n-1}-\alpha(n-1)F(\alpha)^{n-2}}d\alpha \tag{5}$$

and the bucket auction revenue dominates the all-pay auction (i.e. $R^b > R^a$).

Proof: For the all-pay auction, the derivative of the expected payoff of a bidder with a marginal return of α who bids as if his or her marginal return is β and whose rivals bid according to the equilibrium strategy $\sigma(\cdot) \equiv \sigma^a(\cdot)$, is

$$\partial_\beta \pi^a(\sigma(\beta) \mid \alpha) = v(n-1)F(\beta)^{n-2}f(\beta) - (1-\alpha)\sigma'(\beta).$$

From first order condition ($\partial_\beta \pi^a(\sigma(\beta) \mid \alpha) = 0$ for $\beta = \alpha$) we get

$$\sigma'(\alpha) = \frac{v(n-1)F(\alpha)^{n-2}f(\alpha)}{(1-\alpha)}.$$

Integrating on both sides, we obtain the equilibrium bidding function stated in the proposition. The threshold level $\alpha^{a,b}$ is determined by the requirement that this bidder type has an expected surplus from the auction equal to the participation cost of c. Note that expected revenue in the all-pay auction equals the expected contribution of each bidder multiplied by the number of bidders:

$$R^a = n\int_{\alpha^{ab}}^{\overline{\alpha}} \sigma^a(\alpha)dF(\alpha).$$

Integrating by parts and simplifying we obtain

$$R^a = n\{[F(\alpha)\sigma^a(\alpha)]_{\alpha^{ab}}^{\overline{\alpha}} - \int_{\alpha^{ab}}^{\overline{\alpha}} F(\alpha)d\sigma^a(\alpha)\} \Leftrightarrow$$

$$R^a = vn(n-1)[F(\alpha)\int_{\alpha^{ab}}^{\alpha} \frac{F(x)^{n-2}f(x)}{1-x}dx]_{\alpha^{ab}}^{\overline{\alpha}} - \int_{\alpha^{ab}}^{\overline{\alpha}} F(\alpha)\frac{F(\alpha)^{n-2}f(\alpha)}{1-\alpha}d\alpha \Leftrightarrow$$

$$R^a = vn(n-1)\int_{\alpha^{ab}}^{\overline{\alpha}} \frac{(1-F(\alpha))F(\alpha)^{n-2}f(\alpha)}{1-\alpha}d\alpha.$$

For the bucket auction, assume that all bidders bid according to the equilibrium strategy $\sigma(\cdot) \equiv \sigma^b(\cdot)$. The derivative of the expected payoff of a bidder with a marginal return of α who mimics the strategy of a bidder with a marginal return of β is

$$\partial_\beta \pi^b(\sigma(\beta) \mid \alpha) = v(n-1)F(\beta)^{n-2}f(\beta) - (1-\alpha)\sigma'(\beta)(1-F(\beta)^{n-1}) + \alpha\sigma'(\beta)[(n-1)F(\beta)^{n-1}(1-F(\beta))].$$

The first order condition ($\partial_\beta \pi^a(\sigma(\beta) \mid \alpha) = 0$ for $\beta = \alpha$) yields

$$\sigma'(\alpha) = \frac{v(n-1)F(\alpha)^{n-2}f(\alpha)}{(1-\alpha)-(1-\alpha n)F(\alpha)^{n-1} - \alpha(n-1)F(\alpha)^{n-2}}.$$

Integrating on both sides, we obtain the equilibrium bidding function stated in the proposition. The threshold level $\alpha^{a,b}$ is determined by the requirement that this bidder type has an expected surplus from the auction equal to the participation cost of c. To derive the expected revenue, observe that in this auction all bidders pay their bids except for the highest bidder who contributes an amount equal to the second highest bid. We denote the distribution of the first order statistics of players' returns from charitable contributions by $F_1(\alpha)$ and the second order statistics by $F_2(\alpha)$. The expected revenue of the seller is given by

$$R^b = \int_{\alpha^{ab}}^{\overline{\alpha}} \sigma^b(\alpha)d[nF(\alpha) - F_1(\alpha) + F_2(\alpha)].$$

Integrating by parts and simplifying we obtain

$$R^b = [nF(\alpha) - F_1(\alpha) + F_2(\alpha))]\sigma^b(\alpha)]_{\alpha^{a,b}}^{\overline{\alpha}} - \int_{\alpha^{ab}}^{\overline{\alpha}} [nF(\alpha) - F_1(\alpha) + F_2(\alpha)]d\sigma^b(\alpha)\} \Leftrightarrow$$

$$R^b = [nF(\alpha) - F_1(\alpha) + F_2(\alpha))]\sigma^b(\alpha)]_{\alpha^{a,b}}^{\overline{\alpha}} - \int_{\alpha^{ab}}^{\overline{\alpha}} [nF(\alpha) - F_1(\alpha) + F_2(\alpha)]d\sigma^b(\alpha)\} \Leftrightarrow$$

$$R^b = [n\sigma^b(\alpha)]_{\alpha^{ab}}^{\overline{\alpha}} - \int_{\alpha^{a,b}}^{\overline{\alpha}} [nF(\alpha) + nF(\alpha)^{n-1} - nF(\alpha)^n]d\sigma^b(\alpha)\} \Leftrightarrow$$

$$R^b = \int_{\alpha^{a,b}}^{\overline{\alpha}} [n - nF(\alpha) - nF(\alpha)^{n-1} + nF(\alpha)^n]d\sigma^b(\alpha)\} \Leftrightarrow$$

$$R^b = n \int_{\alpha^{a,b}}^{\overline{\alpha}} [(1 - F(\alpha)^{n-1})(1 - F(\alpha))]d\sigma^b(\alpha)\} \Leftrightarrow$$

$$R^b = vn(n-1) \int_{\alpha^{a,b}}^{\overline{\alpha}} \frac{(1 - F(\alpha)^{n-1})(1 - F(\alpha))F(\alpha)^{n-2}f(\alpha)}{(1-\alpha) - (1-\alpha n)F(\alpha)^{n-1} - \alpha(n-1)F(\alpha)^{n-2}} d\alpha.$$

To demonstrate that $R^b > R^a$ we will show that that the integrand in the expected revenue of the bucket auction $I^b(\alpha) \equiv \frac{(1-F(\alpha)^{n-1})(1-F(\alpha))F(\alpha)^{n-2}f(\alpha)}{(1-\alpha)-(1-\alpha n)F(\alpha)^{n-1}-\alpha(n-1)F(\alpha)^{n-2}}$ is greater than the integrand of the expected payoff of the all-pay auction $I^a(\alpha) \equiv \frac{(1-F(\alpha))F(\alpha)^{n-2}f(\alpha)}{1-\alpha}$ for all α. Observe that the difference in the integrands equals

$$I(\alpha) - I^a(\alpha) = \frac{(1 - F(\alpha)^{n-1})(1 - F(\alpha))F(\alpha)^{n-2}f(\alpha)}{(1-\alpha) - (1-\alpha n)F(\alpha)^{n-1} - \alpha(n-1)F(\alpha)^{n-2}} - \frac{(1 - F(\alpha))F(\alpha)^{n-2}f(\alpha)}{1-\alpha} \Leftrightarrow$$

$$I(\alpha) - I^a(\alpha) = (1 - F(\alpha))F(\alpha)^{n-2}f(\alpha)[\frac{(1 - F(\alpha)^{n-1})}{(1-\alpha) - (1-\alpha n)F(\alpha)^{n-1} - \alpha(n-1)F(\alpha)^{n-2}} - \frac{1}{1-\alpha}] \Leftrightarrow$$

$$I(\alpha) - I^a(\alpha) = (1 - F(\alpha))F(\alpha)^{n-2}f(\alpha)\frac{\alpha(n-1)F(\alpha)^{n-2}(1 - F(\alpha)^n)}{[(1-\alpha) - (1-\alpha n)F(\alpha)^{n-1} - \alpha(n-1)F(\alpha)^{n-2}](1-\alpha)}.$$

As $F(\alpha) \leq 1$ it is straightforward to verify that all terms are nonnegative.

We next present the analysis of the winner pay formats which include the live auction and the hybrid auction. The difference between the two formats is that in the hybrid auction, bidders are charged a participation fee, half of the entry fees are awarded as a prize in the lottery part of the hybrid auction and the other half is added to the auction revenue. With this design feature in mind, we denote the effective participation fee (i.e., half of the entry fee charged) by e. Participation and equilibrium bidding in the live auction with an entry fee of e is as follows.

Proposition 2 (**Winner-pay auctions**). *In the live auction with an entry fee e, bidders with a charitable return of $\alpha \geq \alpha_e$ participate where the threshold value α_e is determined by the solution to the equation*

$$v[F(\alpha)^{N-1} + \alpha(N-1)F(\alpha)^{N-2}(1 - F(\alpha))] = c + (1 - \alpha)e. \quad (6)$$

When $n \geq 2$ bidders participate, they remain in the bidding until the price reaches v and the expected revenue is

$$R^e = [1 - F(\alpha_e)^n - nF(\alpha_e)^{n-1}(1 - F(\alpha_e))]v + n(1 - F(\alpha_e))e. \quad (7)$$

When $c = e = 0$ all bidders enter the live auction and the item is sold for the price of v. It is easy to demonstrate that the all-pay auction dominates the live auction as the expected revenue in the all-pay auction exceeds v,

$$R^a = vn(n-1)\int_{\underline{\alpha}}^{\overline{\alpha}} \frac{(1 - F(\alpha))F(\alpha)^{n-2}f(\alpha)}{1-\alpha} d\alpha > vn(n-1)\int_{\underline{\alpha}}^{\overline{\alpha}} (1 - F(\alpha))F(\alpha)^{n-2} dF(\alpha)$$

$$= vn(n-1)\int_{\underline{\alpha}}^{\overline{\alpha}} 1d\frac{F(\alpha)^{n-1}}{n-1} - \int_{\underline{\alpha}}^{\overline{\alpha}} 1d\frac{F(\alpha)^n}{n} = vn(n-1)(\frac{1}{n-1} - \frac{1}{n}) = v.$$

Proof: Assume that a bidder with a charitable return of α submits a bid that would correspond to the equilibrium strategy of a bidder of type $\beta = \alpha + \varepsilon$. By increasing her bid, this bidder increases her chances of winning by ε multiplied by $\frac{d(F(\beta)^{n-1})}{d\beta}$. Further, by increasing her bid, this bidder increases total revenue in the auction when this bidder is the second highest bidder. The additional benefit from the increase in expected total revenue equals ε multiplied by $\alpha\sigma'(\beta)(n-1)F(\beta)^{n-2}(1 - F(\beta))$. Note that, in a winner pay auction, when a bidder tops the highest bidder, this bidder contributes to the revenue but eliminates the contribution of the toppled bidder. Thus, for the marginal benefit of bidder i we obtain

$$\partial_\beta \pi^l(\sigma(\beta) \mid \alpha) = v\frac{d(F(\beta)^{n-1})}{d\beta} - \sigma(\beta)\frac{d(F(\beta)^{n-1})}{d\beta} + \alpha\sigma'(\beta)(n-1)F(\beta)^{n-2}(1 - F(\beta)).$$

From first order condition ($\partial_\beta \pi^a(\sigma(\beta) \mid \alpha) = 0$ for $\beta = \alpha$) we get

$$[v - \sigma(\alpha)]f(\alpha) + \alpha\sigma'(\alpha)(1 - F(\alpha)) = 0 \Leftrightarrow$$

$$\sigma'(\alpha) - \frac{f(\alpha)}{\alpha(1 - F(\alpha))}\sigma(\alpha) = -v\frac{f(\alpha)}{\alpha(1 - F(\alpha))}.$$

Multiplying both sides by the integrating factor $(1 - F(\alpha))^{\frac{1}{\alpha}}$ we obtain

$$\frac{d}{d\alpha}[\sigma(\alpha)(1 - F(\alpha))^{\frac{1}{\alpha}}] = \frac{d}{d\alpha}[(v(1 - F(\alpha))^{\frac{1}{\alpha}})].$$

The solution to this equation, up to an integrating constant, is $\sigma(\alpha) = v$, and it is straightforward to verify v is the only possible equilibrium price. To obtain the threshold α_e, observe that the expected benefit of a bidder with a return of α equals v times the probability that she is the only participating bidder, $F(\alpha_e)^{n-1}$ plus αv times the probability that there is at least one additional participating bidder, $1 - F(\alpha_e)^{n-1}$. The benefit from non-participation equals αv times the probability that there are at least two other participating bidders, $1 - [F(\alpha)^{n-1} + (n-1)F(\alpha)^{n-2}(1 - F(\alpha))]$. We thus obtain the following condition for the charitable return threshold:

$$vF(\alpha)^{n-1} + \alpha v(1 - F(\alpha)^{n-1}) - c - (1 - \alpha)e = \alpha v[1 - F(\alpha)^{n-1} - (n-1)F(\alpha)^{n-2}(1 - F(\alpha))].$$

Rearranging terms and simplifying, we obtain the condition stated in Proposition 2.

The raffle is equivalent to a Tullock lottery contest with private cost equal to $(1 - \alpha_i)$. If all other bidders play a type dependent strategy $\sigma_j^r(\alpha_j)$, the expected payoff of bidder i who donates b_i is given by

$$E_i^r(b_i, \sigma_j^r(\alpha_j)) = v\int_{\underline{\alpha}}^{\overline{\alpha}} \cdots \int_{\underline{\alpha}}^{\overline{\alpha}} \frac{b_i}{\sum_{j\neq i}\sigma_j^r(\alpha_j) + b_i} dF_{-i}(\alpha_{-i}) - (1 - \alpha_i)b_i + \alpha_i E_{-i}^r \tag{8}$$

where $E_{-i}^r = \int_{\underline{\alpha}}^{\overline{\alpha}} \cdots \int_{\underline{\alpha}}^{\overline{\alpha}} \sum_{j\neq i}\sigma_j^r(\alpha_j)dF_{-i}(\alpha_{-i})$ is the sum of the expected contributions of the other players. This contest has a unique symmetric Bayes-Nash equilibrium with bidding functions described by the following proposition (Wasser 2013).

Proposition 3 (**Raffle**). *When $c = 0$ the equilibrium strategy $\sigma^r(\alpha)$ satisfies the conditions*

$$\frac{\partial E_i(b_i, \sigma_j^r(\alpha_j))}{\partial b_i}\begin{cases} = 0 & for \quad b_i = \sigma^r(\alpha_i) > 0 \\ \leq 0 & for \quad b_i = \sigma^r(\alpha_i) = 0 \end{cases}$$

where

$$\frac{\partial E_i(b_i, \sigma_j^r(\alpha_j)}{\partial b_i} = v \int_{\underline{\alpha}}^{\overline{\alpha}} \cdots \int_{\underline{\alpha}}^{\overline{\alpha}} \frac{\sum_{j \neq i} \sigma_j^r(\alpha_j)}{(\sum_{j \neq i} \sigma_j^r(\alpha_j) + b_i)^2} dF_{-i}(\alpha_{-i}) - (1 - \alpha_i) \quad (9)$$

While strategies cannot be derived in closed form, we can show that the raffle generates lower revenue that the all-pay auction. Dividing all the terms in the above equation by $(1 - \alpha_i)$, the current setting can also be transformed into an equivalent one in which bidders compete without a charitable component for an item of private value $v_i = \frac{v}{1-\alpha_i}$. The values v_i are distributed in the interval $[\frac{v}{1-\underline{\alpha}}, \frac{v}{1-\overline{\alpha}}]$ according to the distribution $G(v_i) = F(1 - \frac{v}{v_i})$. As demonstrated by Goeree et al. (2005, Proposition 2), the all-pay auction generates more revenue than the raffle, as long as $v_i - \frac{1-G(v_i)}{v_i}$ is increasing in v_i.

9.2 Numerical methods

As noted, the equilibrium in the raffle cannot be derived in closed form so we describe the procedure for approximating the equilibrium strategies numerically. This procedure is used to derive the results for the raffle presented in Figure 1. Our approach is based on the routines developed by Wasser (2013) for the numerical approximation of the equilibrium strategies in a Tullock contest with private information about the cost of effort.[26] In particular, we adapt the routines therein for bidders competing in a raffle, with private information about their charitable returns, and who can also choose whether to participate or not.

We begin by discretizing the interval $[\underline{\alpha}, \overline{\alpha}]$ using a grid size $\Delta = \frac{\overline{\alpha}-\underline{\alpha}}{100}$, i.e. we create a discrete version of the raffle with player types $\{\alpha^1, \alpha^2, \ldots, \alpha^{101}\}$ where $\alpha^k = \underline{\alpha} + (k-1)\Delta$ for $k = 1, 2, \ldots,$101. We note that a Bayes-Nash equilibrium has to fulfill the conditions presented in Proposition 3. The $(N - 1)$ dimensional integral in equation (**??**) is approximated using quasi-Monte Carlo integration. A candidate for an equilibrium is derived numerically by requiring that all points α^k satisfy the conditions in Proposition 3. To determine the participation cutoff valuation, we consider first the game with full support $\{\alpha^1, \alpha^2, \ldots, \alpha^{101}\}$. After deriving the candidate equilibrium strategy, we calculate the expected payoff of the bidder with the lowest return $\alpha^1 = \underline{\alpha}$. If the expected payoff of this bidder is equal to or exceeds c, we conclude that all player types participate (i.e. the probability of participation is 1) and the derived candidate equilibrium strategy is the equilibrium strategy under endogenous participation. Otherwise, we assign to the player type α^1 a bid of zero (i.e. this player type does not participate) and consider the reduced set of bidder types $\{\alpha^2, \ldots, \alpha^{101}\}$. Using the above method, we derive again a candidate for equilibrium. We use this procedure iteratively: in case the expected payoff of bidder type α^k is still below c, we assign

[26]We would like to thank Cédric Wasser for generously sharing his Matlab routines.

this bidder type a bid of zero and further consider the game with support$\{\alpha^{k+1}, \ldots, \alpha^{101}\}$ for $k = 2, 3 \ldots, 101$. This iterative process continues until we reach k for which the expected payoff of player type α^k equals or exceeds c, and this charitable return is taken as an approximation for the participation threshold.

9.3 Instructions from the field experiment

You are about to participate in a charity fundraiser. The bottles of wine have been provided by a research grant from the National Science Foundation. All the proceeds from this event will be donated directly to this local Rotary chapter.

[All-pay] Here are the rules:

• Bidders make one bid in a sealed envelope.

• The auction is "all-pay" – regardless of winning or losing, all bidders will be asked to pay the amount of their bids. Please enclose payment with your bid.

• All the bid envelopes will be collected and the highest bid will be identified (ties will be broken randomly).

• The highest bidder wins the two bottles of wine.

[Bucket] Here are the rules:

• To start, all bidders will be given 30 chips worth $5 each (more chips are available if necessary).

• Bidders will form a circle and a bucket will be passed from bidder to bidder.

• To stay in the auction, each bidder must place one chip in the bucket each time it comes to him or her. Bidders who decide to pass the bucket without adding a chip drop out of the auction.

• You must pay $5 for each chip that you add to the bucket, regardless of whether you win or lose.

• The auction winner is the person who puts the last chip in the bucket. This will be the only person who has added a chip every time the bucket has come around.

[Hybrid] Here are the rules:

• All participants interested in placing a bid on the two bottles of wine must first pay a $5 entry fee, which also buys you a 50-50 lottery ticket.

1. 50-50 Lottery:

• Participants pay $5 to bid in the auction and are given one lottery ticket.

• At the end of the auction, one lottery winner will be selected at random.

• The lottery winner's cash prize is 50% of the lottery proceeds (and the rest goes to this Rotary chapter).

2. Wine Auction:

• All bidders will be given bidder numbers.

• The auctioneer will start the auction by announcing an opening bid; he will then ask for bids to increase.

• Raise your bidder number to indicate your willingness to bid on the two bottles of wine prize at the price called by the auctioneer.

• The highest bidder wins the two bottles of wine and pays his or her bid. Following the auction, the lottery cash prize and the wine will be awarded separately.

[Live] Here are the rules:

• All bidders will be given bidder numbers.

• The auctioneer will start the auction by announcing an opening bid; he will then ask for bids to increase.

• Raise your bidder number to indicate your willingness to bid on the two bottles of wine at the price called by the auctioneer.

• The highest bidder wins the two bottles of wine and pays his or her bid.

[Raffle] Here are the rules:

• Each participant will be allowed to privately purchase as many raffle tickets as he or she wants.

• Each raffle ticket costs $5.

• After each participant has had a chance to buy as many tickets as he or she wants, the winning ticket for the two bottles of wine will be selected randomly.

We accept cash, check or credit card. Thank you for supporting this chapter of Rotary!

9.4 Post-experimental survey instrument

Because of time constraints, the survey distributed after the experiment was brief. It asked:

- Imagine that instead of purchasing it at our fundraiser, the two bottles of wine were instead available for sale at your local wine dealer, what is the most you would be willing to pay for these two bottles together [numeric answer]?

- How familiar are you with the format (i.e., the rules) of the fundraiser used today [Likert response]?

- How fair do you think the format used today was [Likert response]?
- Given the opportunity, how likely are you to participate in a fundraiser with this format again [Likert response]?
- Once you had read through the rules, to what extent did the fact that all the proceeds from the auction will be donated to this local chapter of Rotary affect your decision to participate or not in the fundraiser [Likert response]?
- If you chose to participate, to what extent did the fact that all the proceeds from the auction will be donated to this local chapter of Rotary affect how much you chose to bid or spend in the fundraiser [Likert response]?

9.5 Complete regression tables

Table 2A: Participation Differences (complete results)

	(2)		(4)		(5)	
All-pay (I)	0.010	(0.043)	-0.005	(0.033)	0.079*	(0.043)
Bucket (I)	-0.020	(0.052)	0.050	(0.039)	0.131***	(0.046)
Hybrid (I)	0.115***	(0.043)	0.076***	(0.037)	0.052	(0.051)
Raffle (I)	0.131**	(0.041)	0.105***	(0.030)	0.188***	(0.041)
Event Attendance	-0.024***	(0.006)	-0.008***	(0.002)	-0.008***	(0.003)
α Proxy			0.154***	(0.009)	0.170***	(0.008)
Age	0.001	(0.003)	0.001	(0.001)	0.001	(0.001)
Female	0.001	(0.006)	0.015	(0.026)	0.016	(0.029)
College Educated	0.013**	(0.006)	0.024	(0.027)	-0.000	(0.029)
High Income	-0.005	(0.004)	0.057***	(0.020)	0.056***	(0.022)
Mean AGI	-0.001	(0.001)				
Mean UI	-0.227	(0.184)				
Mean Contribution	0.002	(0.011)				
Homeownership	-0.255	(0.165)				
Mean Travel Time	0.015***	(0.005)				
Intercept	0.771***	(0.206)	0.152*	(0.086)	0.030	(0.094)
Level of Analysis	Ses.		Ind.		Ind.	
Experimenter Fixed Effects	Yes		Yes		Yes	
Zip Code Level Controls Included	Yes		No		No	
Zero-bidders Included	Yes		Yes		No	
Observations	95		1398		1227	
Adjusted R^2	0.54		0.25		0.30	

Notes: Dependent variable is event participation rate for session-level analysis and a participation indicator for individual analysis; omitted mechanism is the Live auction; OLS; (robust standard errors); * p<0.10, ** p<0.05, *** p<0.01; demographics include mean age, number of female attendees, number of attendees with high income, number of attendees with a college degree or more education; other zip code level controls include averages of adjusted gross income, unemployment insurance, charitable contributions, homeownership rates and travel times to work.

Table 3A: Bid Differences (complete results)

	(2)		(3)		(4)	
All-pay (I)	-8.607**	(3.848)	-9.155***	(2.283)	-9.535***	(2.003)
Bucket (I)	6.690	(5.360)	6.198*	(3.674)	6.164*	(3.263)
Hybrid (I)	1.723	(5.126)	-0.665	(2.884)	0.745	(3.356)
Raffle (I)	-13.780***	(4.593)	-14.990***	(2.541)	-14.809***	(2.196)
Intercept	10.165	(26.971)	20.421*	(10.687)	1.945	(13.782)
Lambda			8.517	(20.090)	6.868	(24.609)
α Proxy					4.645***	(0.872)
Age	0.381	(0.389)	-0.017	(0.073)	-0.019	(0.0061)
Female	0.950	(0.889	1.445	(2.047)	0.964	(2.315)
College Educated	-0.342	(0.523)	-3.193	(2.406)	-3.679	(2.611)
High Income	0.073	(0.490)	5.996***	(1.660)	5.993***	(2.160)
Mean AGI	0.070	(0.050)				
Mean UI	-15.051	(23.733)				
Mean Contribution	-1.673*	(0.874)				
Homeownership	4.729	(0.532)				
Mean Travel Time	-0.180	(0.005)				
Level of Analysis	Ses.		Ind.		Ind.	
Experimenter Fixed Effects	Yes		Yes		Yes	
Zip Code Level Controls Included	Yes		No		No	
Observations	95		1535		1469	
Adjusted R^2 or Rho	0.27		0.29		0.24	

Notes: Dependent variable is mean bid for session-level and bid for individual-level analyses; the omitted mechanism is the Live auction; OLS or Heckman with instruments of having cash on hand and a willingness to participate in a follow-up survey; (robust or bootstrap standard errors); * p<0.10, ** p<0.05, *** p<0.01; demographics include mean age, number of female bidders, bidders with high income and bidders with a college degree or more education; zip code level controls include averages of adjusted gross income, unemployment insurance, charitable contributions, homeownership rates and work travel times.

Table 4A: Revenue Differences (complete results)

	(2)		(3)	
All-pay (I)	164.519***	(32.027)	168.854***	(33.594)
Bucket (I)	333.863***	(76.732)	345.748***	(82.726)
Hybrid (I)	57.518**	(26.787)	55.608*	(30.928)
Raffle (I)	130.436***	(34.481)	104.415***	(38.610)
Active Bidders (#)$^{\alpha}$			11.943	(14.385)
Intercept	4.902	(329.920)	-90.018	(382.508)
Age	2.191	(3.459)	1.298	(3.853)
Female	12.413	(11.846)	12.512	(11.810)
College Educated	-10.863	(10.548)	-9.890	(9.753)
High Income	19.845	(14.981)	16.588	(12.710)
Mean AGI	-0.007	(0.555)	0.202	(0.689)
Mean UI	-408.421*	(222.402)	-242.468	(375.242)
Mean Contribution	2.876	(7.297)	0.853	(8.103)
Homeownership	120.091	(179.263)	201.172	(239.728)
Mean Travel Time	-0.165	(4.985)	-4.055	(8.430)
Experimenter Fixed Effects	Yes		Yes	
Participant Demographics Included	Yes		Yes	
Zip Code Level Controls Included	Yes		Yes	
Observations	95		95	
Adjusted R^2	0.45		0.48	

Notes: Dependent variable is auction revenue; the omitted mechanism is the Live auction; OLS; (robust standard errors); $^{\alpha}$event start time is used as an instrument for the number of active bidders; * p<0.10, ** p<0.05, *** p<0.01; demographics include mean age, number of female bidders, number of bidders with high income, number of bidders with a college degree or more education; other zip code level controls include averages of adjusted gross income, unemployment insurance, charitable contributions, homeownership rates and travel times to work.